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# Eye on the Street? Sensory Experiences in Public Places
## *Eye on the Street? Esperienze sensoriali negli spazi pubblici*

Research on the sensual experience of place is not a mainstream topic in the architectural debate; it is more common in other disciplines like landscape architecture or interior design. The curriculum sometime offers opportunities of cross-pollination between disciplines; students in architecture courses might be exposed to different theories of space more typical to other fields. This paper explore the teaching/research nexus within QUT Master of Architecture research stream; the focus of the discussion is students' experimentation with people's experience and navigation of the public space. Theories of placemaking in relation to urban design are first introduced; then the teaching/research nexus is discussed; finally students' experience in approaching phenomenological research within the Master of Architecture are presented.

*Le ricerche sull'esperienza fenomenologica non sono argomento centrale nel corrente dibattito architettonico; il ruolo dei sensi é in genere discusso piú in termini di paesaggio od interni. L'offerta formativa nelle scuole di architettura in alcuni casi offre esplorazioni oltre i tradizionali limiti disciplinari, gli studenti possono entrare in contatto con le differenti declinazioni del concetto di luogo. Questa ricerca discute il nesso tra ricerca ed insegnamento nel contesto della Queensland University of Technology, con particolare attenzione al Master in Architettura. Gli studenti sperimentano differenti approcci alla navigazione dello spazio urbano valutando il ruolo dell'esperienza sensoriale nell'informare l'attivitá mondana. L'intervento presenta il contesto teorico per poi introdurre alcuni esempi di ricerca condotti da laureandi.*

**Keywords***:* phenomenology; teaching-research nexus; architecture; urban design

**Parole chiave**: fenomenologia; nesso ricerca-istruzione; architettura; disegno urbano

## INTRODUCTION

In few cities of the world is possible to walk a main street and encounter side by side artefacts produced by some of the masters of the contemporary architecture; Isozaki, Moneo and Gehry are just some of the awards winning architects who have been working on Grand Avenue in Los Angeles, but this urban space is not the first image people think of when someone speaks of the Californian metropolis (Gebhard & Winter, 2003). Los Angeles is often associated with its beaches or the Hollywood sign; more mundane spaces would be familiar to residents, but quite obscure for actual or virtual visitors (Banham, 2000). This is just an example of a city renowned for its lifestyle, for its role in the global economy or politics that in first instance hardly can be correlated to one of its urban spaces. In many cases we associate cities with clear images of their environment or with some specific iconic elements; often the way towns are advertised, branded and commercialised is based on the promotion of specific visual cues (Koolhaas, 2007).

The way we understand a city is connected to our experience of the urban environment, but the visual component of this experience is generally intended as the main one (Cullen, 1971; Lynch, 1984). We associate cities with images we have experienced in first person or through the filtered interpretation provided by media (Reijnders, 2010). In some cases we recognise iconic architectures, in other instances renowned public spaces. In the competition to reclaim an identity, to celebrate the uniqueness of a locale, architecture and urban design have been applied, often in a bold way, to promote civic values or, better, ambitions (Brook & Dunn, 2011); temples, palaces and more recently museums or complex urban renewal development as well as new suburbs have been designed to project on the city intended values through a defined visual journey (Cullen, 1971; Venturi, Scott Brown, & Izenour, 1977). The conceived image (Lefebvre & Nicholson-Smith, 1991) of the urban environment often aims to change the perception of a locale presenting a town as a unique setting characterised by unique architecture, but people often live the built environment following patterns informed by not so obvious or eye-catching features (Alexander, Ishikawa, & Silverstein, 1977; de Certeau & Rendall, 1984).

The way we experience a city is multimodal and we actually engage all the senses in this activity (Cowan & Steward, 2007); sight, hearing, touch, taste and smell, but also the less commonly discussed balance, vestibular or kinaesthetic senses as well as thermoception or chronoception all contribute to our understanding of a space through our interaction with a locale (Light, 2005; Zardini et al., 2005). We might directly associate a town with one of its iconic architectures, but often memories of places are activated by a smell, a taste or even a more general feeling (McConville & Finch, 1999). The complexity of the sensory experience of space and the notion of place are broadly discussed in literature, but often in fields other than architecture; psychology, social sciences, but also landscape architecture or interior design generally deal with the environmental experience of a space beyond the simple visual appeal (Taylor, 2009).

The visual approach to architecture, focussed on the imageability of a location (Lynch, 1960), is so common and accepted that is clearly reflected in the way new architects are trained (aaca, 2009). Placemaking is generally an important component of the curriculum, but an in depth exploration of a sensory experience of space is often not fully explored. The traditional approach to teach architecture through a studio environment is quite consolidated (Ledewitz, 1985); research is generally recognised as a fundamental component of this learning experience, but also in this case visual qualities are the ones generally experimented more in details (Al-Qawasmi, 2006). Students might be asked to investigate different approaches to design, new technologies and even ethical issues in a guided environment were the output of the learners' activity is intended to be just for academic purposes (Bennett, Wright, & Blom, 2010). The teaching-research nexus is instead a pedagogical approach that recognises the possible synergies between the training of new professional and the contextual production of new knowledge (Mick Healey, 2005). This process is also extensively elaborated in literature, but often in scientific context (Kieser & Herbison, 2001).

This paper discusses two propositions; on one side a sensual experience of space for the production of place, on the other the teaching-research nexus as an opportunity to advance our understanding of people's experience of the urban environment and, at the same time, train reflective practitioners. After discussing the literature and debate about this two central topics, the research uses the experience in the Master of Architecture at the Queensland University of Technology (QUT) as a case study to discuss the synergy between constructivist pedagogy and sensual design, to introduce some examples of students' research that, with different level of complexity, address placemaking and urban navigation.

## A SENSUAL APPROACH TO PLACE

The notion of place is common in different cultures and societies (Arefi, 2004); at intuitive level this concept is easy to understand, but explaining its true nature has been topic debated in philosophy, sociology and architecture (Casey, 2001). Whist is possible to define a space on the base of its articulation, design and typology because it is a physical and objective element (Krier, 2003); place usually is understood as concurrency of three phenomenon (Cresswell, 2004). Relph (1976) speaks of physical setting, activities and meaning; Canter (1977) discusses physical attributes, actions and conceptions; Sixsmith (1986) focuses more on relationship and introduce the tri-polar model of personal, social and physical; Agnew (1987) investigates locale, location and sense of place; Augé (1995) suggests relationship, identity and history; Gustafson (2001) researches environment, self and others. What these propositions have all in common is an attempt to unravel the complexity of place recognising that clearly it has a spatial connotation; it is deeply interrelated with the physical qualities of a landscape. On the other two levels there is no general consensus; culture and society are understood as central elements, providing codes to interpret spatial signifiers and mundane elements (Eco, 1986). In contraposition to the societal approach to place, philosophers often discuss personal experience (Norberg-Schulz, 1979). The identity of a space would be only in part due to its objective features or indented symbols; the everyday experience of a locale is suggested as a central element in creating attachment and meaning (de Certeau & Rendall, 1984). Lefebvre (1991) has summarised these ideas in his triad of conceived, perceived and lived space, specifying how intentions, desires and experiences are closely interwoven in our way to relate to the built environment. Lacan, discussing the development of our psyche, also uses a triad based on imaginary, symbolic, real (Bailly, 2009); this model, built on Saussare's semiotic paradigm (Bouissac, 2010), has assonance with Lefebvre's proposition. Symbolic and Conceived are the projection of a concept from the subject, in the case of architecture these would be the intended design. Imaginary and Perceived are the interpretation of a phenomenon, filtered by culture and social settings; these would be the way people relate to architecture, navigate and understand the built space. Lived and Real are the actual interaction with an object, the bodily experience of space that might follow sometime not evident patterns. Creswell (2004) also articulate his theory around a descriptive approach to place (Landscape); a social constructionist approach (Culture) and a phenomenological approach (Body). To represent the interrelation between the three elements Lacan uses Borromean rings (Bailly, 2009), a topological geometric figure that requires the contextual presence of all three elements to create and maintain the connection between them. Translating this concept to place, it is evident that is not possible to define this phenomenological experience of space without the concurrency of a physical setting, a meta-physical interpretation and a conceptual projection (Leach, 2002).

The relationship between the three different components is not static, but depends on a series of internal and external variables (Duff, 2010). Whilst the conceived environment can be designed to fulfil a function or to answer a contingent need, the way people relate to it is influenced by their personal history and background as well as by the actual activity they are engaged in (Casey, 2001). Navigating the space with different modes, for example, provides a different phenomenological experience; walking, riding a bicycle or driving alongside the same pathway would provide a different experience to the users and especially a different understanding of place (Guaralda, 2006). More informal and unstructured is the activity, more directly is possible relating to space and engage with it. Walking usually follows general patterns or paths, but the way the journey is structured is flexible in term of pace, rhythm, directions or interaction (Gehl, 1987). Pedestrians can use the built environment in an unstructured way, stop, correct their movement and especially engage with space and its occupants in a casual way. When vessels are utilized, the interactions with space become more structured affecting the experience of place; just riding a bicycle requires a minimum speed and directions that are less fluid or fragmented. Whilst pedestrians can live the city in an organic way, bicycle start requiring more defined routes, straight paths and devices to separate and protect different traffic modes (Guaralda, 2006). These simple examples illustrate how a locale can be lived in different ways; the physical activity influences the perception of the environment and ultimately its design (Rawlinson & Guaralda, 2012). The metaphysical interaction with a site is mediated through the senses; the use of different vessels directly relates to our kinaesthetic sense and also structure the visual journey in a landscape at different paces (Zukin, 2010). Recurrent sounds inform our everyday interaction with the built environment linking spatial experience to the temporal one; in

Europe, for example, bells traditionally pace the activity during the day; birds, traffic or even people's everyday activity can provide clues to signify a particular moment in time as well as a defined location in space (Karp, Stone, & Yoels, 1991). Smell is often less obvious, but our body immediately record something that is not part of our daily routine. Even more than a sound or an image, an odour is able to trigger memories, recollect past experiences and distract or direct the activity in a space (McConville & Finch, 1999). Taste, touch, chronoception or thermoception are often less obvious, but they all capture particular characteristics of a space and alter our perception of the built environment (Guaralda & Kowalik, 2012; Zukin, 2010). Comfort or discomfort in a site influence the way we explore a location and interact with others (Hall, 1990). People are a main factor that guides our use of space; social norms and unwritten rules influence our behaviours as well as our bodily experience of space (Jacobs, 1961).

Conceived, perceived and lived places are interwoven; the everyday experience of a space allows people to develop a meaning for a site that can be or not in line with the intention of the designers making evident how spatial organisation is much more than a visual experience. Different activities, different personal stories filter the built form producing a sense of place only when users can directly relate to a context. The architectural debate traditionally focuses on visual qualities, more in general on styles and the production of iconic elements (Koolhaas, 2007); the engagement of different senses is explored only in limited cases and often in a not explicit way (Zardini, et al., 2005).

## TEACHING-RESEARCH NEXUS

Architecture and more in general the built environment are often planned in terms of functional performances or visual qualities (Allan, 2012); the research on a sensual approach to design is a developing sector; this paradigm is explored and commonly applied in different disciplines, like landscape architecture or interior designs (Eyles, 2008). The investigation about phenomenology, or more in general research in different fields, is generally seen as an isolated activity respect the development of the curriculum, but the discussion on existence and relevance of a nexus between research and teaching-learning activities dates back at least to the 18th century when Von Humboldt introduced the research-based university model (Robertson, 2007). Since then this link has been debated often including the more general role of higher education institutions (Simons & Elen, 2007). On one hand there are supporters of 'teaching only' universities based on the transmission of knowledge produced in more professional settings (R. Neumann, 1996); on the other, proponents of 'research intensive' departments where mentoring new minds is a secondary activity (Jenkins, Breen, Lindsay, & Brew, 2002). The nexus has been discussed from an ontological point of view debating its actual existence and relevance (Hattie & Marsh, 1996); its implications (Brew, 2003) and its dynamics (Ruth Neumann, 1992).

The incompatibility between teaching and research is often presented in terms of competition for the researchers' resources. In research-intensive universities for example, an unbalanced teaching work-load is often discussed as one of the cause for slow progression in the production of new knowledge (Gottlieb & Keith, 1997). Other theories support the idea that the nexus achievement depends on the capabilities of staff in negotiating the synergy between the two (Couper & Stoakes, 2011), as well as on time management. Literature suggests leaving the calendar semesters for lecturing and the breaks to produce new knowledge (Parker, Gregory, & Chambers, 2006); some academics recognise that the boundary between the two activities can sometimes be uncertain, suggesting that they are just two sides of the same process (Zamorski, 2002). There is also an assumption that, when there are high standards in research, good performance in teaching is a logical expectation (Carney, 1998). Meanwhile, it is generally recognised that academics are more likely to find satisfaction in research, which provides recognition and funding, than in teaching, which can prove demanding and time consuming (Edwards, O'Shea, Cretchley, & Narayan). Neumann (Ruth Neumann, 1992) discusses the link more in terms of its dynamics; she introduces the concepts of tangible nexus, based on the active transmission of knowledge, and intangible nexus, promoting subtle critical skills to approach learning.

The nexus is more complex than what generally assumed; different disciplines have different traditions and understanding of what actually research is (Barnett, 1992). Subject based variations require a different approach to the relationship of teaching and research (Griffiths, 2004). In the arts,

| Zamorski (2002) | Healey (2005) | Griffiths (2004) |
|---|---|---|
| *Gaining knowledge from recent research through taught courses and units* | *Bringing data and findings from staff research into the curriculum* | *Research-led curriculum; in the sense that the syllabus is structured around subject content, and the content selected is directly based on the specialist research interests of teaching staff* |
| *Understanding more fully the complex and provisional relationships between research and knowledge* | *Developing students' appreciation of research in the discipline* | *Research-oriented curriculum; in the sense that the syllabus places emphasis as much on understanding the processes by which knowledge is produced in the field as on learning the codified knowledge that has been achieved* |
| *The gradual development of various research skills during the passage of an undergraduate course* | *Developing student's research skills (explicitly, in addition to other disciplinary and generic skills)* | |
| *Learning about research methods and skills on specialised units, such as a research methodology course or unit* | | |
| *Engaging in research activity or a research project as an integral part of a course or unit* | *Using assignments that involve elements of research processes (e.g. Literature review, bidding for grants, drafting bids or project outlines, analysing existing project data, presenting at a conference)* | *Research-based curriculum; in the sense that the syllabus is largely designed around inquiry-based activities, rather than on the acquisition of subject content* |
| | *Using teaching and learning processes that simulate research processes (e.g. Project-based modules, dissertation modules, problem based learning)* | |
| | *Giving students the opportunity to work on research projects alongside staff (e.g. As a research assistant)* | *Research-informed curriculum in the sense that the syllabus draws consciously on systematic inquiry into the teaching and learning process itself* |
| | *Giving students first-hand experience of commercial consultancy (e.g. as an intern, as work-based learning, as a consultant assistant or as a supervised consultant)* | |

*Table 1.* Frameworks Teaching-Research Nexus implementation, based on Zamorski (2002), Healey (2005) and Griffiths (2004).

including design, the nexus has been investigated in term of creativity (Bennett, et al., 2010). In this kind of approach professional practice assumes a leading role in the relationship between production and distribution of new knowledge (Bennett, et al., 2010). The implementation of the nexus in the curriculum has been widely discussed in recent years; literature proposes several strategies that, to some extent, overlap or simply exposes the same concepts from different perspectives. Possible frameworks for the achievement of the link are given by Zamorski (2002, p422), Healey (2005, p187) and Griffiths (2004, p722).

Generally these positions advocate an incremental level of exposure and involvement for students in the research process through the curriculum. Each different proposition has its own benefits and characteristics:

- Transfer research outcomes within the teaching (Research-led teaching)

Teachers who use their own research to inform their teaching are more engaged (Parra, Osgood, & Pappas, 2010) and up-to-date (Johnes, 2007); on the other hand, students appreciate the exposure to original academic investigations supporting a positive attitude to learning (Mick Healey, 2005). This approach is entirely teacher-centred.

- Train students in doing research (Research-oriented teaching)

The syllabus can include specific units to develop students' research skills and in the use of research methods. This approach is in line with Race's idea of a central role for students in the learning process (Race, 2007), but literature also points out how better results are achieved when lecturers are active researchers themselves (Okell & Rowe, 2009).

- Develop students' skills through inquiry-based activities (Research-based teaching)

Students active involvement in the production of new knowledge is supported as an effective way to teach research (Hattie & Marsh, 1996), as well as to inform the lecturer's own investigations (Willcoxson, Manning, Johnston, & Gething, 2011). Learners find the research-based approach appealing (Kieser & Herbison, 2001) and that it stimulates high cognitive skills (Faouzi & Hussein, 2011).

- Develop students' skills through a systematic approach (Research-informed teaching)

In this case students are not only involved in the production of new knowledge, but also in an in depth exploration of a topic of their choice (Griffiths, 2004). The exposure to real research, developed in synergy with teaching and learning activities, has been promoted indicating its benefits for students (Okell & Rowe, 2009). They not only become proficient in research, but also in the investigated topic through project base work (Guerin & Ranasinghe, 2010). Other studies suggest activation of the link through teachers' ability and attitude in implementing different teaching strategies (Boyd et al., 2010). This approach investigates how researchers can benefit from the link and inform their investigations through both a tangible and an intangible nexus. Boyd et al. (2010) have defined 5 possible approaches.

| Approach | Strategy |
|---|---|
| *Learning through research* | The teacher includes Research Based Intended Learning Outcomes to develop students' critical thinking |
| *Research-led teaching* | The teacher informs the curriculum contents from his own research and its own research from students' feedback |
| *Researching teaching* | The teacher focuses on his teaching as reflective practitioner |
| *Teaching informed research* | The teacher realigns the research to the teaching activity |
| *Learning how to do research* | The teacher learns to research through the teaching activity |

*Table 2.* Teaching strategies to Implement the Nexus, based on Boyd et al. (2010)

In this case the framework is focussed on what teachers do and how the nexus could also be achieved outside the curriculum; instead of aligning teaching with research, a possible option is revising research directions to reflect the actual teaching (Boyd, et al., 2010). Lecturers, refocussing their investigations, could benefit from the nexus in terms of time management and research outcomes (Bennett, et al., 2010); on the other hand a teacher working in the field to be taught benefits students (M. Healey, Jordan, Pell, & Short, 2010).

There are possible issues in the nexus activation; one example is the misunderstanding of its actual intent. For staff, the synergy is intended in generating new knowledge, for students in gaining

a deeper understanding (Buckley, 2011). The involvement of learners is another central issue. In some cases students are treated as cheap labour and are therefore not fully engaged in achieving ownership of their research contribution (Buckley, 2011); learners also have the impression that they are not a priority for the lecturers, who may not be available to discuss their issues as often as required (M. Healey, et al., 2010). In some fields, students could also argue the real need of acquiring research skills and how these would make them more employable (Okell & Rowe, 2009), this is in some instances the case of architecture (aaca, 2009). Different research traditions and methodologies applied in different disciplines can also drive the assumption that investigations are not of equal complexity or value (Zamorski, 2002); this issue is particularly relevant in the case of units common to more than one curricula or where different topics are being investigated by students in the same course (Simons & Elen, 2007).

In order to activate the nexus in the curriculum it is necessary to consider the discipline specific approach to research (Griffiths, 2004); to provide a central role for the student (Ruth Neumann, 1992). Intended Learning Outcomes (ILOs) should be generic to allow customization and flexibility in the learners' approach to research (Johnes, 2007), which depends not only on the discipline investigated, but also on the specific topic.

| | **DAN110 Architectural Theory and Research 01** | **DAN220 Architectural Theory and Research 02** |
|---|---|---|
| Intended Learning Outcomes | 1. Present research findings in a range of outputs at an academic level<br>2. Identify emerging questions in the field of design through a rigorous critical process<br>3. Summarise different theories and ideas collecting information from a variety of sources<br>4. Demonstrate an understanding of research theories, methods and procedures<br>5. Discuss theoretical positions through a rigorous research process | 1. Conduct and evaluate research related to a specific topic<br>2. Demonstrate techniques applicable to an empirical and/or theoretical investigation<br>3. Demonstrate an ability to effectively gather and analyse data<br>4. Present research findings in a range of outputs at an academic level<br>5. Critique and discuss research outcomes and architectural theory |
| Assessment Items | 1. Report<br>2. Portfolio<br>3. Project (research) | 1. Peer Review<br>2. Journal article<br>3. Conference |
| Activity organised by unit coordinator | Workshops on the development of assignments.<br>Lectures on specific research methodologies through case studies of local and international researches. | Workshops on the development of assignments.<br>Lectures on the development of research and presentation skills. |
| Activities organised by supervisor | Mentoring on a weekly or fortnightly base. | Mentoring on a weekly or fortnightly base. |
| Activities proposed to students | Quasi research activities such as literature review, research proposal, preliminary data collection. | Research activities such as developing a proper methodology, collect, organise and analyse date; present research outcomes. |

*Table 3.* DAN110-DAN220 units Synopsis

## THE RESEARCH STREAM IN THE MASTER OF ARCHITECTURE AT QUT

The training of new architects is generally based on a 5-year-syllabus (aaca, n.d.); the studio is traditionally the environment where to summarize different types of knowledge and experiment with design. The experimentation is often in terms of program or form; research in other fields is usually constrained by time and availability of resources (Ledewitz, 1985). In the Australian context new graduates are required to have an understanding of research (aaca, 2009), but the way this requirement is implemented varies in different institutions. The Queensland University of Technology is the only academy that offers a 4-year-bachelor and a 1-year-master; the latter includes a specific research stream of two units, DAN110-DAN220 Architectural Theory and Research 01-02 (table 3).

DAN110 is based on Research-oriented teaching, training students through a series of quasi-research exercises in acquiring investigation skills they will apply in the second part of the curriculum. DAN220 is Research-based and learners have to produce original knowledge, developing their own methodology, collecting and analysing data. In some cases supervisors involve students in their own research, activating the nexus with a Research-informed approach aimed at consultancy and/or professional outcomes. The nexus activation in the curriculum reflects several of the strategies indicated in literature; the two units are organized through a close collaboration between students and staff actively engaged in research. This synergy is seen by academics as research-led teaching, where students can actually provide data and information for supervisors' own work; the units are also seen as a way to effectively manage staff's time producing research outcomes during the teaching semesters. Some supervisors adopt a Teaching Informed Research approach, adjusting their actual investigation to the directions suggested by students; other staff member focus more on Researching Teaching, adopting a blended approach where students critically reflect on their activity. From the learners' perspective, the curriculum is a chance to gain skills useful in professional environment as well as developing an expertise in the investigated topic, which also could be included in their resume. The project base work is usually engaging for both teachers and students. The nature of the nexus in these units is tangible because the production and transmission of new knowledge is clearly stated in the objectives; the more general benefits are intangible, with students' proficiency developing beyond the simple acquisition of research skills and expanding into expertise in a chosen field.

Although the units generally produce good outcomes in the form of journal papers, and a high level of students' satisfaction, data collected through interviews and QUT structured feedback process (Queensland University of Technology, 2011) revealed in some instances mentors and mentees have a different understanding of their relationship, aims and expectations. The data collected about the research stream in QUT Master of Architecture confirms several of the positions, strategies and issues presented in the literature. It is evident that the supervisors' approach and attitude is a central element in activating the nexus as well as providing a good learning experience for students or conversely generating conflict. The activation of the nexus between teaching and research is a complex topic which does not allow a simple transposition in the curriculum; literature exposes not only different interpretation of the link, but also several possible strategies to achieve it even in the same discipline. The case study has confirmed how a generic approach does not suit research's ambitions as well as students' engagement; every student has a different attitude to learning as well as every supervisor has to research. The challenge in achieving the nexus is in the negotiation between mentor's attitude to the production of new knowledge and mentee's engagement.

From the point of view of what students do, there is evidence that to achieve good learning outcomes, mentees have to be actively engaged in research activities with a clear organisational framework (Hughes, 2005); possible tasks indicated are real word scenarios, such as conferences of journal publications, as well as literature reviews, data collection and critical evaluation (Jenkins, et al., 2002). These ATs could activate the nexus both in a tangible or intangible way, but this depends on lecturer's attitude. From the point of view of what the research does, it seems that the most effective strategy could be framing research activities outside the syllabus to be aligned with teaching (Mick Healey, 2005). This approach suggests an effective management of resources and also possible interesting outcomes from the dialogue with students. Learners can be a resource in order to test methodologies, evaluate propositions and discuss findings and not just to collect data (Griffiths, 2004).

## TEACHING-RESEARCH NEXUS AND SENSORY EXPERIENCE

In the last 5 years the teaching-research nexus has been explored within QUT Master of Architecture proposing learners to investigate a sensual approach to design, as one of the possible options in the research stream. A general phenomenological framework has been provided to students in terms of basic literature of reference and methodology; every research has then evolved negotiating the interests of the specific students with the ones of the supervisor. In some instances the work produced has investigated more in detail the role of the activities in defying the sense of place, for example walkability in subtropical environment. Other students have discussed more the conceived space through the provision of greenery, use of colour or materials. Although the different papers produced have a specific focus, they align with the supervisor's broader research providing not only original data, but also a critical approach to the complex field of placemaking. The possibility to identify a specific topic within a defined framework has been well received by learners, as evident from the teaching data collected. Students' work, on the other hand, has provided the supervisor with pilot projects, preliminary information and usually interesting literature reviews to further structure and advance their own research. The new knowledge produced within the Master of Architecture has also been reintroduced in the curriculum through other undergraduate units, mainly addressing urban morphology or phenomenology.

The papers presented in the following section illustrate how different students, with different attitudes and background, have been engaged in discussing a sensual approach to design; they have achieved different degree of complexity and success in their researches. Starting from a review of current literature, case studies have been individuated to apply a methodological framework developed in close collaboration with their supervisor; primary and secondary data have been collected and analysed often with an original approach. In some cases conclusions are quite obvious; in other they open possible avenues for further postgraduate research. The exploration of a sensual approach to design has offered students an opportunity to widen their horizons and go beyond the traditional visual approach to the planning of the built environment; the engagement in actual research has provided them an awareness of the import role phenomenology has in structuring our sense of place and developing conceived spaces.

# Improving the Walkability of Subtropical Urban Areas.

## A case study analysis for the development of a design process

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*ABSTRACT: This research develops a new framework to be used as a tool for analysing and designing walkable communities. The literature review recognises the work of other researchers combining their findings with the theory of activity nodes and considers how a framework may be used on a more global basis. The methodology develops a set of criteria through the analysis of noted successful case studies and this is then tested against an area with very low walking rates in Brisbane, Australia. Results of the study suggest that as well as the accepted criteria of connectivity, accessibility, safety, security, and path quality further criteria in the form or planning hierarchy, activity nodes and climate mitigation could be added to allow the framework to cover a broader context. Of particular note is the development of the nodal approach, which allows simple and effective analysis of existing conditions, and may also prove effective as a tool for planning and design of walkable communities.*

*Keywords: walkability; activity nodes; pedestrian priority; climate mitigation*

### INTRODUCTION

This research has investigated the low walking rates in Brisbane, Australia that may contribute to decreased health, social and economic outcomes; and through the analysis of case studies it provides a framework for improving walkability and its related benefits.

Many cities that grew rapidly through the 20th century have low walking rates in comparison to developed cities in other parts of the world such as Europe and South East Asia. Brisbane averages 0.5 walking trips per person per day compared with 0.8 in European cities and 0.6 in affluent Asian cities (Burke and Brown 2007).

Modern cities like Brisbane are characterised by a higher dependence on motorised transport. This creates a car-centric cityscape where the ground plane is disconnected, resulting in decreased social and economic outcomes. This disengagement of large parts of the ground plane means fewer walking trips for everyday activities are inevitable. Lower walking rates have a detrimental effect on the health of a population (National Heart Foundation of Australia 2009).

Planning in car-focussed cities is exactly that – car focussed. This relegates pedestrian flow and access to an afterthought. Pedestrian measures are therefore tacked on rather than integrated. The zoning or grouping of certain activities together means complementary activity nodes are often widespread and beyond walkable distances. A node is any place where activities occur - this could be as simple as a residence or the local shop. The relationship between activity nodes is fundamental to the need for movement within a city (Salingaros 2003).

The purpose of this research was to develop a framework to be used as an analysis and design tool. The application of such a framework has the potential to improve the walkability of subtropical urban areas. This will have further benefits of improving the health of a population; reducing congestion on the roads; and improving social and economic activity on the ground plane.

### LITERATURE REVIEW

#### What happened to the walkable city?

- Prior to industrialisation the only means of transport for most citizens was to walk. Cities were thus reflected by their human scale. All human activity was designed into a space that could be easily

reached on foot. Improved technology allowed the city to expand first via rail and then further as the automobile became common place. Marchetti (1994) noticed a phenomenon occurring; the city had expanded in distance travelled but had remained the same in time travelled. Big cities around the world on average are one-hour wide (Marchetti 1994).

Cities expanded from 5-8 kilometres wide in medieval times to 50 kilometres wide during the 20th century (Newman 2004). Time travelled is an important factor here as studies cast doubt on the contention that investment in road infrastructure saves time. It appears that on a whole people invest travel time saved by travelling longer distances therefore increasing sprawl (Metz 2008).

Pre-modernist cities were fractal in nature – incrementally enlarged at the human scale (Salingaros 2003). 20th century cities have been planned with cars at the top of the hierarchy reducing the smaller connections that generated walking trips (see figure 1).

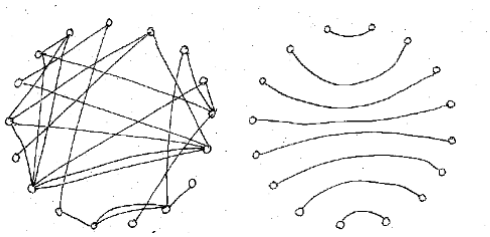


*Figure 1. Abstraction of the multiple connected walkable city on the left and poorly connected car city on the right.* (Salingaros 2003)

Salingaros (1998, 2003) introduced the idea that the attraction between nodes is fundamental to creating movement. Clustering nodes of different activities creates many connections. But separating nodes and grouping like nodes together creates fewer pathways.

**Why Walk?**

Walkable communities are the basis of the sustainable city and without it meaningful resource conservation may not be possible (Southworth 2007). Walking not only reduces congestion, but also has low environmental impact, conserving energy without air and noise pollution. It can serve a utilitarian purpose as in walking to work, to school or to the shops; and can have both social and recreational value. Gehl (1987, 79) suggests, "Slow traffic means lively cities". Walking is also a socially equitable mode of transport that is available to a majority of the population, across classes, including children and seniors (Southworth 2007).

Walking also has many health benefits. The National Heart Foundation of Australia (2009) points out that walking reduces the risks of cardiovascular and other chronic diseases. It also improves the mental state and is capable of reducing obesity levels within a population (Southworth 2007).

Perhaps one of most telling reasons for focussing on walking is that it can be targeted at a mass population. Results from many studies done on cities and neighbourhoods with favourable environmental factors indicate significant changes in the levels of walking across the population (Humpel et al 2004; Krizek 2003; Frank & Pivo 1994; Newman & Kenworthy 2006; Parenti 2007). This would suggest that influencing the environment to promote walking would have a profound effect on the health of a population.

**Walking for transport or walking for recreation**

We can divide walking into two categories; it can be utilitarian; or it can be recreational. Walking for transport is all those trips that are associated with reaching a destination for further activity. This could be any part of a trip to get to work or school or shopping or just meeting friends. The walking component can be the whole trip; or combined with another mode of transport. Recreational walking on the other hand is where the act of walking is the principle activity (National Heart Foundation of Australia 2009).

**Criteria for a Walkable City**

> *Walkability might be defined as the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network.*
>
> (Southworth 2007, 5)

Southworth (2007) suggested criteria for planning a walkable community that was based on the "experiential quality of the city". These points are summarised below.

1. Path Connectivity - needs to be well connected without gaps or barriers both within the neighbourhood and in the larger urban setting.
2. Linkage with other modes – uninterrupted connections with public transport
3. Fine grained land-use patterns – an accessible pattern of activities to meet daily needs
4. Safety – safe from traffic hazards and crime
5. Path quality - well designed in terms of width, paving, landscaping, signing, and lighting.
6. Path context - path network must engage the user. A safe, continuous path network in a monotonous physical setting will not invite pedestrians

Research by Giulia Dell'Asin (2010) categorises pedestrian needs into five basic requirements: connectivity; conspicuity; comfort; convenience and conviviality. Although this list differs from Southworth's it covers the same basic points with perhaps the exception of path context.

Mariela Alfonzo (2005) developed a social-ecological model that considered the decision making process involved in walking. The model applies the ideas of Maslow's hierarchy of needs to walking behaviour. Maslow's theory suggested that basic physiological needs must be met before motivation can be sought for more psychological needs such as social needs and self-esteem needs (Maslow 1943). In the same vein Alfonzo (2005) has developed a hierarchal pyramid for walking motivation. Basic needs start with feasibility and progress through accessibility, safety, comfort and pleasurability.

**Large-Scale Urban Studies**

Newman and Kenworthy (2006) discovered that the tipping point between car usage and alternative transport usage is at 35 people per hectare; below this level the intensity of activity is too low and the physical restraints of time and distance mean people require their cars for activities that may have otherwise been suitable for walking.

Similarly studies by Frank and Pivo (1994) focussed on densities and mixed uses to draw a relationship between different modes of transport. They found that both density and mixed-use were factors in reducing car use and resulted in increased walking – in particular providing a good mix of uses stimulated walk trips. The results also correlated with Newman and Kenworthy's analysis suggesting that there was significant reduction in car use when density was above 20-50 people per acre. Both these studies are based on a large scale and recommend further research be conducted to understand how densities and land uses effect walking at scales of block-size and under.

Along with density the street pattern also plays a role in improving walkability. Grid patterns that allow for multiple alternative paths of travel create many more access options for pedestrians. Simple iron grids are often the best provided they have small block sizes (Hawkins 2007).

**Walking in Brisbane**

The city of Brisbane is situated in the sub-tropics. The high humidity levels perhaps play a role that restricts certain types of walking behaviour where the built environment is not suitably designed. Studies by Burke and Brown (2007) found that Brisbane residents made an average of 0.5 walking trips per day compared to 0.8 in western European cities and 0.6 in affluent Asian cities. Of most interest from this study it found that walking associated with catching public transport made up the majority of trips and that on average those people were walking for 28 minutes per day – close to the recommended daily level of 30 minutes (NHFA, n.d.). Burke and Brown (2007) suggest that there is an opportunity for public transport improvements to increase walking and thereby improve the health of an urban population.

Daniel O'Hare (2006) points out that the normally accepted mark of 400 metres for walking to a transport stop may not be as appealing as it is in a temperate city. His research also highlights the advantages of a sub-tropic climate in promoting street activity such as dining. He points out that shading techniques improve pedestrian comfort levels. Both trees and awnings break down the vastness of the volume of the street.

Burke et al (2006) research data actually rebuked the idea that Brisbane's sub-tropical climate and hilly terrain were not conducive to walking behaviour. This study found little variance in walking trip rates throughout the year irrespective of weather conditions.

Kelvin Grove Urban Village has displayed a greater percentage of walking, cycling and public transport usage compared with the rest of Brisbane and the inner northern suburbs (Muley et al 2009). Kelvin Grove Urban Village was developed in the last 10 years in the inner city area and was designed to "promote walking, cycling and public transport" (Queensland Government 2011)

**Need For an Updated Framework**

Although there is some consensus on the general attributes that are required to make an urban area walkable, it is clear from the research that the specific idiosyncrasies of different climatic and cultural areas also play a significant role in the propensity to walk. Further to this the theories of activity nodes have not been included in previous framework studies. Investigation is required to map out a more thorough set of criteria that may be applied to all cities including those in the subtropics like Brisbane. This approach recognises that frameworks already exist such as by Southworth, Alfonzo and Dell'Asin, and combines some of this theory with that of Salingaros' activity nodes. It also adds further criteria to address the climatic issues of different cities.

## METHODOLOGY

The methodology for this research project has been based around the close analysis of case studies (see figure 2). The analysis was conducted using the research question to tease out commonalities that have assisted in the promotion of walking behaviour. The research question asks, what are the qualities, characteristics and features that lead to more walkable urban communities? Most of the existing body of knowledge around walkable community making has been compiled in temperate and sub-temperate cities. This provides a useful starting point as many characteristics of walkability are common regardless of location. This research has analysed three case studies of successfully implemented programs that have improved walking and cycling opportunities.

A generic framework has been developed in order to analyse the characteristics of the case study cities. This framework carries on from the work of Southworth in 2007 and Dell'Asin in 2010 by combining the similarities of their studies, and adds further categories in Planning Hierarchy and Activity Nodes. Planning Hierarchy has been included to analyse the extent to which authorities must legislate and prioritise in order to change the collective behaviour of their constituents. It recognises the importance of planning before acting and analyses catalysts for change. Analysis of Activity Nodes creates an understanding of the relationships between different nodes and how strong attractions between nodes may lead to walking behaviour. Therefore the framework categories used were:

- Planning hierarchy
- Activity nodes
- Connectivity
- Accessibility
- Safety/security
- Path qualities

These categories were then broken down into criteria and analysed in the following way for each of the case study cities:

**Planning Hierarchy**

This category was assessed through the analysis of literature to determine the level of importance placed on walking and cycling in each city's planning system. Evidence needs to point towards a walk first approach.

**Activity Nodes/Connectivity/Accessibility**

Mapping was used to highlight the intensity and regularity of activity nodes; the potential for interaction through connectivity and accessibility; existing pathways (bike, pedestrian, shared); and evidence of an urban web.

**Safety and Security/Path Quality**

Sections and images were analysed to show surveillance, visibility of pathways and interaction/separation with the road network; path quality was also analysed using images to understand characteristics such as treatments; widths; and the relationship to local environments.

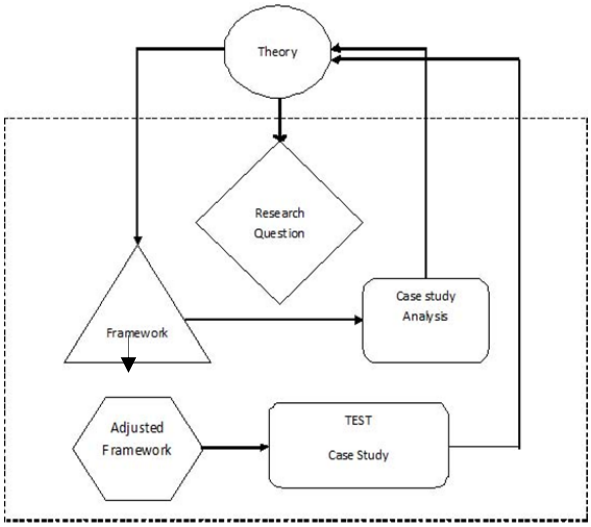


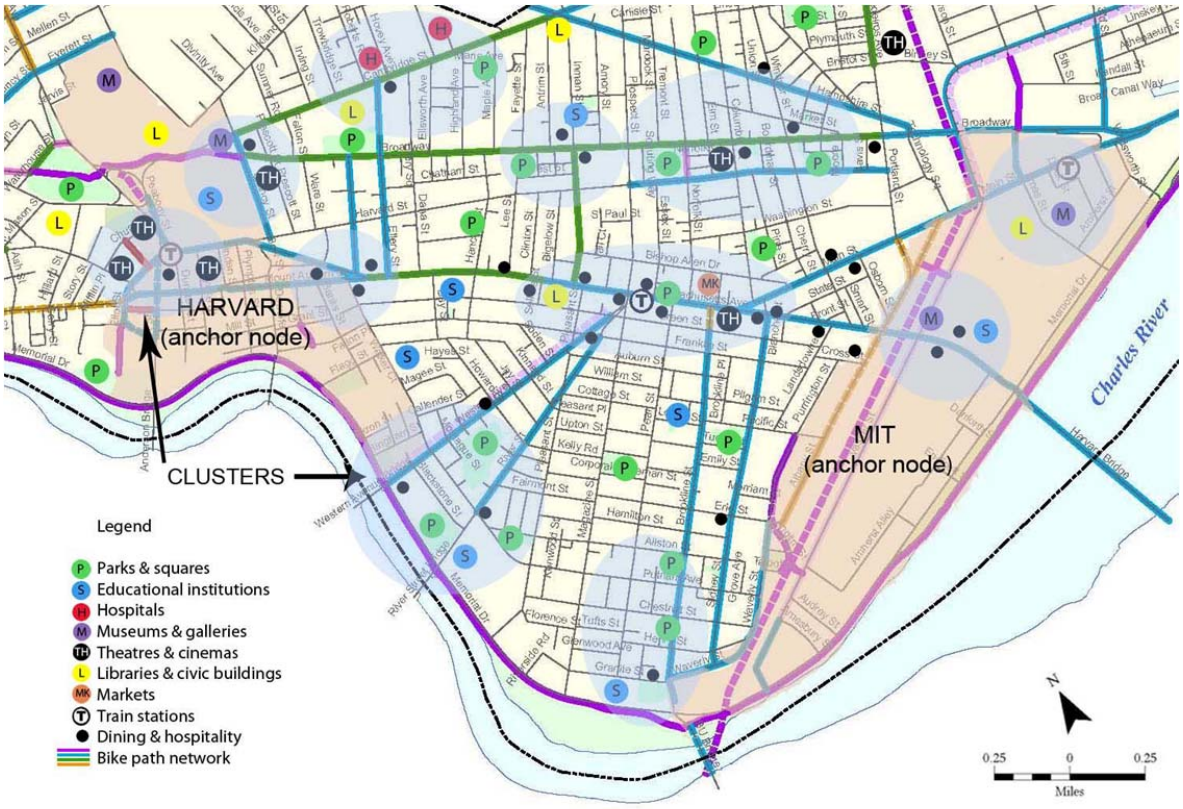

*Figure 2. Methodology chart*

The results of this case study analysis were then overlayed upon the current understanding of designing the built environment in the subtropics. The framework was adjusted to recognise variations in climatic conditions.

The final stage of this research project was to test this new framework on a selected urban area in Brisbane. The area chosen was Bowen Hills as this is an inner city area earmarked for rejuvenation.

## CASE STUDIES

The generic framework discussed in the methodology has been used to analyse the following case studies. They have been selected from the literature as interventions that have effectively improved the walkability of their host cities. This section provides an overview of each city and it is followed by the detailed analysis using the developed framework.



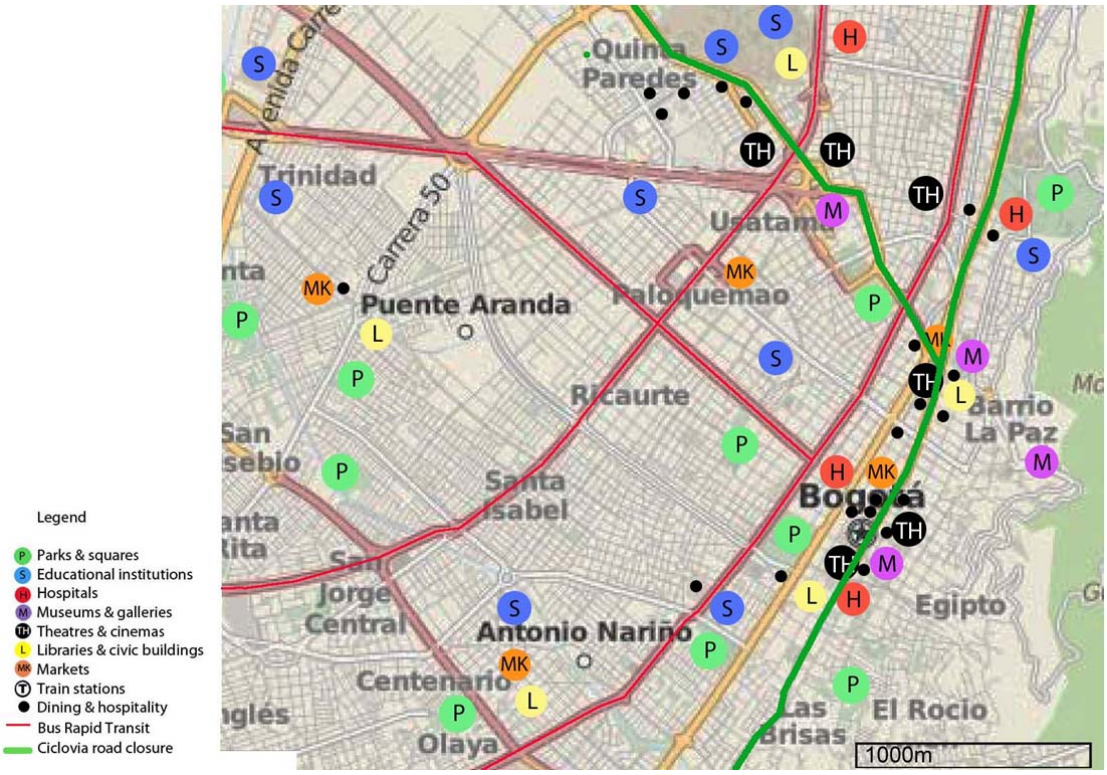

*Cambridge Map (Braben 2011)*

**Cambridge, Massachusetts**

Cambridge is possibly the most walkable city in the United States with over 24% of its citizens travelling to work on foot (Parenti 2007). The success is a result of great collaboration amongst stakeholders from policy makers to community advocates to engineers.

"This achievement started with the simple concept that a community should be designed around walking, cycling, and transit rather than the automobile" (Parenti 2007, 1). The statement backs up previous ideas about the hierarchy of planning and the case study provides evidence of how this method works in practice.

The city of Cambridge has only approximately 100,000 inhabitants but maintains a density higher than Philadelphia, Boston and Washington DC. Density explains some of the high walking habits; however cities like New York with much higher densities have much lower walking behaviour than Cambridge. Parenti (2007) argues that it is the walk first planning that sets Cambridge apart. This means that walking is safer, more comfortable and is engaged with the built environment. The road system is constructed to keep vehicle speeds very low in high pedestrian areas.

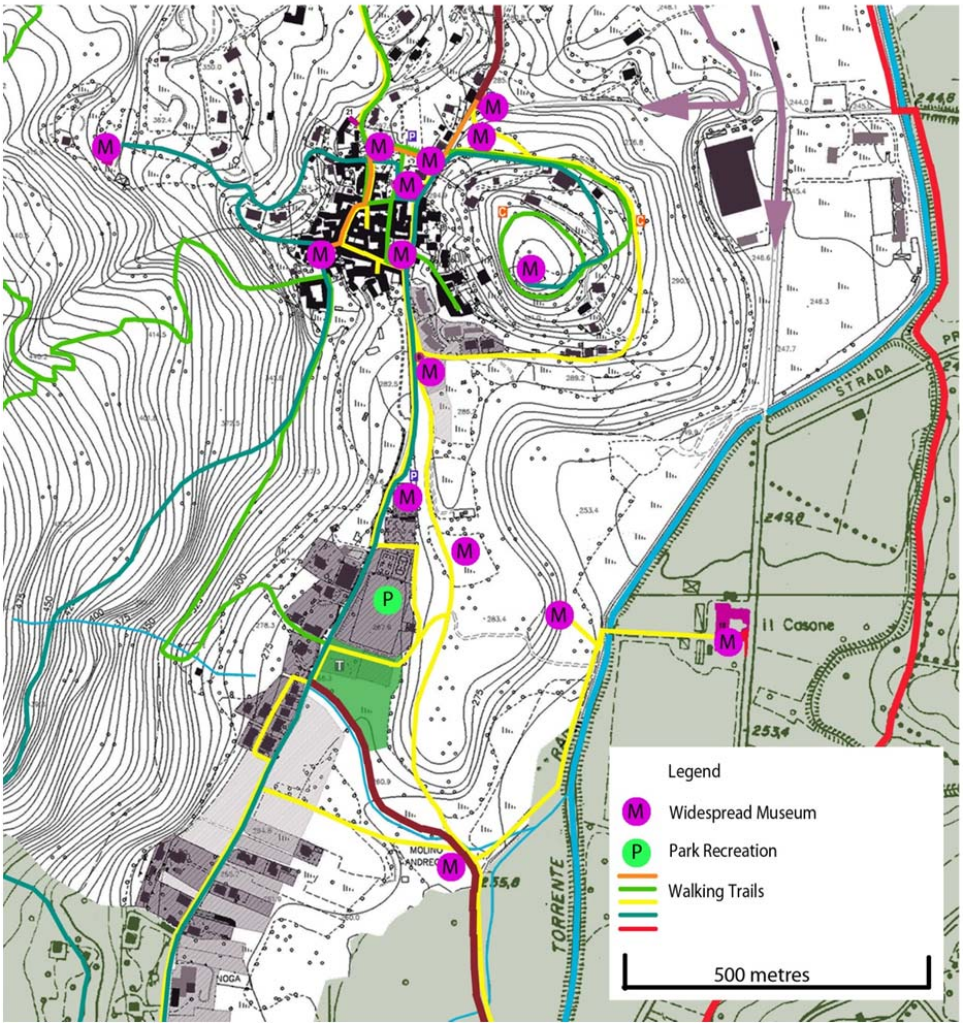



*Bogota, Colombia (Braben 2011)*

**Bogota, Colombia**

In Bogota, Cervero et al (2009) found that density and land-use mixes were not associated with increased physical activity. The mix of uses in and compact nature of Bogota existed before automobile travel became entrenched and networks of public transport were already easily accessible.

Again this suggests that whereas mixed land-uses and density play a part in creating walkable community other initiatives are required to provoke significant behavioural change. Facility design plays a significant role in encouraging physical activity in Bogota. In particular street density and a large interconnecting network of cycle paths are influential. Bogota also closes certain streets on Sundays to allow free movement of bicycles and pedestrians this is known as *Ciclovía* (cycle way).




*Cassano Valcuvia (Braben 2011)*

**Widespread Museum, Cassano Valcuvia, Italy**
This project presented by Mirko Guaralda at the 2005 Walk21 conference in Zurich finds the answers to engagement are within the existing built and natural forms. It is a matter of linking them in some meaningful way that allows the pedestrian to make the most of the experience.

> *The project "Widespread Museum" has the aim to create on one side a walkable neighbourhood, on the other to increase the sense of identity and of belonging to the community of the citizens, connecting city landmarks, residential estates, amenities and leisure places with a pedestrian network. The idea is to create a network of patterns which have to drive the people through all the memories of local rural culture, such as churches, public buildings, gardens, but also fields and woods. A Museum made of buildings and landscapes, in which people live their everyday life and in which they can find the place and the time to stop, to think, to remember, to dream.* (Guaralda 2005, 1)

All the important buildings of the town are linked by paths and more paths radiate out of the town centre to take people to new destinations – the journeys tell the historic story of the town. In this place the visitor is encouraged to leave the car outside the town and continue on foot; and the residents share their streets with slow moving traffic. The involvement of the community in the development of this idea not only manifests itself in the legacy of the physical pathways but in the "creation of a collective conscience, a sense of the community" (Guaralda 2005, 8). This personal involvement makes the path network infinitely more usable.

## RESULTS

| | Case Study Analysis | | | |
|---|---|---|---|---|
| | Design Principles | Cambridge, MA | Bogota, Colombia | Cassano Valcuvia, Italy |
| Planning Hierarchy | **VISION**<br><br>Walkable cities demonstrate an overarching vision that drives decision making in favour of walkable outcomes. | *This achievement started with the simple concept that a community should be designed around walking, cycling, and transit rather than the automobile* (Parenti 2007, 1 on Cambridge). | *We want a city with more public space for children than for motor vehicles; a high population density and relatively short travel distances; people in public spaces; autonomy and freedom of movement for the children and the elderly; very low levels of noise and air pollution; small children walking out of home to the safety of pedestrian streets; homes with nearby stores, restaurants, movies and cultural activities; abundant parks, pedestrian streets, wide sidewalks, bicycle paths.* (City vision from Bogota's masterplan) | City design plan called "Widespread Museum".<br><br>Walkability is at the heart of this plan to redefine a small village.<br><br>The objective is to reduce car usage and rediscover the rich history of the town by linking monuments along different walking trails. Trails that can be used for discovery, rediscovery or just everyday travel.<br><br>(Guaralda 2006) |
| | **COMMITMENT**<br><br>Commitments are actively made via decision making and legislation. | *Vehicle Trip Reduction Ordinance*<br><br>Passed legislation in 1992 that actively enforced pedestrian amenity as first priority. | *pico y placa* (rush hour and number plate) was law passed to restrict private transport usage during peak periods to alternate days of the working week. This had noticeable effects in reducing traffic. Ciclovia – road closures every Sunday make way for bikes and walking. | Cassano Valcuvia has a small budget which makes radical change difficult. The town is committed to seeing all normal maintenance of roads etc as an opportunity to add amenity to the Widespread Museum. In this way the concept is the underlying driver of decision making. |
| | **STAKEHOLDER INVOLVEMENT**<br><br>To ensure the buy in of the community a reasonable cross section needs to be part of the decision making process. | Extensive community consultation in creating the cities vision (Seiderman 2004)<br>An official pedestrian committee which includes representatives from neighbourhoods throughout the city, city staff, and representatives from Harvard and MIT (Seiderman 2004) | Community involvement has been set up as part of most decision making in Bogota | *In Cassano Valcuvia the key word is sharing the choice, so the citizens are involved in the planning process, are actors in the building of the town; actually the people from this town is used to materially build the city...*<br>(Guaralda 2006, 9) |

| | | | | |
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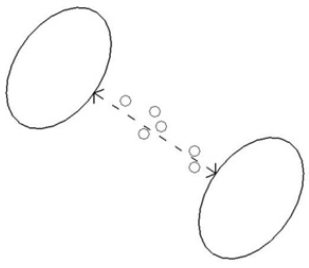
| | **INFRASTRUCTURE INVESTMENT**<br><br>Infrastructure that supports walking and cycling supports the commitment towards more walkable communities. | Hundreds of infrastructure items have been produced over the past 15 years that have all contributed to Cambridge's walkability (Parenti 2007). | Bogota bikeways (pictured) was an investment that cost the city $180 million – about half of the amount the entire US spends annually on cycling infrastructure (Cervero et al 2009). The network of paths links into the Sunday road closures known as Ciclovia. Transmilenio (Bus Rapid Transit) has been another significant implementation that has reduced car usage. | Small budget makes large scale infrastructure spending difficult. All necessary spending on infrastructure is seen as opportunity to integrate the Widespread Museum.<br><br>The restoration of the military terminal provides a hub of facilities and a gateway for the regions walking trails. |
| | **INTEGRATED APPROACH**<br><br>Decision making across all aspects of government are influenced by the vision of walkability. This allows for an integrated approach that leverages opportunities from the diversity of the fabric of the built environment. | "For a city to invite walking, every street needs to be easy to cross, all the sidewalks need to be in good condition, and the streetscape needs to be pleasant and feel safe. Active uses on the ground floors of building and building design are also important; buildings that are oriented to the sidewalk and passing pedestrians invite people to walk." (Seiderman 2004, 4) | Bus Rapid Transit has been well integrated with cycle and walking paths. *Pico y placa* has also reduced congestion. | Extremely well integrated approach. The creation of a network of pathways connecting different parts of the town integrates the ideas of walkability; social conscience; and sense of identity. Various methods are being used or suggested to help implement the program from road and path treatments to village fairs that build spirit and awareness. |
| *Activity Nodes* | **ANCHOR NODES**<br><br>  <br><br>These are the major nodal points within a city. They contribute greatly to the form of the city as their attractions to other nodes lead to major connection paths. | City activity cradled between two large nodes (MIT & Harvard). The attraction between these two nodes creates a major connection path and smaller nodes set up along this path.<br><br>Refer to map of Cambridge | Obvious anchor nodes exist at Plaza de Bolivar (the old heart of Bogota flanked by important government buildings and the cathedral); the new commercial hub some 1km to the north east; and the national university campus a further 2km to the north west. Evidence of smaller nodes setting up along these paths. | Anchor nodes exist in the form of the old town and the new estate to the south. |

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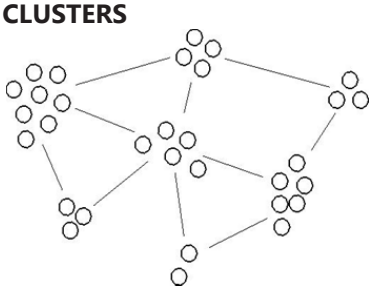
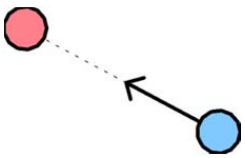
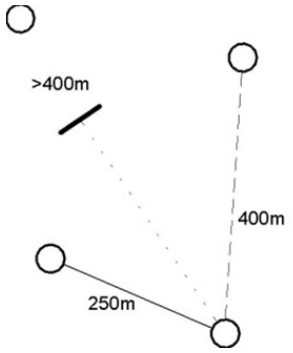
| | **CLUSTERS**<br>  <br>Nodes spread out across the city to create different cluster zones. Each cluster then acts as a super node with activities internally creating attractions with each other and the cluster attracting people from neighbouring nodes and further afield. | Clusters of nodes have formed near both major educational campuses, as well as in the Central Square district.<br><br>Refer to map of Cambridge | Clusters prominent around anchor nodes. Clustering outside of these areas is not so prominent – residential areas do not have a diverse range of activities. Walking in these areas is usually as part of "walking for transport". | Due to the rural setting and spread out nature of the town clustering is mainly limited to the denser old town section |
| *Connectivity* | **ATTRACTION BETWEEN NODES**<br>  <br>Complementary nodes create attraction resulting in a pathway connection between nodes.<br><br>It is important when planning for walkability, that the scale start with the smallest walkable connections and then work up through the paths of increasing capacity - this is the hierarchy. (Salingaros 2003) | In Cambridge complementary nodes support each other and are often located within short intervals creating simple walkable connections.<br><br>The relationship between nodes is fundamental to connectivity. A desire to travel from one node to another creates movement – if the pathway between nodes is conducive to walking then walking will occur. | Complementary nodes create multiple connections within the obvious clusters as discussed previously.<br><br>Further out in the residential areas there are far fewer complementary nodes. In these areas the ground plane is not as well engaged as the attraction to walk to activities is diminished. | Different walking trails are set up that connect nodes that may contribute to a certain experience.<br>For example:<br>*The civic walk, which starts from the Post Office, crosses the Memorial of the World Wars and the Public Gardens, reaches the Town Hall square with the Municipal Theatre, passes through the centre in order to arrive to the Medical Center, in the place of the Old Post Office.*<br>Attraction between these nodes makes the walking track viable. |
| | **WALKABLE DISTANCES**<br>  <br>Distances between nodes need to be kept short in order to provoke widespread walking behaviour. | Nodes are generally less than 250 metres apart and rarely over 400 metres apart. This creates a wide active ground plane. | Nodes along the corridors from the old town to the new town and up to the university are well within 400 metre intervals and this creates a long walkable zone. As discussed the lack of complementary nodes in the residential areas means powered transport (or cycling) would be required to reach the walkable zone. | The concentration of nodes within the built up area are within 250 metre intervals. This helps engage the ground plane.<br>Outer nodes form walking trails through the countryside. This creates an exception to the rule of nodes being within 400m intervals. Path quality and context need to make up for the extra distance. |

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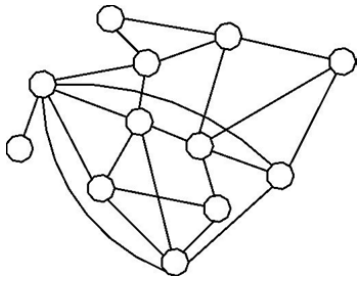
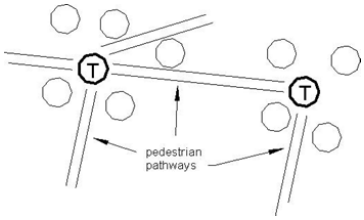
| *Accessibility* | **MULTIPLE CONNECTIONS**<br>  <br>Widespread clustering of nodes allows for many cross connections. This creates multiple pathways allowing alternative forms of travel. It also creates new connections by crossing paths, connecting nodes that may have otherwise been inaccessible. A multiple connected city is a complex urban web. | Deep shape of the city area allows for cross connections not just linear connections.<br>This is an example of a multiple connected city with a complex urban web. | Fine grain street network allows for multiple connections. Lack of nodes in residential areas lessens the impact of the multiple connections | Multiple connections occur within the town centre area.<br><br>Outer nodes tend towards a more linear connection.<br><br>Small nature of settlements mean it is not desirable to have a complex urban web |
| | **INTEGRATED WITH TRANSPORT**<br>  <br>Infrastructure and nodal system integrate to allow easy access to public transport. | Evidence of clustering around transport stops. | In Bogota clustering does not occur close to the Bus Rapid Transit system (apart from the anchor nodes). However the integration occurs due to the permeable street pattern that allows easy access to transit stops. | Pedestrian pathways coincide with bus stops and help link people to the wider network of tracks. |
| | **PERMEABLE STREET PATTERN**<br><br>Street patterns do not restrict walking. Small block patterns in all directions allow for many alternative routes. | Nodes are easily accessible by dedicated, and shared bike paths, and pedestrianised streets.<br><br>Permeable street pattern allows easy access for pedestrians from residential areas to the bike and pedestrian network. | "To promote active transportation (i.e., walking and cycling), particular attention should be given to street designs and layouts that create dense networks with high connectivity" Cervero et al 2009, 223.<br>Block size in many parts of Bogota is only about 40 x 40 metres. Permeable street pattern collects pedestrian traffic and feeds it towards the Bus Rapid Transit system. | Town centre has permeable street pattern however the rest of the region tends towards linear development along arterials. The ideas behind the Widespread Museum act to counter this condition. |

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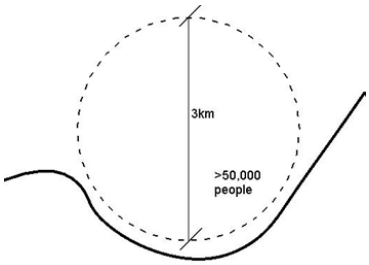
| | **COMPACT**<br>  <br><br>(Cambridge density)<br><br>Densities above 3500 per square kilometre (35 per hectare) are considered the tipping point for walking behaviour. (Newman and Kenworthy 2006; Frank and Pivo 1996) | Compact nature means short distances from any one point to required nodes. | Compact development is the rule of thumb in Bogota with only 25% of households owning a car.<br>This ensures public transport is efficient with high usage and relatively low area to cover. It also means basic shops and other facilities can be supported locally and reached on foot. | Traditional town centre is compact allowing for a diverse range of activities all easily accessible by foot. New development has sprawled the town across the rural area and created weaker connections resulting in high car usage. |
| *Safety and Security* | **PEDESTRIAN PRIORITY**<br><br>In line with any vision for walkable communities, pedestrians must be given priority were possible.<br>Pedestrians must feel they are the most important road users in order to feel safe and secure. | Extensive use of Zebra crossings instead of light indicated crossings puts the pedestrian first and places the onus on vehicle drivers to give way. A driver needs to be constantly aware of any pedestrians. | Banning private vehicles, reducing lanes and creating extremely wide footpaths and malls has transformed this downtown plaza area into a pedestrian safe haven. | Car parks are built on the rural edges of the town with no parking for visitors inside the town. Visitors must then take one of the walking tracks into town. |
| | **TRAFFIC CALMING**<br><br>Slowing down traffic reduces the risk of accidents and creates a feeling that the roads are a shared resource. | In many areas the road level is raised at pedestrian and bike crossing points<br>In effect this becomes a speed bump for vehicles and a smooth transition for bikes and pedestrians<br>This slows down the traffic and creates a street that feels safe for the pedestrian. | Most feeder streets are very narrow with very short blocks (40m) meaning it is difficult for vehicles to drive with any speed. | Speed will be reduced by narrowing the streets dramatically: *the plan previews in fact to change the street sections creating narrow and obligated gates, so to drastically reduce the commercial speed, not only in the old centre, but also in the new estates along the old rural roads* (Guaralda 2005, 6) |
| | **BUFFER ZONES**<br><br>Creating barrier lines between motor vehicles and non-motorised transport paths allows for safe passage on busy arterial roads. It also breaks down the volume of wide roads. | Common layout of busy street in Cambridge.<br>Creates a hierarchy of safety with pedestrians closest to buildings and their functions.<br>Buffer zone of planting also softens the streetscape.<br>Preference taken away from motor vehicles by reducing lanes from 4 to 2. | Similar layouts are common on Bogota roads. | There are plans to use similar landscaping elements as buffers between pedestrian paths and the wider roads leading into the town. |

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| | **SURVEILLANCE**<br><br>Buildings need to be built close to pathways with windows looking over the path providing passive surveillance. | Buildings including houses are built right to the street which allows for maximum surveillance<br>Eyes on the street creates a safer and more secure atmosphere. | Bogota's residential feeder streets and lanes are very narrow with housing built right to the footpath. Main thoroughfares are very wide. Little surveillance is offered via housing on these roads, however the round the clock busy nature of these roads offers some security. | Buildings are built right to the road in the old town with windows overlooking the road providing surveillance. |
| *Path Quality* | **STREETSCAPE**<br><br>The streetscape should provide an amenity that allows for easy and comfortable walking conditions. This includes items such as path width, lighting, paving, furniture, signage, fences and landscaping. | Footpaths have been widened and vehicle lanes reduced.<br>Different treatments denote cycling, walking and vehicle zones.<br>Trees create a barrier to the road and provide shade.<br>Paths are smooth<br>Strip shopping along arterials is not common in Cambridge. | Significant investment in widening of footpaths and creating bike paths.<br>Integration of artwork with pathway infrastructure.<br>Landscaping such as trees used to separate vehicles from bikes and pedestrians. This also provides some shading. | Narrow streets become shared zones by the judicial use of different paving types. The lighter paving creates a track for cars to follow – everything else is for the pedestrian. Cars instinctively go slow as they follow the tight path. |
| | **REMOVAL OF BARRIERS**<br><br>The ideal situation is to have smooth continuous pathways with no interruptions. | Raised crossings create a smooth transition for pedestrians.<br>There is significant use of treatment changes on the road surfaces.<br>This breaks up the feeling of a straight road ahead and makes all users aware of each others' likely presence. It also creates a feeling that the crossing is a continuation of the pedestrian pathway (priority to walkers)<br>The barrier now exists for the car not the walker. | Heavy investment in infrastructure such as pedestrian overpasses helps ensure a continuous, uninterrupted journey | Redirecting the vehicle traffic around important sections of the town allows the pedestrian to have preference. |
| | **DEDICATED PATHWAYS**<br><br>Separate pathway networks for non-motorised transport allow for an alternative way to navigate the city. | Where possible dedicated bike and pedestrian lanes are properly separated from other road traffic | Dedicated facilities and amenities along path network for walkers and cyclists.<br>291km of dedicated pathways.<br>Ciclovia – roads closed to cars and opened to [pedestrians and cyclists on Sundays | The Widespread Museum uses shared zones, properly separated pedestrian paths and dedicated pedestrian trails |

## DISCUSSION

### Analysis of Design Principles

*Set the Scene*

Planning Hierarchy has not been included in previous studies. This may be because studies have focussed on tangible successes. Other frameworks such as Southworth's (2006) assume that a demonstration of tangible improvements show a planning system that is prioritising walking over motorised forms of transport. This may be the case; however the proactive approaches highlighted in the case studies act as a catalyst for change. Whether it is a visionary leader such as Enrique Penalosa from Bogota or a more low key collective effort as in Cambridge, articulating a plan sets the wheels in motion. Therefore a framework category based around planning and vision would contribute highly to a well rounded set of criteria to be used for analysing and designing walkable cities.

*Engaging the Ground Plane*

The development of and relationship between activity nodes is essential to creating the right dynamic on the ground plane. Little has been written or studied on this topic. Salingaros (2005) has proposed the idea of activity nodes as the building blocks of a well-connected city. The results of the case study analyses back up this theory, with noticeable differences in the level of walking movement in areas of clustered nodes as opposed to areas where like activities were grouped.

In most western cities governments and councils use zoning as a method to assess development applications. Zoning actively groups similar types of nodes that often have very little attraction to each other – that is, there is no information exchange. An example would be strip-mall shopping; the attracting forces do not exist between the different shops but between an individual shop and a purchaser. Residential nodes are zoned elsewhere. In most cases the connection is too far or unsuitable for walking.

This suggests that were nodes cluster they need to be complementary to each other such as nodes of residences clustering with shops and places to work. Small scale connections such as those within a cluster are likely to lead to walking activity – not just out of a desire to walk as the healthy option but because on a small scale walking is easier than using a car. This is the essence of creating a walkable community; creating the conditions that make walking the most attractive option. It must start at the smallest connections and these connections must be many.

### Findings from Case Study Assessment

*Inherited conditions of the city*

Older cities tend to be set up better for walking. The urban fabric of such cities was entrenched well before the automobile dominated. It was designed around pedestrians as this was the principle method of travel. This can be seen clearly in Cambridge and Bogota in their fine-grained street patterns. It can also be seen in Cassano Valcuvia in the old part of town. Older cities around the world still have their issues with car first planning principles but when these cities decide to adopt walk first principles they have inherited a significant criteria to achieving this goal. Newer cities must take up the challenge to come up with innovative solutions to creating street patterns that improve permeability. Retrofitting existing built up areas is perhaps the biggest challenge.

The test case study of Bowen Hills will provide an opportunity to explore some options for retrofitting an existing built fabric. Being a car dominated area with very poor connectivity Bowen Hills will require some innovation and compromise to create the small scale paths necessary to engage the ground plane.

*Making cars subservient to pedestrians*

Much of the analysis using the framework pointed to strategies that make the pedestrian feel number one on the street. Ideas such as raised crossings in Cambridge and tyre tracks on shared lanes in Cassano Valcuvia paint the picture of a road network where the car must give-way to the pedestrian.

A continuous smooth network of footpaths would be the ideal situation, where pedestrians do not wait for cars. However a city could no longer function without its vehicular movement and creating a complete city where pedestrians have priority would lead to chaos. There are many roads were vehicles will need priority. But this does not mean the pedestrian should be made to feel vulnerable. Much work can be done on large car dominated

roads. All three case studies highlighted opportunities to create a wider safe zone of footpaths and bike paths – often separated from the road by raised planting. This creates a feeling of a separate street for non-motorised transport.

*Extreme Climate Mitigation*

One area that is perhaps missing from this framework is a city's ability to limit the impacts of climate on walking behaviour. In Cambridge, for instance, heavy snow is a factor in winter. Roads can become impassable at times and walking is the only means of transport. It has become compulsory by the city's Snow Ordinance to clean away snow from the footpath in front of one's residence or business and fines are possible for not complying (Parenti 2007).

Adding another category of Climate Mitigation will allow the framework to remain generic but also allow the application of the framework to cater for specific climatic conditions. This may be useful in a city like Brisbane where heat, humidity and storms reduce the propensity to walk.

## TEST CASE STUDY: BOWEN HILLS, QLD

**What is already known?**

Bowen Hills is in the sub-tropical city of Brisbane in Australia. Brisbane's climate is high in humidity particularly in summer and the terrain is hilly – characteristics that may be considered a hindrance to walking. Due to this, doubts have been cast on the policy of creating 400 metre intervals for walking to transport (O'Hare 2006). Despite this walking for transport is the most common form of walking in Brisbane.

The benign climate is suited to street activities like dining and very few activities need to be cancelled or postponed due to rain. Shade is required due to the intense sun. Footpaths need shading such as awnings or tree canopies, as well as break points like benches (O'Hare 2006).

Brisbane has a low overall density of 340 people per square kilometre (ABS 2011). This means activity nodes gravitate along arterial corridors reducing connectivity and accessibility for the pedestrian. The urban web is therefore weak as there are not enough connections between nodes and they are spaced too far apart. Bowen Hills in particular has very poor connectivity and accessibility. This inner city area has a population density under 1000 people per square kilometre.

Bowen Hills is controlled by the Brisbane City Council but currently has a state controlled planning mechanism placed on it called an Urban Development Area (UDA). This paper is not meant as a comparison or criticism of the different jurisdictions.

The following case study uses the adjusted framework to first analyse the issues in Bowen Hills and then offer solutions based around the key criteria.

| Test Case Study – Bowen Hills, Queensland | | | |
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| | Characteristic | Current Condition | Proposed Design Solution |
| Planning Hierarchy | **VISION** | Vision in UDA is long winded. It has some minor references to walkable communities but this is buried well within the text of the document. UDA vision section does not have an overarching vision statement. | VISION STATEMENT<br>*Provide a well connected walkable society that can leverage the opportunities provided through complementary activities: Create an urban web that weaves in new connections and increases complexity.* |
| | **COMMITMENT** | UDA is still car focussed. An example is the intended creation of a new main street (existing Hudd St) which will be widened to allow 4 lanes of traffic. This will create a wide road for pedestrians to cross. The road is not intended as an arterial route | The UDA could be adjusted to ensure all new development provides a plan for how the development will improve the facility for pedestrians in preference to motor vehicles. |
| | **STAKEHOLDER INVOLVEMENT** | Existing Community Engagement Framework ensures some input from stakeholders prior to the formulation of an Urban Development Area Plan. No community engagement is sought during the development assessment phase for individual projects. | Formation of a pedestrian committee which includes representatives from the Bowen Hills neighbourhood, city council and state government, Royal Brisbane Hospital, Queensland Rail, and the RNA. Committee to review all development to ensure it meets the vision for Bowen Hills. |
| | **INFRASTRUCTURE INVESTMENT** | Large bus station has been developed at the Royal Brisbane Hospital which potentially adds another layer of public transport for this part of Bowen Hills. There is currently no pedestrian link from the Bowen Hills side of Bowen Bridge Road forcing pedestrians to cross 6 lanes of traffic. | Further infrastructure spending in the form of an overpass is essential to encourage pedestrians over Bowen Bridge Road (one of Brisbane's busiest roads). Continuation of bike/walkway, currently finishing at Victoria Park, through Bowen Hills and connecting with river walk at Newstead Park. |
| | **INTEGRATED APPROACH** | The UDA is focussed on the fast delivery of land to developers. A coordinated approach to developing the community is missing as the ULDA body sits outside of other jurisdiction. | Planning communities within cities may benefit more from one body being in control of the whole area and coordinating with other stakeholders to ensure an integrated approach. |

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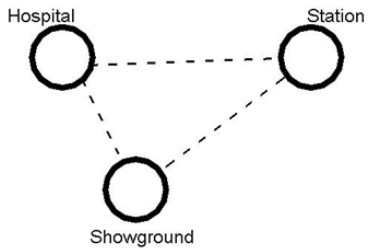
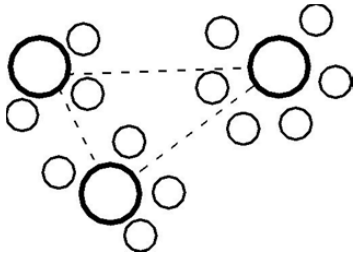
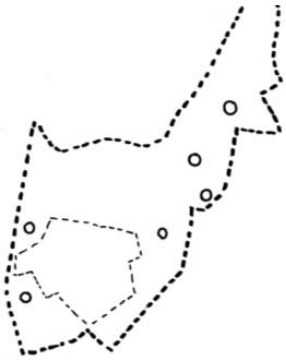
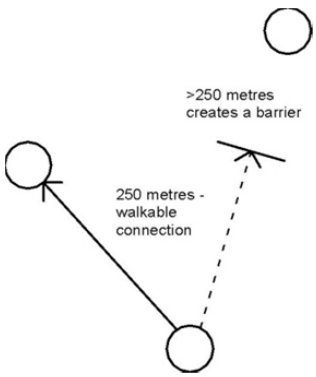
| *Activity Nodes* | **ANCHOR NODES**<br>  | The Royal Brisbane Hospital exists as a large node on the western border of the Bowen Hills community. | The Bowen Hills Railway Station provides an opportunity for TOD development and would therefore become an anchor node. The underutilised RNA showground site could be developed and engaged on a daily basis creating a third anchor. This triangulation has the potential for creating multiple connections. |
| | **CLUSTERS**<br>  | No clusters currently exist | Other nodes will then cluster around the anchor nodes in order to benefit from the infrastructure and relationship with other nodes within the cluster. (see attraction between nodes) |
| *Connectivity* | **ATTRACTION BETWEEN NODES**<br>  | Currently nodes are sporadic and have very little attraction between them. | The relationship between nodes is fundamental to connectivity. A desire to travel from one node to another creates movement – if the pathway between nodes is conducive to walking then walking will occur.<br><br>New nodes that cluster around the anchor nodes will need to provide activities that complement each other. |
| | **WALKABLE DISTANCES**<br>  | Nodes are generally well over 400 metres apart reducing the desire to walk | Walking distances have usually been designed around 400 metre intervals; however doubt has been cast on this assumption in a humid climate like Brisbane (O'Hare 2006). Reducing these distances to 250 metre intervals and addressing the heat sink produced by roads and footpaths would be a good strategy in Brisbane. |

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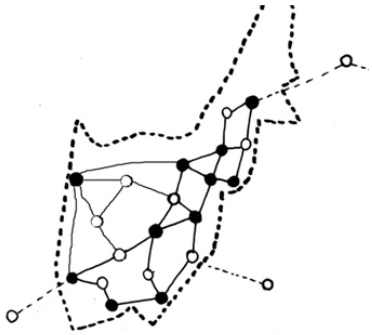
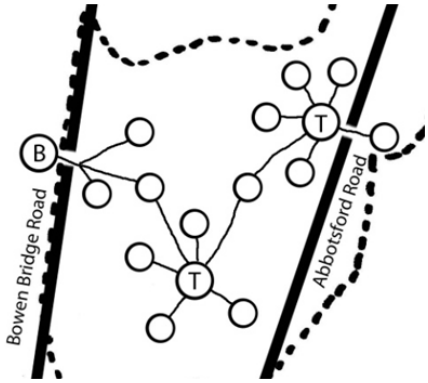
| | **MULTIPLE CONNECTIONS**<br>  | Only a few nodes exist in the development area and they are generally in a linear connection. | Nodes spaced within 250 metres intervals will help engage the ground plane across a wide area. Spreading nodes throughout the area creates cross attractions. This results in new pathways and a more complex urban web. |
| *Accesibility* | **INTEGRATED WITH TRANSPORT**<br>  | Train station at Bowen Hills is poorly connected to many parts of the development area.<br><br>Train station at the RNA showgrounds is only used for 10 days of the year.<br><br>New bus station at the RBH is across 6 lanes of very busy traffic. | Pedestrian access to transport stops needs to be improved. Over passes could be built over Bowen Bridge Road to access the RBH bus station and another one across Abbotsford Road to allow better access to Bowen Hills Station.<br>The RNA showgrounds has a railway station that is only used during the show, however as this infrastructure exists and a high density is proposed in this precinct making this station part of the normal train service would be viable. New development would then need to ensure good pedestrian access is maintained. |
| | **PERMEABLE STREET PATTERN**<br>  | Existing street pattern pushes pedestrians onto the arterial roads. Block sizes are mostly too large.<br>  | Overlaying the new nodal pattern on the street pattern shows the potential for new pathways. In this scenario most of these new paths will be laneways between buildings. These become the shortest and safest connections between nodes.<br>Block sizes are effectively reduced to about 40 x 40 metres. |

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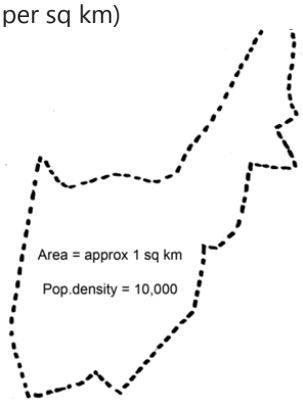
| | **COMPACT** (HIGH DENSITY above 3500 per sq km)<br>  | Potential shape is good for creating compact community.<br>Area has not been developed as residential with most buildings used for light industrial and commercial purposes. | The deep shape of the development area and potentially high density of residents creates a compact community with good cross connections. This makes for better access to more activity nodes. |
| *Safety and Security* | **PEDESTRIAN PRIORITY** | Pedestrians forced onto narrow footpaths on busy arterial roads. | Create pedestrian only zone between Campbell St and Hudd St (north to south) and Mayne Road and Abbotsford Rd (west to east).<br>Create system of laneways between buildings for pedestrian access. |
| | **TRAFFIC CALMING** | No traffic calming measures have been implemented. | Slow point created across Campbell St to link precincts .<br><br>Narrower back streets to be reduced further and to become shared zones. |
| | **BUFFER ZONES** | Pedestrians and cyclists may feel vulnerable standing so close to busy roads that have many large trucks using them. | Reduction of one lane of traffic along Brooks St and Hamilton Place. Extra space used for wider pedestrian path and new bike path with new trees as a buffer zone from vehicular traffic. |
| | **SURVEILLANCE** | Current development is set back from the street so there are no eyes on the street. | All new development to address this issue by building to the street line for the first 3 floors. |
| *Path Quality* | **STREETSCAPE** | Very few trees.<br>Narrow footpaths.<br>Bitumen and concrete footpaths.<br>Very wide driveways crossing the footpaths with parking between building and footpath. | Widening of footpaths and reduction of vehicle lanes.<br>Landscaping and paving to be introduced to help with separation and softening of the streetscape.<br>Building to the edge of the footpaths – no vehicle parks between building and footpath. |
| | **REMOVAL OF BARRIERS** | Busy roads need to be negotiated to move anywhere on foot in the precinct. | Creation of laneway network for pedestrian use.<br>Slow point created across Campbell St to link precincts. Will remove curb barrier and also act as obvious barrier to fast vehicle movement. |

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| | **DEDICATED PATHWAYS** | Bikeway from city currently ends at Victoria Park.<br>No dedicated pathways through proposed community. | Continue bikeway through Bowen Hills and link up with the river walk at Newstead.<br>The idea of road closures similar to Ciclovia is worth considering. This would need to extend beyond Bowen Hills |
| | **MITIGATION OF CLIMATE** | Humid sub-tropical climate and high use of concrete and bitumen create a real heat sink effect in Bowen Hills. | Reduce walking distances between nodes to maximum of 250m.<br>Significant landscaping along footpaths including garden beds to add continuous path of green and trees to provide shade.<br>Bench seats preferably covered or in shade of trees at intervals of no greater than 50m.<br>Direct pedestrian traffic away from busy roads and into green laneways. |

## FURTHER DISCUSSION

### Planning Control

The adjusted framework has highlighted some specific issues for Bowen Hills. Significant plans are in place to create a high density inner city suburb. The control of planning in Bowen Hills is confusing. Despite the suburb being part of the Brisbane City Council area this new community is being developed outside of the City Plan by a state government affiliate. This approach may lead to missed opportunities in leveraging economies of scale. An example being the council controlled busway with a new station at the Royal Brisbane Hospital. This rapid transit has the potential to improve the quality of living in parts of Bowen Hills close to the bus station but the UDA plan does not provide infrastructure for pedestrian links.

The framework criteria for planning hierarchy has allowed for a broad analysis of the issues. Most importantly it highlights that for this development pedestrian first planning principles are not successfully guiding the decisions.

### The Nodal Approach

Using maps to assess the relationship between activity nodes proved a successful method. Highlighting where these nodes are on a map quickly pointed out where the strong walkable areas were likely to be and hinted at the possible weaker areas.

In Bowen Hills for instance the existing condition showed only sporadic activity nodes that were too far apart to attract walking behaviour. The nodal approach also highlighted the potential building blocks for a new community already exist, with anchor nodes present in the Royal Brisbane Hospital, the Bowen Hills Railway Station and the RNA Showgrounds.

The nodal system can then be used as a means to plan a new well engaged ground plane. The abstract positioning of new activity nodes will in turn, create many new connections. It may be used as part of a system to create a strategic plan for a walkable community.

Retrofitting new activity nodes may be relatively simple; however the multiple connections they engage may require more innovative thought. It is usually not possible to create a whole new grid of streets. In the case of Bowen Hills the analysis highlighted an opportunity to create pedestrian and shared laneways between buildings, particularly as most existing buildings within the area are likely to be replaced.

### Mitigation of Climate Issues

The inclusion of this criterion opens the framework up to a broader usability base. Most previous

studies have been conducted in cooler temperate regions of the world where reducing the impacts of climate have not been considered. However, most cities are affected by extreme climatic conditions from one time or another. The types of issues range depending on the region and for walking to continue a mitigating process must be in place.

In Bowen Hills the issue is the hot sun and humidity as well as the occasional sudden downpour. Reducing the distance between nodes would create smaller connections that make walking more appealing than driving despite the prevailing weather. Walking distances of no more than 250 metres would seem reasonable. Providing significant, almost continuous planting would reduce the heat sink effect on footpaths and trees with wide thick canopies provide shade. Rest points like bench seats also offer respite

## CONCLUSION

The purpose of this research was to develop a framework to be used as an analysis and design tool. The application of such a framework has the potential to improve the walkability of urban areas.

The research has highlighted several important additions to the body of knowledge on planning and designing walkable communities. Existing frameworks such as Southworth's (2007) and Dell'Asin (2010) did not contain criteria that looked at the importance of planning priorities in the outcome of successful walking strategy. In particular this research shows how important it is for authorities to plan in the right order – that is there needs to be a hierarchy of paths starting from the smallest path and working up to the largest highways.

The second important contribution was the use of a nodal approach. Understanding how the relationship between activity nodes can actively engage the ground plane can go a long way towards creating the right conditions for walking. Further research could now be undertaken to understand the intimate relationships between activity nodes and how this may be manipulated to further engage the ground plane.

The last major point is the addition of a criterion on climate mitigation. This allows the framework to be applied in many more locations around the world.

The framework developed in this study could be used by planners to understand where the issues lie in their city. It can also be used as a design tool to assist in the creation of strategic plans.

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# Environment and Interaction:
## A study in social activation of the public realm

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*ABSTRACT: The natural and built environment has been shown to affect its users in both psychological and physiological forms. But can if affect the sociological aspects of human processes and actions?*
*The activation of the public realm can be shown to reduce socially dysfunctional behaviour through the simple occupation of the space and a number of other key variables through its design. In order to explore this further we must study how public space is being used in terms of social interaction, which will lead to a set of design ideals through which the social activation of public space can be achieved. Observations of differing social contexts have been undertaken in order to solidify key ideas and design principles for the activation of public space. Three sites were selected, each containing different amounts of vegetation and opportunity for occupation. These were then analysed through a lens of levels of social interaction. In this way it can become evident how the users interact with and within their social environments*
*Through the analysis of the chosen sites, it has become evident that levels of interaction between the users, whether for transitory or occupational purposes, rise directly with vegetation and opportunity for occupation. With this in mind it can be determined that through design, public space can allow for and create greater opportunity for social interaction.*
*KEYWORDS: interaction, psychology, sociology*

## INTRODUCTION

Social interaction is a key for any functional public space, which assists in the creation of a sense of community and ownership, and activates the site as a social realm focused on its occupants and users. A defined approach to psychologically activating social interaction through the environment would serve a great purpose in further establishing these spaces. This paper is a study of the psychological and physiological effects of the environment on human interactive processes. At the moment studies have focused mainly on the internal user and not on his outward actions and interactions with others within the public realm. Therefore studies have relied on what are psychologically effective designed and defined spaces, rather than that of a socially responsive psychological design.

Through the examination of a number of sites, selected due to their similarities in the sense of occupation, purpose and traffic, but differing in relation to vegetation, the effects of said vegetation can be examined on how the users interact with the environment and with each other. Three sites will be examined in an attempt to reveal these user oriented actions. Each site will vary in amount of vegetation, from baron (relatively no green), to vegetated (some areas of grass and some trees/plantings), to well vegetated (predominantly grass covered, with multiple plantings and trees).

Through the examination and findings we can reveal a number of design ideals in which to appropriate a socially functional public space. These findings will be cross examined through international examples in order to relate them to cross cultural ideals of the design of the public realm.

## CASE STUDIES IN THE URBAN ENVIRONMENT

The external environment can have a deep effect on how we perceive and use space. Public and civic squares, social space and common grounds are generally perceived as required elements in the formation of any major centre. These spaces must facilitate their use to their occupants and those transiting through taking into account the psychological well being of the users as they navigate through in order to fully assist in interactive processes. Although baron landscaping is the current answer to the most effective design of the public realm it must be examined as to whether or not these social spaces encourage interaction in a functional form.

Many effects of social dysfunctional attitudes are examined through a psychological perspective in order to formulate a design response for mental well-being leading to increased social interaction. Although social interaction is influenced in some ways by cultural factors (Hall, 1968, Hall, 1989) studies in interactive processes have shown it can

be enquired as a purely psychological act. (Rummel, 1976, Schutz, 1967, Weber, 1964) The psychosomatic and physiological component of the relationship between public space and its users has been analyzed through a number of existing studies, relating a number of environmental elements such as heat, noise, perception of crowding, fear and vegetation which can adversely and positively effect the interaction between people and their surroundings.

The psychological and physiological factors pertaining to the decreasing ability of one to interact socially lead us to the examination of the conception of an environment which not only facilitates interpersonal interaction, but enhances the possibility of such relations.

**Social Interaction**

Social interactions are the acts, actions, or practices of two or more people mutually oriented towards each others selves, that is, any behaviour that tries to affect or take account of each other's subjective experiences or intentions.(Rummel, 1976) This does not actually involve the participants being physically near each other, just to be aware of each other. Social interaction requires a mutual orientation, (Weber, 1964) that takes account of the behaviour of others and therefore oriented towards the agent, vehicle and meaning of the actions whether they are of reflexive, action, act or practice nature. (Schutz, 1967)

This brief definition shows that the act of interaction involves behaviours and intentions of the participants, not their physical presence. It is a purely psychological state of orientation towards that of another human being. In consideration of this, the ways in which public space can affect the psychology of the users of the environment should be considered in order to determine how to design and create environments which facilitate and enhance interpersonal interaction and psychological well being.

The quantity and quality of informal social contact is critical in the formation of social ties (Kuo et al., 1998b) and the design of the common spaces in which these interactions occur is of great importance. The characteristics of these common spaces play a material role in the development and use of the public realm.

A number of factors within the public realm affect the psychological response of the users to their environment. These factors are not always caused by the user's placement within the public realm, and can be experienced isolated from social space and even in transit. The perception of the public realm is then paramount in creating psychologically restorative space, in turn facilitating more meaningful interpersonal interactions within the space (Kuo et al., 1998b).

**Perception of Public Space**

Perception of the public realm, and in turn those occupying the public realm can be affected by many physiological and psychological factors. Crowding, high temperatures and noise have all been linked to antisocial behavioural patterns. These patterns of aggression and violence are not isolated to the public realm, and many of these traits are transferred or carried with the user until they have had time to recover from the psychological fatiguing situation.(Kaplan, 1995).

A number of studies have been conducted in order to determine if high temperatures can create fatigue and antisocial behaviours, (Griffitt, 1970, Rule et al., 1987) which have revealed consistencies between the variables. High levels of noise has also been linked to aggression and violence.(Baker, 1984, Donnerstein and Wilson, 1976)

Crowding in public spaces can also have negative affects on social activity (Baum and Koman, 1976) to the extent that people get in each others way and constrain their actions,(Anantha, 1991) or are forced to maintain inappropriate personal distances, invading each others personal space causing frequent, unwanted and uncontrollable interaction. This is likely to induce stress as groups grow larger and is associated with coping responses causing the sufferer to direct towards minimizing social contact or re-establishing control over social encounters.(Baum and Valins, 1977,Calhoun, 1971, Milgram, 1964) In extreme circumstances this can lead to panic attacks and a fear disorder known as agoraphobia.

Fear in many forms other than the perceived apprehension of crowding is associated with the use of the public realm. Feelings of anxiety and vulnerability have been noted to occur when the space is densely forested or heavily vegetated. (Talbot and Kaplan,1984) This is due to a perceived lack of security caused by the extent of the vegetation. (Shaffer and Anderson, 1985) This lack of security has been shown to result in more perceived places for criminals to hide.

A number of other studies have shown that dense vegetation has been used by criminals to conceal their activities, escape, and shield their examination of stolen goods and to dispose of unwanted goods. (Michael and Hull, 1994) Although these studies do show how dense vegetation can be used to conceal and assist in criminal activity, no studies to date have examined whether crime rates are actually higher in the presence of dense vegetation. (Kuo and Sullivan, 2001b) Though there are many links

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between dense plant life and anxiety and the fear of crime.

The perception of dense vegetation and its relation to crime dates as far back as 1285, when King Edward I instated laws forcing landlords to clear their land along highways, and those who did not would be answerable for any crimes committed along their stretch of the road. (Plucknett, 1962) A number of these precautions are still in place in North American universities and municipalities. The reduction of dense vegetation is thought to reduce the threat of criminal activity.

The fear or danger of unforeseen actions such as crime places high demands on the attention of the users of public spaces. Although there is an ever-present possibility of crime and/or violence happening, the stresses caused by the constant attention on the fact can have dramatic effects on the cognitive abilities of the user.

Other studies into the user's perception of vegetation in and around residential building has shown that residents tend to dislike or fear spaces which were baron and/or devoid of vegetation. (Kuo et al., 1998b) The fears and dislike of these spaces were transformed by the simple addition of visibility retaining trees and grass. In this way the baron qualities were removed while allowing visibility which in turn created social observation and a sense of security at the site.

**Mental Fatigue**

The continual attention and focus on crime and violence can lead to a cognitive state known as mental fatigue, characterized by irritability, inattentiveness and impulsivity. (Kaplan, 1987) The state is caused by the information processing demands of everyday life such as traffic, conversations, complex decisions, and problems at work. The extent of irritability, inattentiveness and impulsivity of those undergoing a state of mental fatigue is also shown to result in violent behaviour (Kuo and Sullivan, 2001a) and that reductions of this would lead to reductions in dysfunctional actions. Mental fatigue may also account for relationships between crowding and aggression and noise and aggression being as both situations may have some level of required focus. (Cohen and Spacapan, 1978)

Direct attention is important as the central role of information processing and selection. It is also vital in the inhibition and management of behaviour. (Kaplan, 1995) Because of the importance and continual use of direct attention it is susceptible to fatigue, which in turn reduces control on inhibition creating a greater chance of falling into antisocial behaviour patterns. It has been shown that even mild mood changes can effect social interaction. (Isen and Shalker, 1982)

The ability to use direct attention and information processing plays a major role in managing social situations, especially in conflict resolution. (Crick and Dodge, 1994, Dodge and Crick, 1990, Dodge and Schwartz, 1997) The behavioural response to social stimulus follows a number of information processing cues in order to formulate and enact an appropriate response. The mental willingness and abilities of an individual to produce reflective or effortful processing decreases with mental fatigue. With a fatigued mental capacity the responses become more thoughtless, tactless and unstrategic, which can result in conflicts spiralling out of control. (Dodge and Crick, 1990)

Mental fatigue can then be linked to aggression because of its effects on behaviour through decreased control over impulses. (Kaplan, 1987) Impulsivity is in turn associated with aggression and violence in a variety of populations including violent (impulsive) vs non violent (non impulsive) offenders, parolees, martially violent men and depression sufferers. (Kuo and Sullivan, 2001a)

Impulse control and inhibition are essential in any social atmosphere. Those lacking the capability to delay and reflect on situations behave in a less adaptive and appropriate fashion. (Kaplan, 1995) This creates less appropriate or impulsive behaviour of the individual who will tend to act in a more impatient and hasty manner.

In response to these factors we must look for ways in which to recover and restore the mental possessing abilities in order to create space which can facilitate healthy social interaction. This includes measure in which to reduce perceived crime and fears associated with perception of public space. The need for urban dwellers to recover this capacity has been shown to require a context of nature (Olmsted, 1968) to fulfil the restorative process.

**Restorative Measures**

The first and most obvious response to dealing with mental fatigue is sleep. While sleep is a very useful mechanism in recovery, serious cases of direct attention and mental fatigue can result in insomnia before full recovery can be set in place. (Kaplan, 1995) An alternative means of attention is required in order to fully recover; this measure would have to temporarily render the use of direct attention unnecessary. Kaplan (1995) outlines four requirements for these restorative environments; being away, fascination, extent and compatibility.

Being away, in principal, frees one from mental activity that requires continued direct attention.

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Natural settings are often preferred, easily accessible environments are an important resource. Though the continued struggle with old thoughts in new settings is unlikely to be restorative, it is a more conceptual idea rather than physical transformation of environment. The change is more attuned to ones focus; a change in perspective can provide conceptual shifts necessary for revitalization. (Kaplan, 1989)

Fascination with the natural or 'soft' environment offer many processes that people find engrossing. Attention on these is effortless and leaves opportunity to reflect which can enhance the benefits of recovering from fatigue. (Kaplan, 1993)

Extent refers to cohesion and richness of environment, constituting a 'whole other world' (Kaplan, 1995) containing sufficient scope to engage the mind. It provides enough to see, experience and think about to take up a substantial portion of ones current consciousness.

Compatibility relates to the purposes and inclinations of the user. The setting must fit what one is trying to and wants to do. In these environments there is no need to second guess or to focus solely on ones behaviour as what one does comfortably and naturally is appropriate to the setting. (Kaplan, 1983)

Natural settings are a reoccurring theme in the ideas of restorative environments. The role of natural scenery is shown to '*employ the mind without fatigue and yet exercises it, tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system*.' (Olmsted, 1968) This does not only assume the full emersion of one into the natural environment. Evidence of mental restoration effects have been noted from a variety of 'natural' settings including wilderness areas, (Hartig et al., 1991) prairies, (Miles et al., 1998) community parks, (Cimprich, 1993) views of nature through windows, (Tennessen and Cimprich, 1995) and even rooms with interior plants. (Lohr et al., 1996) Other studies have shown the restorative effect through reduced hostility in prison inmates after participating in gardening projects. (Rice and Remy, 1998)

Positive mood has been directly linked with contact with nature (Hull and Michael, 1995) which in turn reduces the possibility of unprovoked or impulsive aggressive actions. Recovery from stress, everyday functioning and attention has also been linked with interaction, in one form or another, with a natural environment. (Cimprich, 1993, Hartig et al., 1991, Rice and Remy, 1998) These studies show the regenerative effects that can occur when natural elements are invited within the psychological framework. Mental fatiguing and its pertaining symptoms can be counteracted with the addition of plants or trees. But as previously mentioned, some vegetation can increase the perception of crime, and in turn fear. This leads to the users of public spaces exerting extra attention on unforeseen actions of others, leading to further mental fatiguing and reducing the restorative effects of the vegetation.

**Effects of Vegetation on the Public Realm**

Further studies into the effects of vegetation in the public realm have shown that differing forms of vegetation can in fact reduce the perception and fear of crime within public spaces (Kuo and Sullivan, 2001b). Vegetation that restricts views and allows for concealment of criminals and criminal activity are shown to create the perception and fear of crime. (Kuo and Sullivan, 2001a) Therefore vegetation should not promote crime when it preserves visibility.

Grassy areas and widely spaced, high canopy trees have minimal effect on visibility throughout common spaces. Flowers and low growing shrubs are also unlikely to disturb visibility. A study linking vegetation and crime (Kuo and Sullivan, 2001a) has found a consistent link between vegetation and lower levels of incivilities. These results, based on police crime reports, show a distinct negative relationship between vegetation and crime.

A further series of studies conducted on inner city neighbourhoods has shown that public spaces containing trees and grass are far more consistently used by youth, adults and mixed age groups. (Coley et al., 1997, Kuo et al., 1998b) There has also been direct links made between the number of trees in a public space and the simultaneous users of the public space. There is also more likely to be adult supervision of children in green spaces than in similar but baron spaces. This implied surveillance is likely to also deter criminals from these spaces, even when no observers are present. (Newman, 1972)

Increased surveillance is the simple presence of members of the community within the social spaces is a major deterrent for crime. (Jacobs, 1961) Perpetrators avoid areas with more surveillance and a greater likelihood of being observed. With greater surveillance within the public realm crime can be deterred and the perception of crime within these spaces can be removed from the user's immediate attention, thus reducing stresses on direct attention capabilities.

The use of these spaces is also dependant on the location of vegetation within the space, and the location of the public space in relation to the user. The proximity of residents to the public space is important as its use may be overlooked or unusable

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due to stresses and fatigue created in transit to said space. (Kuo and Sullivan, 2001b) Within the public realm, proximity of trees with surrounding buildings also determined the use of the public space. The more visually and physically accessible the vegetation was perceived to be; the more people spent time outside near them. (Kuo et al., 1998b) Not only do common spaces with trees attract larger groups than similar sized baron spaces, the greater number of trees in the space created greater numbers of people simultaneously occupying the space. (DePooter, 1998)

**Summary of Urban Environment Case Studies**

Social interaction in its definition has to do with psychological well being and positioning in relation to others. The effects of psychological well-being have been established along with the restorative abilities of a natural environment. Analyzing the current literature on the topic, it is possible to determine a number of design ideals in order to create responsive social spaces thus restoring psychological well being, a precursor for meaningful as well as informal social interaction.

The use of vegetation in specific types and positioning can increase use and therefore informal interaction between participants within the space. This also creates further informal surveillance of space, producing more 'eyes on the street' and a greater sense of security. Vegetation in a number of forms is shown to establish restorative environments in which users can recover from a number of mental stresses, which in turn lead to an improved psychological perspective that creates a greater chance of socially interactive mind sets.

High canopy trees introduce vegetation which allows for visibility in turn reducing the perception of crime. The placement of the trees along the periphery of the space involving the attention of passers by and residents of nearby building which in turn leads to greater use of the space by residents and travellers alike.

Other vegetation such as low growing bushes and flowers has little to any diminishing effect on surveillance within the public space. The use of grass instead of paving in some areas, although requiring attention and upkeep, creates space which residents and users find more comforting.

The perception of crowding can be counteracted through the same principals as used in surveillance measures. Having accessible ways out of space can be all that is required to lower perceptions of crowding. If surveillance is possible with little disruption, then the users will be able to assess routes of access and escape from public space.

Temperature control in the public realm, especially those in natural environments can be hard. As cold weather is not a significant factor in aggression studies, counteracting heat is of importance. Shade cover created by high canopy trees will assist in the cooling process. Evaporative cooling measures may be another response to issues of high temperature within the public realm, dependant on specific climates.

Placing these measures into the public realm will assist in creating restorative spaces. These spaces will in turn reduce a number of psychological factors which impair mental functioning related to social interaction. With these restored social attitudes the users of these spaces will be cognitively able to have incidental and meaningful interaction.

Considering factors of psychology and interaction within the design of the public realm can in turn boost the use and social activity within the space. Although the spaces may restore these abilities, will this assist in creating interaction within the public realm? No studies have yet to show environmental factors which increase interaction between its users. With the psychological factors pertaining to interaction assessed and included within the design intention, spaces which promote social activity can be assessed and explored.

## METHODOLOGY

With previous research into psychological and sociological public space, how can we examine and expose keys of design to create socially active public space? How do we create an environment which not only facilitates interpersonal interaction, but enhances the possibility of such interaction?

In order to answer these questions the level of interaction within a number of public spaces have been observed and analyzed based on case studies in the urban environment as an extension of said research to fill the noted gap in prior knowledge on the subject of active and interactive public space.

To do this, three sites have been selected, observed and analyzed in terms of their ability to address differing levels of social and personal interaction. The habitability and design of each site has been analyzed based on the current use in context relating to their spaces and characteristics of each space. This relates directly to vegetation, seating (and other function oriented elements), shade, paths and the location of these elements.

With the inclusion of these details it can be properly examined the extent of user occupation of the sites in relation to their interaction, whether it is of a transitory nature through, or occupational nature within the sites.

**Site Selection**

In order to complete an extensive analysis of public space each site must be viewed for an

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extended period of time. This requires multiple observations and in order to observe each site under similar weather, noise and occupation states they must be located within close proximity. Through these overarching selection criteria all sites would be selected from within Brisbane's CBD. The locations were then observed and selected on a basis of a number of similarities versus a single difference, as noted in the analysis of prior case studies. Each criterion was set in a way of determining the greatest chance for pure statistical relevance in terms of interaction within the public spaces.

**Location:** (similarity). Each site was located within the CBD close to a major transport hub, with two edges along a well trafficked pedestrian street. This is due to visibility of exits being shown to reduce the effects of the perception of crowding. With each site in a similar location heat and noise, other cause of dysfunctional behavior, should not be an issue in relation to site continuity.

**Context:** (similarity). Each of the sites holds a certain level of contextual importance within the city. In this way users are likely to visit either of the sites for historical/contextual significance.

**Accessibility:** (similarity). As they are located close to transport hubs, and historically and culturally significant, accessibility to the sites is similar. This factor is seen as very important within similar study frameworks (Kaplan, 1989).

**Opportunity:** (similarity). Each site has a similar level of opportunity for occupation, whether that be brief activity of photographing relevant historical items on site, or sitting and staying for an extended period. In this way each site has a number of longer term options, whether seating, garden bed edging or by other elements on the ground plane.

**Conditions:** (similarity). Due to changing weather conditions and the issues of heat changing day to day, each site has been examined for a number of hours on each day of observations. This allows for each of the chosen spaces to be observed during the same weather conditions.

**Vegetation:** (difference). Each of the three selected sites has differing levels of vegetation ranging from the baron, vegetated, to well vegetated. Each of the vegetated sites relates to the aforementioned ideals of vegetation within the public realm. Trees have high level canopies, creating shade while allowing for social observation and surveillance removing the perceived fear of crime and criminal acts. Grass and other plantings are also present increasing the restorative effects of the sites.

**Selected Sites**

Through these factors the three sites were chosen to be observed. King George Square (baron), Queens Park (vegetated) and ANZAC square (well vegetated) were seen to relate directly to all the recognized elements for the selection.

**King George Square** has been recently renovated, removing green space which once adorned the civic square for a baron approach to public space. A number of trees line the historically significant town hall and are place near built in seating. The vegetation has yet to grow to its inevitable size and offers little cover for shading purposes, but does allow for clear vision throughout the square. The recent renovations included the major hub for the new busway, which is apparent on site through the extrusion of its entry points along the south western road edge.

The site is generally used for transitory purposes but allows for occupation through built in seating, raised edges of planting boxes and stairs in the northern corner of the site.

**Queens Park** lies as the entry forecourt to the historic casino and hotel buildings, containing a number of statues which draw the attention of users of the site and its passers by. Two major paved paths cut through the mainly grassed site leading from the hotel doors to the opposite corners. High canopied trees line the perimeter of the site shading all but the immediate centre and casino edge. The north eastern edge runs along the well trafficked George Street and is located within 1 block of major bus stops and the Queen Street bus station.

Built in seating lines the central pathways and raised garden beds with wide edging line the periphery creating a number of opportunities for the users to occupy the site for extended periods.

**ANZAC Square**, the home of the eternal flame, lies at one of the entrance ways to central station and along two busy inner city streets. Paths leading to the central station entry break up the grassed ground plane which contains a number of high canopy trees and low level plantings. A number of statues adorn the lower level which is seen to be focal points of the Square.

The walled edges of the site consist of a number of built in seats and raised edging creating many opportunities for occupation. This being said, occupiers of the site can and do tend to sit on the grassed sections.

**Quantitative Analysis**

Each site has been observed in relation to the quantity and quality of social interaction, responding to the work of Kuo et al, has been recorded over a period of 25 hours. The hours of observation were from 10am to 3pm for 5 week days. In this way a

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number of elements were removed from the results. These include the multitudes of people using these spaces for purely transitory purposes at rush hour times on their way to and from work within the CBD. In this way, those using the site to transit to and from school are also removed from the results. A number of these occupants are still apparent in the data, as the selected sites are used for this purpose throughout the day, but the reduced number of these users allows the result to show a more apparent activity within the location.

To align with this, the users of each location who do not enter the site proper where not recorded, walkways along road edges were seen to be unrelated to the site in terms of occupation and transition.

In terms of the observations, a number of factors were taken into consideration in order to understand their interaction within the location. These include; how the site was entered, that being as an individual or within a group of users. Technology; as this has the ability to reduce the opportunity for interaction such as the use of mp3 players of mobile phones. Purpose for visiting the site; whether in a transitory or occupational form. Interaction experienced by the user; this ranges from no (none) interaction to low quantity (incidental, brief) to high quality and quantity (meaningful), in this way the extent of interaction can be examined through its full spectrum (Kuo et al., 1998a).

## ANALYSIS/RESULTS

Through the examination of the selected sites over a period of 25 hours each, the total users and their tendency towards interactive behaviour has been observed and recorded. Throughout the time period over 32,000 users were observed at King George Square (table 1), 16,000 at ANZAC Square (table 3) and 6,000at Queens Park (table 2). Due to the varying numbers the results were analysed through percentage rather than totals in order to gain a greater understanding of interaction with the chance to cross examine each site as equals.

As each of the sites is close to major public transport hubs it was understood that a majority of the users would be of a transitory nature. This is apparent in the results with 92.1% of KGS users, 73.4% of QP and 70.3% at AS using it in this way. Also as previously examined, occupation of the space increased with the increasing levels of vegetation, as well as the increase in meaningful interaction. Meaningful interaction increased close to 7% from the baron site to the vegetated, increasing another 2% to the well vegetated site.

As vegetation increased, the numbers of users experiencing no interaction steadily decreased. 'None' level of interaction was consistently 5% less over each of the sites meaning that all forms of interaction was increasing due to the elements contained within.

Technology had some effect on the perception of interaction 6.4%-7.6% across the sites. In some cases the users of such technologies still managed to have interaction within the location. This leads to the assumption that these technologies do not interfere with social interaction in its physical form, but allows one experiencing no interaction to experience a different form of interaction, as it does not require physical attendance, but mutual orientation (Rummel, 1976).

## DISCUSSION

In terms of these observations into interaction within the public realm, it can be seen that vegetation and opportunity for occupation can increase the likelihood for the users of the site to relate. Where a site employs vegetation as a means of aesthetic or cultural value, users of the site, although not using it more, but using it meaningfully in a social context, increases the strength of social sustainability within. The findings also suggest that the inclusion of individual technologies can affect the chances of one interacting within the public realm, where their orientation is to an individual matter. These technologies do not completely impair the ability to interact within a physical context. The sites which interaction is increased also show a sense of mutual orientation (Weber, 1964). These sites are more frequently occupied during the 'lunch time' hours where groups would sit and eat, oriented around each other and the function of eating.

As these sites are all existing and within a certain context and climatic region, it cannot yet be said that the results would be apparent in a global context. To achieve this means, sites which have been examined prior to and post revitalization and have been shown to have created greater interaction and social functioning must also be studied.

### International Example

'A Horses Tail: Tilbury' in the London borough of Newham was designed and planned out carefully and with public issues in mind by MUF architects, whose designs are characterized by modest, socially responsive work. This project in particular has been proven to have reduced incivilities and increased use and social harmony in the immediate surrounds of the interventions (Dodd, 2009).

The site is located along the peripheral, marshy edges of the country where a number of social housing estates had been established, considering the needs of travelers unable to continue their

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nomadic lifestyles. The site was located in a more permanent form of these communities known for social housing and dysfunctional behavior patterns. The project was planned as a community garden including space for a number of social activities.

Upon examination of the site it was discovered that many horses were nearby. This fact was not included in the brief and the presence of the horses on the site seemed insignificant to those involved with the site. This 'invisible' factor was seen by the architects as what made this ordinary site extraordinary and became a focus in the design.

Further examination and research along with the surrounding community led to the concept of creating a sense of ownership of the site. The simple fact that the horses were present meant that the participants were utilizing their right to use the site for grazing their animals.

With this as a starting point further enquiry into ownership, whether deeply significant or not, of the site was undertaken, involving school children in an attempt to create community participation.

The design itself contained a series of spaces for community use. The spaces ranged from football fields and places for smaller children to play to a dressage field, incorporating the element of the horses. These spaces were created by only slightly formalizing the landscape, allowing the space to remain green and vegetated. The slight intervention upon the landscape also allowed for the current ownership of the site by the residents to remain stable.

After the works were completed and the space was in use, MUF architects undertook studies into how the space was being used. This revealed an entirely new constituency using the community garden. Not only was the site being used more frequently by the residents, but a number of middle-class families from surrounding areas, and pony clubs started using the site in a significant way. The new visitation marked a turnaround for the site in social terms.

In this way the design responded to a number of psychological and physiological factors proven to increase dysfunctional behaviors. Identity of the site in relation to its residents was also shown to be an important issue when creating public space which is able to respond to social attitudes. In the examination of the site in relation to how the project promoted social reforms through its design a number of other elements became apparent.

This is done through direct attention being paid to the identity of the space, whether that is from former and underlying heritage or current elements on site. This creates a sense of ownership between the users and the social space itself. With the engrained sense of ownership, residents are less likely to behave in socially disruptive actions as they are linked to the site. This in turn promotes the perceived surveillance of the site. A commonly used and cared for site is more likely to be under scrutiny from its residence reducing dysfunctional behaviors of visitors to the site. The social surveillance is assisted through the use of specific types of vegetation.

Not only does the vegetation used allow for this informal surveillance, it also brings a restorative element into the environment. As the landscape in the project is entirely natural, the benefits of the restorative process lie in its ability to respond to the social atmosphere it is situated within. As the use of the space increases, surveillance increases reducing stress and fear. As there is no thick vegetation and views across the site are achievable the natural elements on the site respond to these psychological concerns. The site is also well maintained, and required to be maintained as another response to the ideas of ownership and perception of home territories.

In addressing the factors of psychological restoration and social reform this project has created spaces which involve and invoke restorative processes linked to decreasing levels of social dysfunction. As the project has been completed and further review of the site has been undertaken it has been proven that social dysfunction can be addressed through architectural intervention. These effects can be seen to change the social atmosphere upon these sites, enlivening the public realm and promoting socially functional behaviors.

**Discussion Summary**

These sites and their user's positive reaction to elements within a social framework allow us to examine and define a set of principles in order to understand human interactive process within an environmental context.

In the case of prior studies and research undertaken it has been shown that vegetation, in some forms, holds a great importance on psychological wellbeing and, as interaction has a major psychological underpinning, also assists in the creation of socially active space.

Cultural and contextual values also play a role, throughout the examined Brisbane sites and the Newham site a cultural and contextual significance relates directly to how the sites are used and occupied. This relates directly to the intentions and orientation of the users towards others and their environment.

Creating space of mutual orientation, seen in the Newham site through playing fields and in relation to the context of the horses, and at the green sites in Brisbane as a place to eat lunch or rest in hours

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off. This positions the users in a psychological mindset which allows for the greatest possibility for interaction.

## CONCLUSION

The sociological aspect of any public site is of great importance in creating an active and functional social realm. Defining an approach to psychologically activating social interaction through the environment can serve a great purpose in further establishing these spaces.

Through a study of the psychological and physiological effects of the environment on human interactive processes it can be shown how to focus not only on the internal user but on his outward actions and interactions with others within the public realm.

Through the examination of a number of sites, the effects of vegetation can be shown to increase interaction within the environment. Not only seeing to the psychological and physiological factors of human processes, but also assisting in creating comfortable interactive environments.

These factors of design can be seen cross culturally and have been positively reviewed in a number of different contexts. This shows a global response in interactive process towards these ideas of design, relating them back to their core psychological basis.

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# The Study of Design Elements and People's Behaviour in Campus Public Space

## How Design Shape User's behaviour

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*ABSTRACT: A growing body of researches provided evidence of the successful design in particular focus on design elements, ranging from colour, lighting, technology, landscape and spatial arrangement. However, no example or literature investigates the opportunities for linking these design elements in a practical base. Drawing upon existing architectural design theory, this paper investigates the relationship between design elements regards to public's behavioural response to the public space. The aims of this paper are two-fold: first to examine whether there is a direct relationship between the two, and second to find out how the design elements could be coordinated together to influence not only the activities but also the environment, function and experience. To meet this objective, observation, behavioural mapping, interview and cognitive mapping methodologies are used.*

*The present study involves two local case studies to find out the relationship between design elements in order to assist the design of a better public space for public activities. Correlation between the design elements shows that public activities is more likely to happen in relatively space with well balance of design. These finding provide a better understanding of public space design by gaining deeper perceptive between design and user's behaviour, consequently improving social activities and interactions in public space. Moreover, it focuses on campus public areas which can be a vital aspect of university campus and play a valuable role in the overall success of public space design.*

*Keywords: public space, design elements, user's behaviour, interrelation, activities*

## INTRODUCTION

Public space is a place to meet, learn, rest, observe and potentially interact with others, it is part of the public culture and is' the stage upon which the drama of communal life unfolded' (Carr, 1992). It provides the channels for movement, the nodes of communication, and the common grounds for play and relaxation. Public space gives form to the flow of human exchange. It is an essential counterpart to the more settled places and routines of everyday life. Research conducted by Hall (1966) addressed that there are pressing needs that public space can help people to satisfy, significant human rights that it can be shaped to define and protect special cultural meanings that it can best convey. These theories reveal the value of public space and lay the groundwork for influencing design for public behaviour.

In recent decades the relationship between public space design and public behavior has attracted researchers from the social sciences – psychology, sociology, geography and anthropology; and from the environmental design disciplines – architecture, urban and regional planning and interior design. They constantly strive to create well designed public gathering spaces that respond to people's needs and aesthetic values and help promote social interactions. This resulted in many theories from different study perspectives and used as tools in the understanding and design of space for public use both now and into the future.

In studying the typologies of public space, researchers have indicated perception of public place's characteristics and related public activities can be impacted and encouraged. The benefits of such studies have included the knowledge of how to use design elements such as colour, lighting, technology, landscape and spatial arrangement in public area to improve user's behavior.

The expansion in the number and types of public space seen today shows how changes in the ways people use it. Some motives for making public space do not adequately reflect user needs. As a result, there have been failures in public space design and much criticism. This paper intends to explore the balance between public space design and public behaviour. The purpose of this study is to explore the interrelationship between the design elements and user's response. It aims to determine

and explain how design elements can be coordinated together in a practical way to impact the environment, function and experience. Drawing upon existing architectural design theory, this study has tested the validity of analysis for space design in public area, by applying such theory to a case study in a systematic approach.

## LITERATURE REVIEW

In recent decades the relationship between public space design and human behaviour has attracted **p**lanners, designers and decision makers. What is in many respects a new and exciting field of public space study has developed rapidly. The field of public space research over recent years has become increasingly popular. These studies of public space could have the potential to facilitate successful integration of new public space into existing urban fabric in the future (Bentlry, 1998).

Public space is the stage upon which the drama of communal life unfolded. It provides opportunity for users to have their recreational creativities and social interaction. Carr (1992) recognised public space is an essential counterpart to the more settled places and routines of everyday life, providing the channels for movement, the nodes of communication, and the common grounds for play and relaxation. Such space is often considered as green nucleus, void or breathing space which gives form to the ebb and flows of human exchange.

Research conducted by Hall (1966) also pointed out the importance of a public space effect to public behaviour, Hall discussed that there are pressing needs that public space can help people to satisfy, significant human rights that it can be shaped to define and protect, and special cultural meanings that it can best convey. Greater appreciation on public place has been expanded whereby the physical and social functions are elements that afforded pleasure, safety and care public users (Lynch, 1960; Carmona et.al, 2003). These theories reveal the value of public space and lay the groundwork for improving design for public behaviour. The key elements shaping public space design are discussed as following order: colour, lighting, technology, landscape, personal space and spatial containment.

### Colour

People are bombarded with all sort of information when they enter in to a public space. The first thing they assess is its colour, unconsciously and consciously (Augustin, 2009). Color can be used to distinguish, contain, unite, equalize, and emphasize the design elements of a space. It could be simple colour or complicated patterns could be more or less transparent, but all of these physical parameters have psychological implication.

Research has shown that saturation and brightness have strong influence on how people respond to place emotionally (Valdez & Mehrabian, 1994). People often have more energy and are exciting with warm colours around while calming with cool colour (Augustin, 2009). Therefore, cool colours generally used in calming space and creating a relaxing and pleasant environment. On the other hand, warm colours generally used in energizing space, which could lead to higher energy levels, however these spaces are less pleasant (Figure1).

*Figure 1. Places with cool and warm colours.*

Augustin (2009) described that colours are usually used in combination and the contrast between those colours influences people psychologically. When colours that are directly across from each other on the colour wheel area used in a public space, the effect is very energizing (Figure 2). When several cool colours that are used together, they are particularly calming, while several warm colours are used together, they are particularly energizing. Also, the pairing is more pleasant the larger the contrast in brightness between the colours. Moreover, people's experience of any colour is determined by the amount of space in a place painted that colour. The larger the size of the space coloured, people are more influenced.

*Figure 2. Colour Wheel*

Colours are regularly used intertwined into patterns and generally people prefer simpler pattern around (Alexander & Angle, 1977). Lynch (1960) described that pattern characteristics could affect the legibility of a place. Augustine (2009) pointed out that pattern is the repetition of shapes or forms and is an immediate concomitant of color. In public space people tend to feel more comfortable and less confused to look at certain patterns that are mathematically similar to each other.

**Lighting**

The effective use of light has been the traditional characteristic of an aesthetic experience in public space. According to Hayward (1974) people in public space rely more on visual perception than on other perceptual system to obtain information about their surrounding environment and their relation to it. Such a state of affairs has significant consequences for public space design. This can be understood such as the quantity and quality of light available in public space impacts our experience and has strong effect on public emotions, communication, and behaviour. A research article by Rosenthal (1969) outlined that light gives public not only the phenomenological experience but also the non-phenomenological, the overt behavioural, the unconscious influences that are very important.

When analyzing the effect that light has on people in public space, most of the literature in lighting research deals with subjective preferences, impressions and expressed opinions about the way we perceive public space and react in the public space. A similar view is expressed in a research article by Antonakaki (2006), suggested that light can affect not only our perception of public space but also the way we use public space. Antonakaki argued that light has influence on public activities that are not directly related with vision, for example uneven illuminance pattern was associated with less noise while a higher more even illuminance was associated with higher human noise and activity. Furthermore, research from Rowlands (1971) discussed the links between lighting and public performance has shown that higher illuminance can positively affect reaction times, brain activity and alertness.

A similar research from Augustin (2009) also elaborated on the key aspects of light level in public behaviour. Low light intensity level could create space relaxing, while higher level of light are psychologically and physically stimulating. Public tend to have more intimate conversations and speak more quietly in lower light level background. However, for a creative public space higher light intensity level could be used to encourage public to think more broadly, more cheerful and more creative.

Light and colour usually work together to influence how people move through a space. In this respect, Augustin (2009) pointed out that lights in public space are usually used as a direction guide tool, to illustrate connections between buildings that lined them (Figure 3). This horizontal lighting technique offered alternative views of the area's character to what could be interpreted in plan, and enabled the author to draw conclusions regarding the identity of place from the street and adjacent blocks.

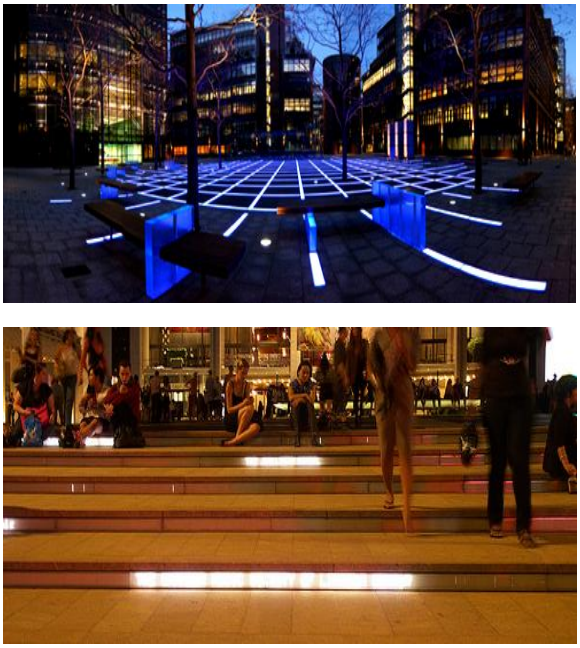


*Figure 3. Light as direction indication*

**Technology**

Technology, wireless technology in particular, also enters as an important factor defining the use of public space. It will not reactivate a public place by itself, however, if technology is viewed as an amenity, it can be added to the repertoire of features that have been proven to drive activity and life into physical spaces that need to be tailored in order to fit today's lifestyles (Bill, 1999). Without doubt, technology has changed the urban environment and it has changed the meaning of place and public space.

*Figure 4. Technology impact to public behavior*

Wireless is definitely has strong impact in the way people interact with each other, and it is becoming unceasingly common in public space. (Figure 4). As this new form of technologically - enabled social life become more popular, the isolating effects from the technology based activities and its impact on public life are increasing (Carr, 1992). On the other hand, Dougherty (2005) suggested technology could be one of the amenities to attract the community members to have a new sophistication based upon information freedom. Graham (2004) pointed out that wireless network

technology should be used as a means of energizing public space rather than retreat it into isolating virtual world. Perhaps it's time to use technology to review and rethink about the design of public places. Just because people are working on laptops or smart phones, doesn't mean that they are isolated from the public environment. Instead, a well-designed public space has to provide better setting for different kind of users and activities regardless of wireless capabilities. Meanwhile, let's don't forget about the principle factor for a public space to succeed is "What attracts people most...is other people." (Whyte, 2001)

**Landscape**

Public space not only offers recreational opportunity, but also provides wildlife habitats and the opportunity for a place to breathe. It can be understood that public space should offer a network between people and nature.

An example of a particular focus study relating the influence of well-designed landscape on public space is the text by Carmona (2003). Carmona investigated the landscape in public space designed to provide a sense of repose are usually associated with signal or direction where people stop and rest. It provides a sense of scale, unifies the space by linking the public space to the surrounding buildings. Carmona identified that soft landscaping can be a decisive element in creating character and identity. It can be enhanced by tree planting, which may reinforce or complete a sense of spatial containment, or create a 'space within a space'. Trees and other vegetation express the changing seasons, enhancing the temporal legibility and adding a sense of human scale to public space environment. A good local example can be seen in Brisbane is ANZAC Square: the abundant shade, benches, sitting walls and lawn make the square a popular lunchtime destination (Moore, 2009). Comparing to ANZAC Square, King George Square is an opposite example. Moore (2009) described this Brisbane redeveloped public space as 'a contemporary and angular feel without green aspect'. Moore's study indicated that the speed of public movement is rapid as the space becomes a pass-through space instead of a stop-rest space for public because lack of soft landscaping (Figure 5).

*Figure 5. Brisbane ANZAC Square and King George Square*

The theories of Robinson (1992) on the importance of the landscape in achieving a well functioning public space offer another detailed level of research, he suggested landscape plays an important aesthetic role in adding coherence to other disparate environments, in another word, a crucial role in 'joining up' the environment and users. In another word, landscape creates physically and visually coherent, adds clear identification in places. This could explain why public often recognize and define public space identity through its landscaping.

**Spatial Arrangement**

"We shape our space, thereafter, our space shape us." this text adapted from Winston Churchill provided the fundamental understanding of relationship between public space design and human behavior based on the context of spatial arrangement. It explains the responsibility of the designer of a space and the impact of design decision to the quality of public life. It could be understood that a well designed public space not only has strong influence to the longevity and success of the space but also the quality of public life.

A study from Booth (1983) exhibited the quality of public space through a series of simple diagrams. A single form does not define nor create space; it is just an object in space (Figure 6a). A weak definition of space arise when forms are organized in a long row and there is no co-ordinate relationships between them (Figure 6b). In these situations, the forms are individual, public space become unrelated element without containment or focus, people use these public spaces will have a sense of unsure or unsafe. One of the simplest and most commonly used means of achieving compositional order is placing forms at right angles to another, however this easily create monotonous public space (Figure 6c, 6d).

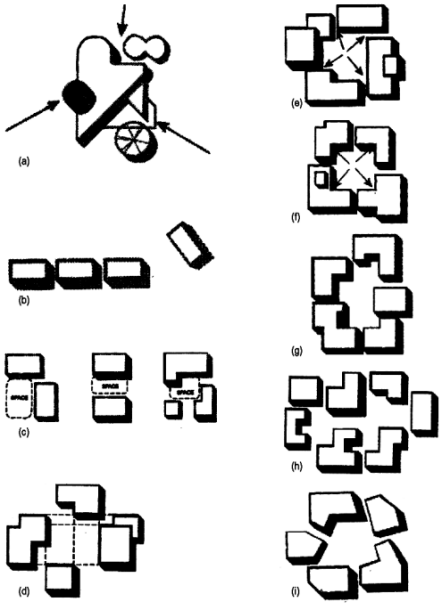


*Figure 6. Booth's principle of spatial arrangement*

Booth's diagram showed the most straightforward means of creating a sense of public space is to group forms around a central space (Figure 6e, 6f), a much stronger sensation of spatial arrangement therefore is made. Given a more varied and complex design, the central public space can have a richer quality with a number of hidden or partly disguised subspace to create a sense of mystery (Figure 6g, 6h). However as a simple space becomes more complex, there is a danger of breaking apart into a disjointed series of separate spaces and causing confusion to people use the space.

Booth suggested creating a force for public entering to experience the public space (Figure 6i), it encourages public to walk though, rather than pass by it (Carmona, 2003). His study indicated that spatial arrangement is the principle of public space design; this principle could be applied, developed and defined a further key factor in creating a stronger sense of public space.

Refelcting to Booth's spatial arrangement principle, a successful example is one of the world's most famouse public space – The Piazza del Campo, Siena. Like Rynek Glowny in Krakow, Piazza del Campo is a public space defines the city (PPS). It set the foremost example of how a public space influence can extend, like the tentacles of an octopus, through the surrounding streets (Figure 7). The curved side of the square provides a very strong active edge with very small breaks for narrow streets that spill into the Piazza. Together, the active edge and the slope of the plaza towards the city hall, provide orientation navigationally, but also offer a comfortable orientation to social gathering and interaction.

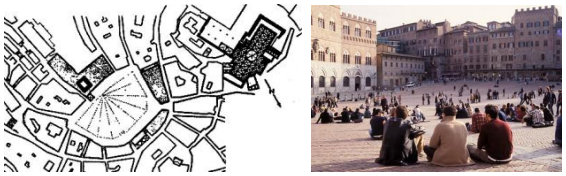


*Figure 7. Piazza del Campo, Siena, Italy*

**Reflection and Gap**

These researches have shown that design elements affect the way people use and perceive a public space physically and psychologically (Table 1). In addition, they influence user's social activities and interactions in a significant way. However, these researches have been done individually within particular emphasis on single element focus, as a result, It lack of deeper understanding of interrelationship between these design elements and their impact to the public space as a whole.

**RESEARCH METHODOLOGY**

The objective of this research is to find out how the design elements influence public space and user's behaviour collectively. In order to achieve this objective, qualitative - methods were applied by using participants observation and in-depth interview. Observation is aim to collect data on naturally occurring behaviours in the public space context while interviews are optimal for collecting data on individual's personal perspectives and experience. These two methods gave the study opportunity to obtain both objective and subjective data.

**Observation – Behavioral Mapping**

Behavioral mapping is a technique that is widely used to study people's locations and actions within a given physical environment (Sommer and Sommer, 1997). Information about movement patterns is typically obtained by observing people, either on-site or through the use of film analysis (Madden and Love, 1982). Therefore, behavioral mapping was used as the basic and first method in this research by observing and video recording of people using the public space. This will allow the research to gather objective data because there is no contact with people in the public space.

The camera was placed for recording during weekday. Several times of observations took place in order to cover both busy and quiet times of the day, such as:

- Morning: 9-10am
- During lunchtime: 12-1pm
- Afternoon: 3-4pm
- Evening: 7-8pm

Visual observation and camera recording were used together to illustrate trends of where people position their paths through the public space and their activity types. By this way, the key circulation and space function characteristics could be observed (Figure 8, 9). Behavioral mapping had allowed the research to collect objective data because there will be no contact with people in the public space.

| Impact | Light & Colour | Technology | Landscape | Spatial Arrangement |
|---|---|---|---|---|
| - Psychological influence<br>- Wayfinding<br>- Pattern<br>- Sensory focus | - Emotional influence<br>- Aesthetic effect<br>-Direction indication<br>- Conscious & unconscious influences | - Interaction<br>- Engagement<br>- New sophistication<br>- Energizing vs. isolating | - Natural aspect<br>- Enhance visual & Physical quality<br>- Recreation & breath<br>- Join up environment & users | - Three dimensional physical understanding<br>- Orientation navigation<br>- Movement and circulation<br>- Quality of spatial sensation<br>- Walk through vs. Pass by<br>- Shape experience & behavior |

*Table 1. Interrelationship between design elements, space environment and user's behavior*

After the video footage was shot, the tape was time-lapsed to better identify trends in the location and activities of the users. Then this data are complied into various place-centered maps (Sommer and Sommer, 1997) to locate where people are positioned and the behaviors they are exhibiting. The objective is to understand how people are using the space and how the design of the space encourage or discourage various activities.

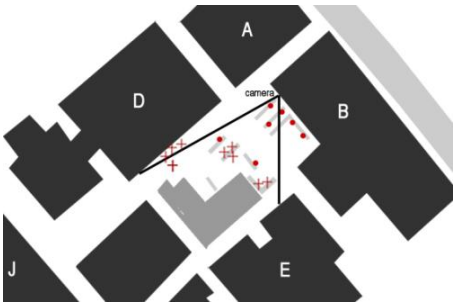



*Figure 8. Example of camera record used for behavioral mapping – the sitting pattern*
*Note: X = people sitting in group; • = people sitting alone*

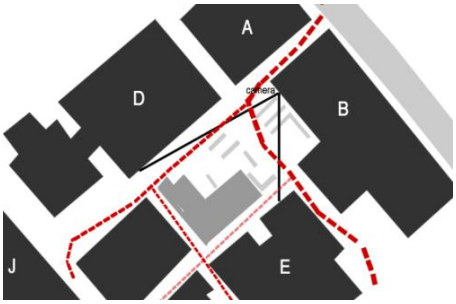



*Figure 9. Example of camera record used for behavioral mapping – the circulation pattern*
*Note: Larger lines indicate heavier traffic*

The "people following" method was also used as part of the observation study in order to investigate the general pattern of use space and people's activities throughout their use. All these data formed a more coherent view of the way people interacted with the entire public space and hence better explained the interaction at the setting at issue.

In order to assess the way people interacted with the public space setting, a recording of the activity inside the public area took place. People were observed and while looking, waiting, reading, eating, stopping or talking and he information was plotted on a behavioral map providing an activity mapping of the area.

**Interview and Cognitive Map**

The second research method was to interview 30 participants from each case study to answer various questions related to the public space design such as:

- How frequent they use the space
- What is their most frequent activity in the space
- Where do they tend to locate themselves and why
- What kind of response do they have in the space
- What they believe the major features of the space
- How they rate the design elements
- What they like or dislike about the design elements

The interview questions were set in the way to capture information from different categories of people at the preliminary phase such as: visitors, students and staff. Blank maps were given to participants to draw to create a cognitive map. Cognitive maps can be understood as mental maps as they provide understanding to user's surrounding in consistent and predictable ways. They are mental representations of a particular environment with which people are familiar (Lynch, 1960). The assumption is that subconsciously people will draw features on the map that are important to them and omit features that are less important or less obvious. For this reason, cognitive maps can be quite different from the actual place they are supposed to represent (Sommer and Sommer, 1997). This method allowed the research to understand participant's need and see how they visualize the place in question.

The interview and cognitive mapping method brought people into the planning and design process. It provided opportunity to understand how people want to use public area and which aspects of the design elements are relevant and important to their needs (Figure 10, 11). This method enabled the research to acquire subjective data, as directly interview the users regarding how functional the public areas will be to their needs.

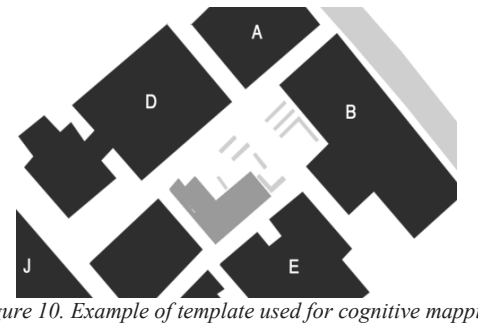



*Figure 10. Example of template used for cognitive mapping*

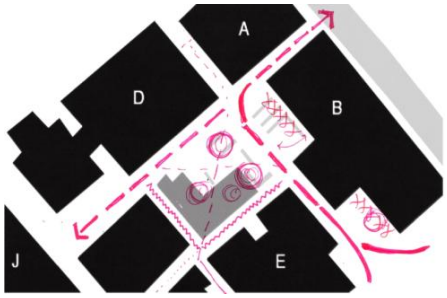



*Figure 11. Example of cognitive mapping from participant*

**Case Studies**

This research chose two local campus public spaces as case studies (Figure 12, 13):

- Queensland University of Technology (QUT): Garden Point, Yard place.
- University of Queensland (UQ): St Lucia, Campbell place.

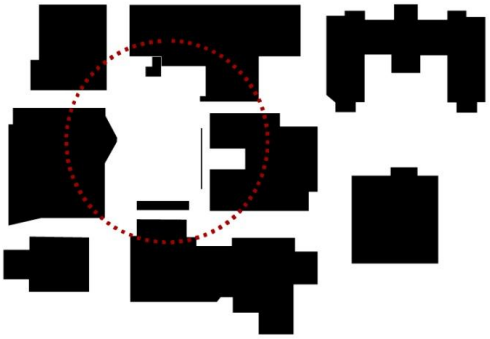


*Figure 12. Case study one: QUT Yard place*

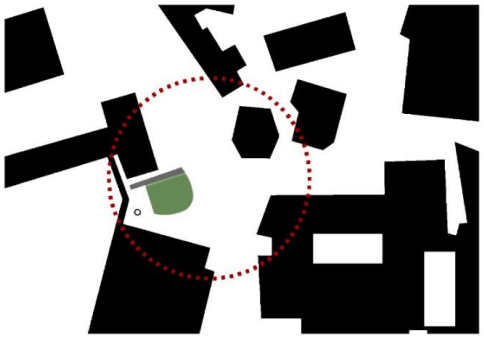


*Figure 13. Case study two: UQ Campbell place*

The reason chose the above campus public spaces because they are representative of urban public space where the study can isolate locations, function and culture because they are more homogeneous that other part of the city. They have similar age groups, ethnic composition and uses. Therefore, this allowed the study to be carried on without affecting by external factors such as location in the city or composition of local population. In addition, between these two case studies there are following similar characters, which provide benefit in the process of generating, matching and comparing data for more accurate result.

- Similar background:
  - Important public space for campus users
  - Centralized place for social activities in campus
- Similar design elements context:
  - Light feature
  - Colour wall/ pattern ground
  - Wireless accessible
  - Landscape and street furniture
  - Open & enclose space, explore & shaded space
  - With major circulation access
  - Nearby café
- Similar activities:
  - Gather, study, reflect, relax, lunch break, pass by
  - Interact with outdoor environment

## ANALYSIS AND COMPARISON

**Colour**

When entering into a public space, users are receiving all sorts of information, however the first thing they assess is its colours, consciously or unconsciously. Color in campus public space has multiple aesthetic and functional applications.

The major colour selection in QUT Yard place belong to warm colours such as warm red, red-orange, light orange, warm brown. They generally lead to higher energy levels (Augustin, 2009). Interestingly, a small amount of cool colours such as light grey, dark grey and light blue are used to set off the major colours (Figure 14, 16). From Figure 17 the colour wheel study, it can be seen that these cool and warm colours are almost directly across from each other on the colour wheel, according to Jeanne (2003) theory, these kind of colour combination normally give the environment
energizing impact.

Compare to the Yard place, the Campbell place in UQ applies different colour scheme: except the sandstone pattern, most of the material belong to cool colour such as dark blue, dark grey, light blue, light grey (Figure 15, 16). Jeanne (2003) pointed out that when several cool colours from the colour wheel that are used together, they are particularly calming, relaxing and pleasant (Figure 17), also with visual impact of enlarging the space and making it less confining. This may explain why in the interviews about responses of the QUT Yard place, 41% of participants responded 'exiting' and 38% responded 'active', while the UQ Campbell place with 46% of participants responded 'calm' and 33% responded 'active' (Table 2).

In public space people tend to feel more comfortable and less confused to look at certain patterns that are mathematically similar to each other (Augustine, 2009). This can be clearly seen in Figure 16, QUT Yard place uses meandering pattern combined with angled and straight lines based on mixed warm and cool colours. This gives intimate and energizing effect to the place, however, the discordant colours and irregular patterns are disturbing visual elements may produce confusion and distraction. In an opposite way, UQ Campbell Place applies simple winding and geometric pattern based on cool colour only, which denote direction and create legibility of subsequence way finding (Figure 18).

*Figure 14. QUT Yard place: colour in big and small scale*

*Figure 15. UQ Campbell place: colour in big and small scale*

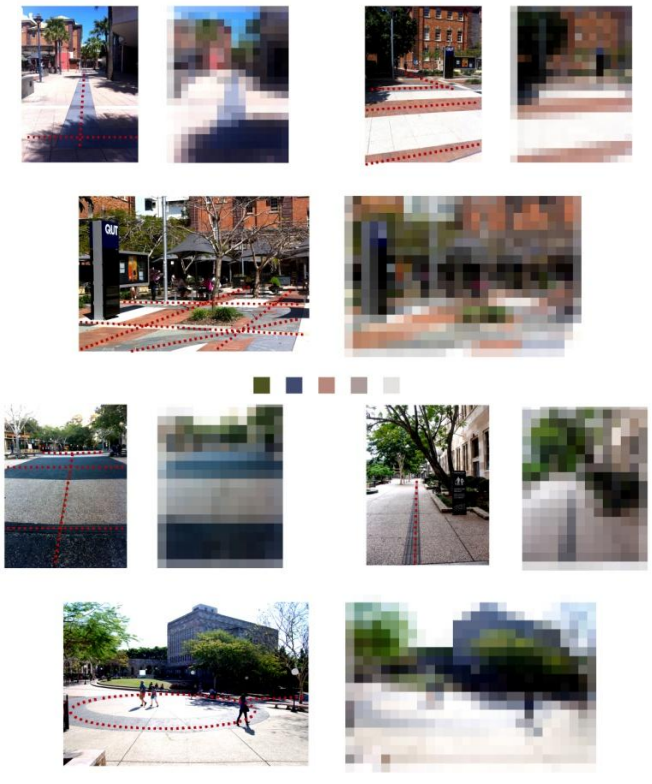
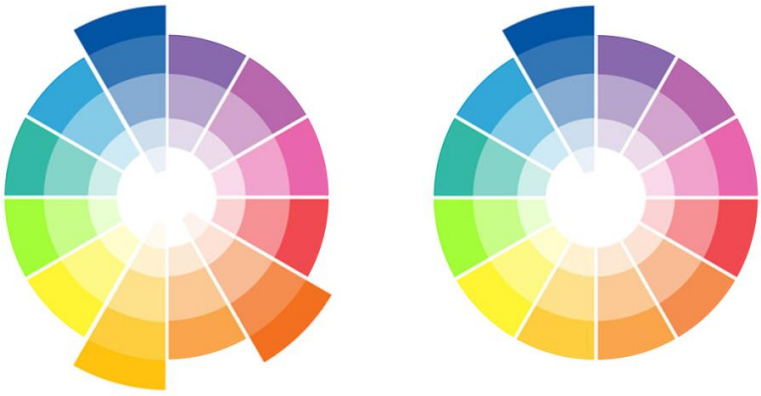


*Figure 16. Yard place and Campbell place: colour pattern comparison*



Yard place colours Campbell place colours

*Figure 17. Yard place and Campbell place: colours comparison by color wheel*

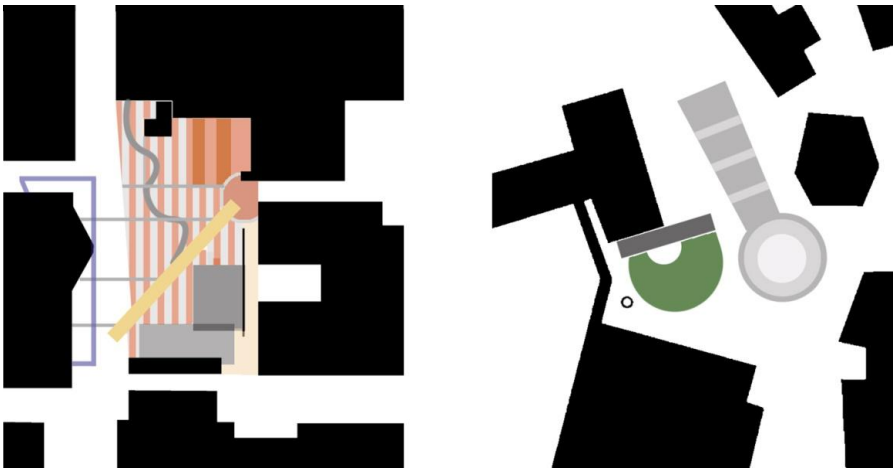


*Figure 18. Yard place and Campbell place: colours comparison by plan view*

| | QUT Yard Place | UQ Campbell Place |
|---|---|---|
| Main colour | Warm | Cool |
| Colour quality rating according to activity impact | 12% excellent 68% good 20% adequate | 56% excellent 33% good 11% adequate |
| Colour Importance | 35% important 65% not important | 48% important 52% not important |
| General response to the place | 41% exiting 38% active | 46% calm 33% active |

*Table 2. Interview and observation result for colour condition*

**Lighting**

People's visual response generally affected by light and colour also the way how they work together. When people are in a place with warm colours light, they will focus on the space they are in and are more active physically. When they are in a space with cooler light colour they focus on their thoughts and reduce the level of physical activity (Jeanne, 2003).

This could be understood that under warmer lights people are more relaxed and under cooler lights they are more alert. In this respect, although lights in both QUT Yard place and UQ Campbell place are positioned next the main route and are used as a direction guide tool to illustrate connections between buildings, however, the different of using lighting colour resulted in different visual response and behavior. The cool coloured lighting

in the Yard place create an environment where people are influenced to increase their awareness and stress level therefore reduce their social activity (Figure 19). This could explain why it becomes a thoroughfare at night where only 15% of participants would stop for meeting friends and 3% for relaxing. Whereas the Campbell place uses warm coloured lighting not only increasing visibility but also creating a more relaxing environment where people feel safe, consciously or unconsciously, which result in a higher level of activity as 31% of participants would stop for meeting friends and 12% for relaxing (Table 3).

According to observation study it has found that there is a major sitting area in the edge of the Yard place however, it has been hardly used during night for its dark and dimly lit condition. Perhaps there is mindful consideration that strangers may behave differently under the lack of lighting and that personal safety may be compromised. Similar to the Yard place, the Campbell place also has a series of sitting area alone its edge but the carefully use of light setting enable users to use the space comfortably also encourage activity maintain at night (Figure 20, 21).

Yard place: cool colour lighting at night

Campbell place: warm colour lighting at night

*Figure 19.Yard place and Campbell place: light colour comparison*

*Figure 20. Yard place and Campbell place: night activities comparison*

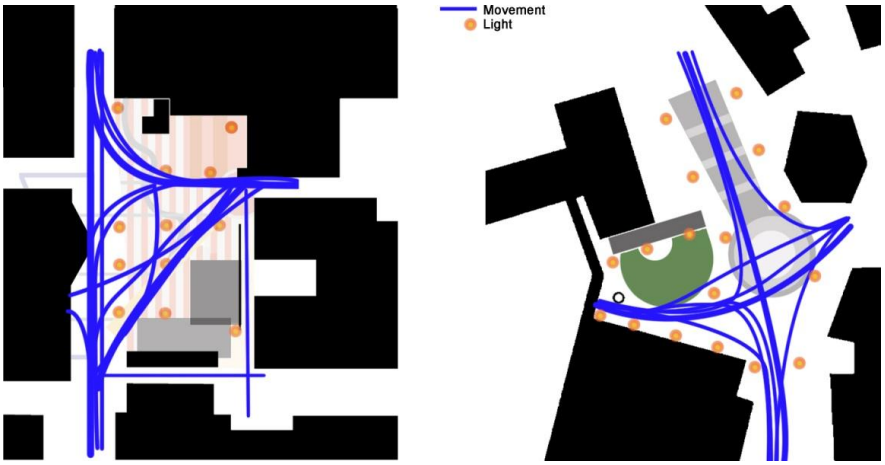



*Figure 21. Yard place and Campbell place: light position and user circulation comparison*

| | QUT Yard Place | UQ Campbell Place |
|---|---|---|
| Direct light number | 12 | 17 |
| Light colour | Cool | Warm |
| Light quality rating according to activity impact | 26% excellent 48% good 20% adequate 6% poor | 67% excellent 23% good 10%adequate |
| Light importance | 24% important 76% not important | 47% important 53% not important |
| Night activities | 82% pass by 15% meet friends 3% relaxing | 57% pass by 31% meet friends 12% relaxing |

*Table 3. Interview and observation result for light condition*

**Technology**

As more people become connected online through wireless technologies in campus, there is a shift in people behavioural patterns including social interaction (Davis and Pease, 2000). Through observation this study has recognised such behavioural pattern and the demarcation between public and private space in both Yard place and Campbell place. There are 42% of participants use technology and 7 2% of them are alone, which means 30% of participants use technology alone in QUT Yard place.Similarly, UQ Campbell place also has comparable situation with 28.5% of people use technology alone.

These figures suggest campus public space activities have tended to moved from the social to the personal and mobile. These behavioural aspects of technologies are not only interesting from sociological perspectives, but also giving influence to campus public space design methodology (Table 4). On the other hand, there are still a large amount of people are not using technology in campus places, their activities tend to be more traditional such as reading books, chatting with friends, having foods or studying with notebook (Figure 22).

Yard place: technological and traditional study methods

Campbell place: technological and traditional study methods

*Figure 22. Yard place and Campbell place: study methods comparison*

| | QUT Yard Place | UQ Campbell Place |
|---|---|---|
| Technology available | Wi-Fi | Wi-Fi |
| Percentage of people using technology | 42% | 38% |
| Using technology alone or in group | 72% alone 28% group | 75% alone 25% group |
| Tech quality rating according to activity impact | 20% excellent 75% good 5% adequate | 78% excellent 15% good 7% adequate |
| Technology importance | 38% important 62% not important | 32% important 68% not important |

*Table 4. Interview and observation result for technology condition*

**Landscape**

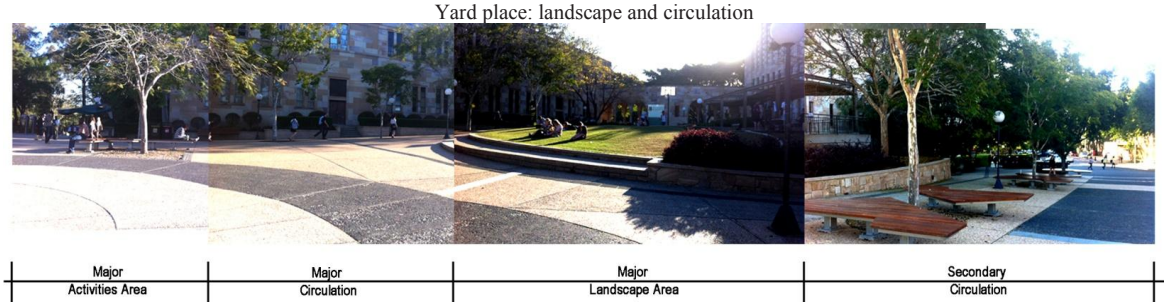
landscape plays an important aesthetic role in adding coherence to other disparate environments, in another word, a crucial role in 'joining up' the environment and users. (Robinson, 1992). Landscape in campus public space provides a sense of repose and it usually associates with signal or direction where people stop and rest. Especially soft landscaping which can be a decisive element in campus public space at creating character and identity.

Both Yard place and Campbell place provide major landscape area to improve the public environment. From study observation, major landscape area at both campuses is located next to the major circulation which means the speed of public movement is rapid. Interestingly, the landscape in the Campbell place reduces the movement speed and turns the space into a stop-rest space, while the landscape in the Yard place somehow still act as a pass-through space for public (Figure 23).

There are 9 trees were planted in Yard place major landscape area to provide shading, enhance the temporal legibility and add a sense of green aspect to the environment, however, it lack of soft landscaping surface (lawn) causes certain level of uncomfortable and unfriendly for users. In an opposite way, Campbell place's major landscape area is explored to sky without any tree for shading, it is a piece of lawn. However, it creates a 'space within a space' for public and provides opportunity for users to get close to the natural ground element. This may explain why it become a popular destination for both group meeting and individual sunning (Figure 24).

This may provide clear explanation of the interview about landscape condition that 58% of participants rated 'adequate' for the Yard place and 69% of participants rated 'excellent' for Campbell place (Table 5).


Yard place: landscape and circulation




Campbell place: landscape and circulation

*Figure 23. Yard place and Campbell place: landscape condition comparison*

*Figure 24. Yard place and Campbell place: relationship between landscape and user's behaviour comparison*

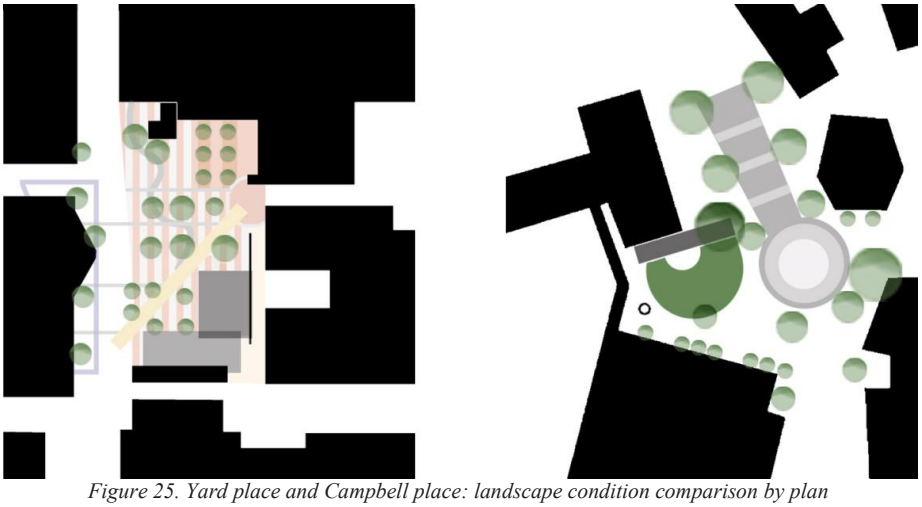


*Figure 25. Yard place and Campbell place: landscape condition comparison by plan*

| | QUT Yard Place | UQ Campbell Place |
|---|---|---|
| Number of trees | 25 | 21 |
| Landscape condition | 85% hard surface<br>15% soft landscape(lawn) | 62% hard surface<br>38% soft landscape (lawn) |
| Percentage of people using soft landscape | 8% | 25% |
| Using soft landscape alone or in group | 45% alone 55% group | 22% alone 78% group |
| Landscape quality rating according to activity impact | 11% excellent 21% good 58% adequate<br>10% poor | 69% excellent 18% good<br>13% adequate |
| Landscape importance | 65% important 35% not important | 81% important 19% not important |

*Table 5. Interview and observation result for landscape condition*

**Spatial Arrangement**

Spatial arrangement in public space such as straight line, corner and curve not only form the spatial quality but also character user's behaviour within it. According to observation, the Yard place spatial arrangement diagram is similar to Booth (1983) diagram (e) which by grouping forms around a space to create a sense of public space in center (Figure 26). The aim of this kind of arrangement is to bring activities from different accesses and directions into the central space. However, according to Yard place user's movement tracking observation study (Figure 27), movement and stopping points are intensive around the center rather than in the centre. It seems that the central public space become unrelated element with lack containment or focus, people use the space with a sense of confusion. This kind of result may caused by un-balanced design elements such as confusing paving colour pattern, landscape position, lights and seats location. It proved that design elements need to be correlated properly to make a good sense of public space.

Whereas the Campbell place spatial arrangement is more close to Booth (1983) diagram (i) which is given a more varied and complex design to the central public space with a number of hidden subspace around to create a stronger spatial quality. It aim of this kind of spatial arrangement is to draw public's attention into the central space, encourage public to walk through it, experience it rather than pass by it. According to Campbell place user's movement tracking observation study (Figure 27), the pattern shows intensive crossing movement and stopping points in the central area, this well match with the aim of its spatial arrangement. In another word, design elements in Campbell place have strong interrelationship to each other and have proper correlation with spatial arrangement to create richer quality of public space.

Seating in Yard place for large numbers gathering located in café sitting area which position in the edge of the Yard place. This is not a significant position for large group seating as people are guided to use the edge of the public space rather than the centre. On the other hand, Campbell place provide adequate seating for large number gathering in its central area. This not only encourage these users to interact with central space but also attract other group of users, as principle factor for a

public space to succeed is "What attracts people most...is other people." (Whyte, 2001). This may explain the interview result about spatial arrangement condition satisfaction that that 26% of participants rated 'excellent' for the Yard place comparing to 73% of participants rated 'excellent' for Campbell place (Table 6).

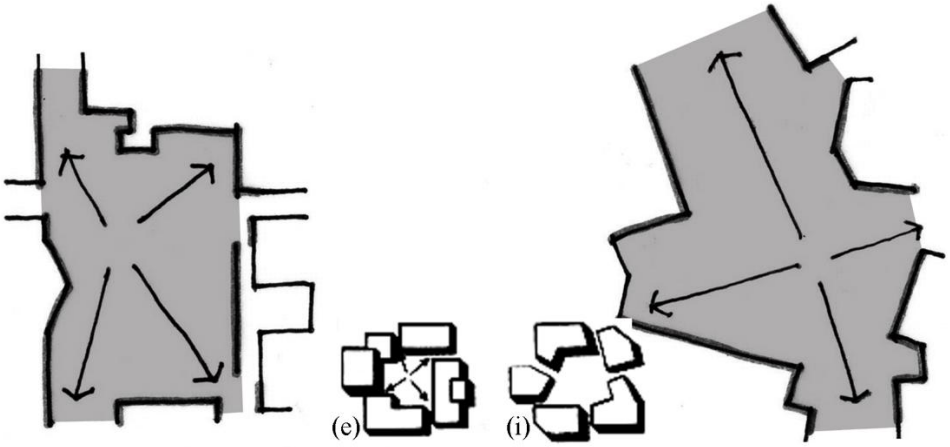



*Figure 26. Yard place and Campbell place: spatial arrangements with reference to Booth (1983) diagram*

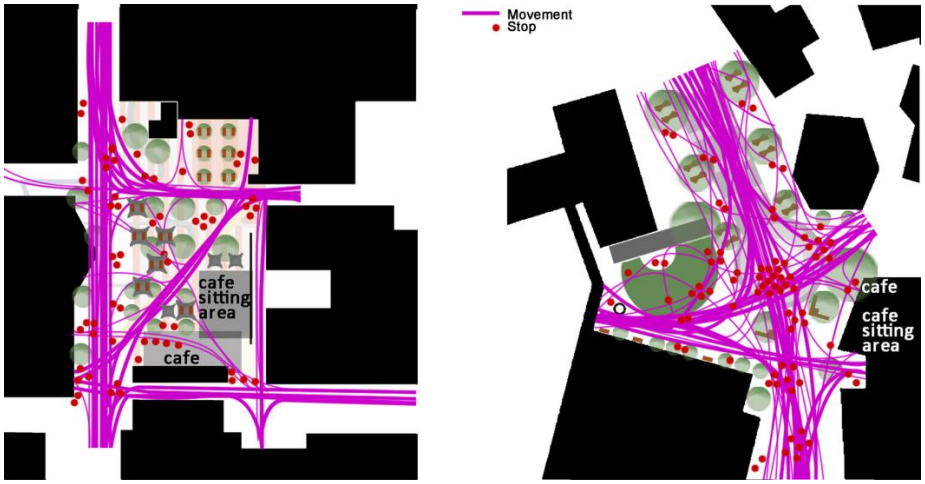



*Figure 27. Yard place and Campbell place: major circulation comparison*

| | QUT Yard Place | UQ Campbell Place |
|---|---|---|
| Number of access | 5 | 5 |
| Percentage of people using edge or centre | 59% use edge<br>41% use centre | 37% use edge<br>63% use centre |
| Number of seat | 12 around the edge, 8 along main circulation<br>25 randomly through the café sitting area | 6 around the edge, 14 along main circulation<br>8 randomly through the café sitting area |
| Use space alone or in group | 38% alone 62% group | 32% alone 68% group |
| Spatial arrangement quality rating according to activity | 26% excellent 34% good 37% adequate<br>3% poor | 73% excellent 16% good<br>11% adequate |
| Spatial arrange importance | 56% important 44% not important | 72% important 28% not important |

*Table 6. Interview and observation result for spatial arrangement*

## DISCUSSION

From the observation and interview study, it indicated that design elements as colour, light, technology, landscape and spatial arrangement provide influence to public user's behavior. Furthermore, among these design elements, landscape and spatial arrangement have more evident visually and physically associated with higher level of user engagement, in another word, they provide further significant impact to the user's behavior in public environment (Table 7). They received more than 50% of participants rating 'important' based on interview result, moreover, according to observation, landscape and spatial arrangement gain more than 50% average use in public space during day and night. Therefore, the following discussion will place emphasis on landscape and spatial arrangement and how they influence to different user groups' behavior, this will allow the study to examine and determine a stronger and more effective interrelationship between design element setting and user's behavior.

Moving path and stopping point show the circulation in public space but also reflect how user response back to the space design. The stopping points mapping (Figure 28) indicated an interesting phenomenon about how users position themselves when they stopped in public space. Individual users are more likely to stop alone the edge or corner of the public space. However, users gathered in group tend to stop in the intersections of pathways or the nodes of different spaces (Figure 29). It could be explained that group users tend to need a bigger space for meeting and individual users are more likely need private and personal space for relaxing. The other reason would be the group users need a significant space where easily to obtain attention as group gathering or waiting for other members, while individual user prefer a protective area for individual space and private time.

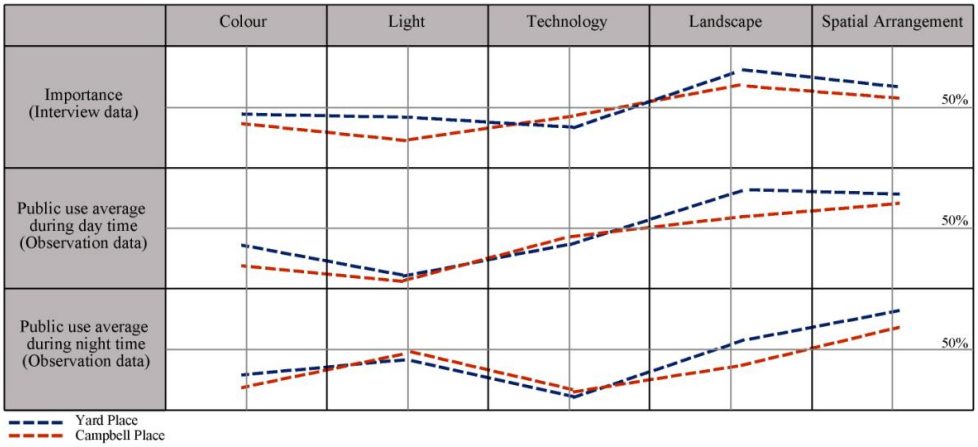



*Table 7. Importance of design elements*


*Figure 28. Yard place and Campbell place: walking paths and stopping points comparison*


*Figure 29. Yard place and Campbell place: user points in stopping points*

From the observations and the interview it was apparent that user's behavior and activity attraction present yet differently according to the design elements in the public place. The result of the observation and movement tracing verified the initial assumption that design elements setting in the public space was affecting the way people use and moved around the area. people tend to position and group themselves differently in a public space according to the environment that design elements created; different size of user groups are significantly and powerfully correlated with the design elements within
the public space.

Different sizes of groups require different physical and psychological needs in a public space. According to the observation, users in public space can be grouped into the following catalogues based on sequence of activities, size of space needed, and different level of behaviors. This enabled the study to gain a better understanding in correlation of environment and grouping.

- Small group (1 to 2 persons)
- Medium group (2 to 4 persons)
- Large group (more than 4 persons)
- Mixed group (vary number of users)

**Small Group**

Small group is made of individual person or a small size of group with 2 persons. Privacy, security and protection from public space are the main concern from these users. Comparing the small group behavior in Yard place and Campbell place, they both tend to locate themselves under shelter or protected areas such as with wall behind or with high density trees around, seating limit to 1 to 2 people, open view to the central place (Figure 30). The different is small group users in Yard place are more likely to stay away from the main circulation pathway while similar users in Campbell place are tend to sit next to the circulation pathway (Figure 31). In the other word, small group users in Campbell place could have better interrelation with other activities in the public space when comparing to the similar users in Yard place. This may be caused by the spatial arrangement and landscape design. From figure 31, Yard place has the offset corner space with high density tall tree as sheltered, which encourage users to 'hide' themselves from the other activities. However, Campbell place has straight wall with high density but low height trees, which allow clear and open visual connection between users by this way to encourage the correlation between groups and activities.

According to small group interview about satisfaction of using public space, there is 48% of participants rated 'excellent' for the Yard place comparing to 72% of participant rated 'excellent' to Campbell place. The observation and interview result both indicated that users from small group are more satisfied and active in Campbell place than Yard place. Open up space for better visual connection and introduce friendly landscape surface might add significant improvement to Yard place small group activity environment.

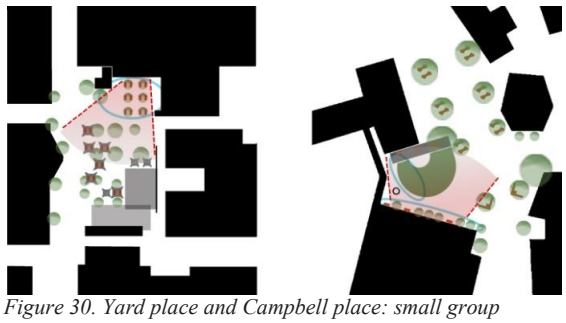


*Figure 30. Yard place and Campbell place: small group activities location*


*Figure 31.Yard place and Campbell place: small group behaviour comparison*

**Medium Group**

Medium group is made of 3 to 4 persons. These users are more likely locate themselves in semi-privacy and semi-protection areas but with open physical and visual connection around. They are more likely stay in these places with seating limit available for 4 to 6 persons surround by medium density of tree.

In Yard place, medium group usually gather in the central space particularly the seating areas appropriate for 4 to 6 persons, with sparse trees and landscape around. Similar to the Yard place, the medium group users in Campbell place tend to locate themselves in the seating areas which also suitable for 4 to 6 persons around the main circulation pathway (Figure 32). However, the Yard place use single umbrella to create individual group gathering environment while the Campbell place use single tree as element to indicated the gathering space. Moreover, the study found that the distance of umbrellas setting in Yard place is closer than the distance of trees setting in Campbell place, which indicated that medium group users in Campbell place have higher physical comfort level as they have more space around them to allow varied activities occur. In comparison, the seating area in central part of Yard place limit the space of activities therefore medium group users have to pushing themselves into a small space instead of spread around like the Campbell place (Figure 33).

According to medium group interview about satisfaction of using public space, there is 68% of participants rated 'excellent' for the Yard place comparing to 76% of participants rated 'excellent' to Campbell place. The observation and interview result both indicated that users from medium group are more satisfied and active in Campbell place than Yard place. It could be improve by providing opener space to allow more activities into central area, introducing better landscape elements such as soft surface and clear tree position layout setting to encourage users to engage into the area also have physical freedom to spread around.

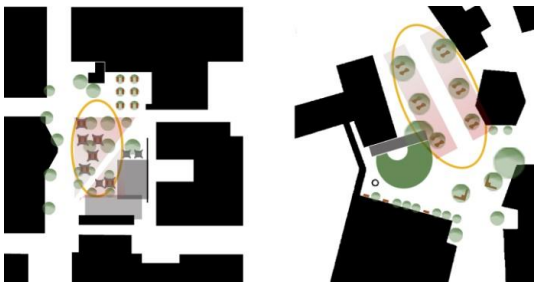


*Figure 32. Yard place and Campbell place: medium group activities location*


*Figure 33.Yard place and Campbell place: medium group behaviour comparison*

**Large Group**

Large group usually contains more than 4 users. They are the users who demand the larger space in public space and it is normally central located. The area where large groups would locate themselves also reflects the concentration ratio of the public space. Open space for flexible movement and convenient communication is the key for large group users to allocate their spaces. In Yard place the large groups are normally locate themselves the café area as this is the only place provides adequate seating for large group gathering. However, it is not a significant position as it is located in the edge of the Yard place which means large number of people in the public space are leaded to use the edge rather than the centre of the area (Figure 34). On the other hand, Campbell place provide adequate seating for large number gathering in its central area. This not only encourages users to interact with central space but also attract other group of users (Figure 35).

From the interview result about satisfaction of using public space, there is 52% of large group participants rated 'excellent' for the Yard place whereas 64% of large group participants rate 'excellent' for Campbell place. From the observation and interview result it was apparent that the users from large group are more satisfied and active in Campbell place than Yard place. Shift or extend

the seating location for large group from edge to central area will affect the interaction pattern of movement within the Yard place, therefore, encourage people to walk more to and through the central area, not only increase the activity level but also the identity of the area will be much more focused.

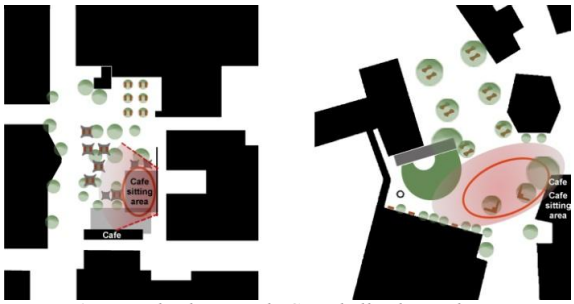



*Figure 34. Yard place and Campbell place: large group activities location*


*Figure 35.Yard place and Campbell place: large group behaviour comparison*

**Mass Use Group**

Mass use group are made up of individual, small groups, medium group or large groups. From the observation, it was apparent that the main characters of the area where mass use group distribute themselves are the openness and people. It has to be a place that has enough flexibility to accommodate 1 person and 20 persons at the same time. Moreover, it provide widely open physical and visual connection to the rest of the public space, radically, it is the area where draws public attention the most within a public space. More importantly, it is the area that attracts the first user and the rest will follow. The areas where mass use group locate themselves at Yard place and Campbell place contain both above characters.

In Yard place, the members of mass use group tend to use the stairs platform in the entrance area of Block D (Figure 36). This widely opens area opposite to the central area and has higher ground position to allow visual connection to the rest of the public place. In Comparison, the members of mass use group in Campbell place are more likely allocate themselves in the heart of the public place – the lawn. Its easy access soft landscape surface and extensively open area defined a rich sense of public space. It provides the opportunity to share and interrelate different user groups and activities between them.

It can be seen from figure 37 that the stair platform in Yard place is less formal and less comfort than the lawn area in Campbell place. This could interpret the interview result about satisfaction of using public space, there is 74% of mass use group participants rate 'excellent' for the Yard place while 82% for Campbell place. From both observation and interview result it indicated that the members of mass use group from Campbell place have higher satisfaction than the ones from Yard place. Adding comfortable space for seating and waiting around stair platform area will give significant improvement to the physical comfort level and increase the activity level.

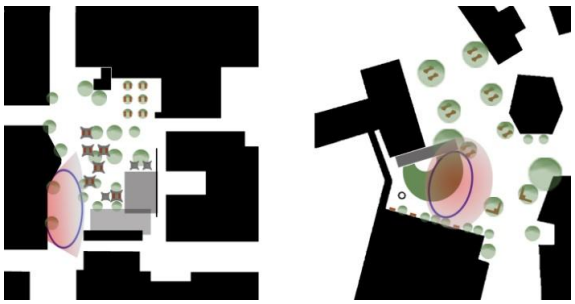


*Figure 36. Yard place and Campbell place: mass use group activities location*


*Figure 37. Yard place and Campbell place: mass use group behaviour comparison*


*Figure 38. Yard place and Campbell place: user groups location mapping*

In summary, the discussion indicated a clear picture that different user groups act differently according to the design elements situation especially the landscape and spatial arrangement setting within the public space (Figure 38). Design element should be cooperated in practical way to influence and satisfy different user groups in positive method, such as high density landscape works with partly closed spatial arrangement to provide private and comfort space for small group, while soft landscape combine with open central space to able physical and visual connection to attract large and mass use group users. A well designed public space contains balanced design elements setting and awards positive impact to the longevity and success of the space.

## CONCLUSION

This study has tried to bridge two very distinct disciplinary worlds, that of architectural design on the one hand and of behavioral psychology on the other. Drawing upon existing literature, this study has applied the knowledge of theory and tested the validity of analysis for design elements relate to user behavior in public space. In order to investigate the interrelationship between design and public behavior, the method used in this study was combination of observation and interview which were undertaken in two local campus public areas as case studies.

The study is the first exploration of public space study regarding to its correlation of design elements. It has provided a preliminary understanding of the interrelation between architectural design and use of space. It gained a deeper perceptive between the design elements and the user's response, consequently improve social activities and interactions in public space. It has proved and explained that design elements such as colour, lighting, technology, landscape and spatial arrangement are powerful tools for influencing and guiding user's behavior within public space. Furthermore, spatial arrangement which associated with higher level of user engagement, in another word, they provide further significant impact to the user's behavior in public environment.

The results of this study provided a connection between architectural design and behavioral psychology based on public space environment. It lend support to the direction that design elements could be cooperated together in practical way to improve the public environment, imagines, function and experience in positive method.

It is important to note that although this study was conducted in Brisbane, the approach is also advantageous in contributing to the understanding of many similar sites in broader topic of public space throughout the world. This research therefore will have value in a much wider context than Brisbane region.

## ACKNOWLEDGMENTS

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## APPENDIX

Interview Questionnaire

Queensland University of Technology
Brisbane Australia

**PARTICIPATE IN RESEARCH**

**Information for Prospective Participants**

*The following research activity has been reviewed via QUT arrangements for the conduct of research involving human participation.*
*If you choose to participate, you will be provided with more detailed participant information, including who you can contact if you have any concerns.*

**Architectural Theory and Research 02**

**Research Team Contacts**

| | |
|---|---|
| Ying Ding — Postgraduate Student | Dr. Mirko Guaralda – Unit Coordinator |
| School of Design | School of Design |
| Faculty of Built Environment and Engineering | Faculty of Built Environment and Engineering |
| Phone 04 3364 3250 | Phone (07) 3138 2464 |
| Email y3.ding@connect.qut.edu.au | Email m.guaralda@qut.edu.au |

**Please contact the researcher team members to have any questions answered or if you require further information about the project.**

***What is the purpose of the research?***

The purpose of this research is to improve social activities and interactions in campus public space by gaining deeper perceptive between campus design and user's behaviour.

***Are you looking for people like me?***

The research team is looking for people who often use QUT Garden Point Campus.

***What will you ask me to do?***

Your participation will involve.

***Are there any risks for me in taking part?***

The research team does not believe there are any risks for you if you choose to participate in this research.

It should be noted that if you do agree to participate, you can withdraw from participation at any time during the project without comment or penalty.

***Are there any benefits for me in taking part?***

It is not expected that this project will benefit you directly.

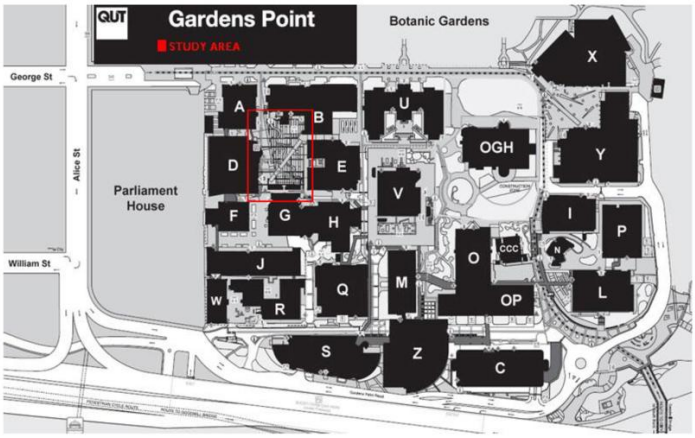
***I am interested – what should I do next?***

*If you would like to participate in this study, please contact the research team for details of the next step.*

*You will be provided with further information to ensure that your decision and consent to participate is fully informed.*

***Thank You!***

**QUT Approval Number:** *1000000691*



**1. Are you**

| | Age under 20 | Age 20 - 30 | Age 30 - 40 | Age 40 - 50 | Age 50 - 60 | Age after 60 |
|---|---|---|---|---|---|---|
| QUT Student | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| QUT Staff | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Public Visitor | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Female | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Male | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**2. How often do you use this campus public spcae?**

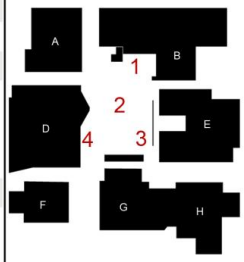
| | Very often | Moderately often | Slightly often | Not at all often |
|---|---|---|---|---|
| Morning | ○ | ○ | ○ | ○ |
| Noon | ○ | ○ | ○ | ○ |
| Afternoon | ○ | ○ | ○ | ○ |
| Night | ○ | ○ | ○ | ○ |

**3. What is your most frequent activity in this space? and where about(see map below)?**

| | 1-Edge seats under shading | 2-Central open area | 3-Cafe area | 4-Stair and pathway |
|---|---|---|---|---|
| Meet friends | ○ | ○ | ○ | ○ |
| Eat | ○ | ○ | ○ | ○ |
| Have a break | ○ | ○ | ○ | ○ |
| Study | ○ | ○ | ○ | ○ |
| Pass by | ○ | ○ | ○ | ○ |
| Intimate | ○ | ○ | ○ | ○ |

**4. Do you prefer to have more:**

| | 1-Edge seats under shading | 2-Central open area | 3-Cafe area | 4-Stair and pathway |
|---|---|---|---|---|
| Soft Surface-trees/lawn | ○ | ○ | ○ | ○ |
| Hard Surface-paving | ○ | ○ | ○ | ○ |




**5. What kind of responses do you have in this space?(Multiple answers)**

| | Strong | Fair | Poor |
|---|---|---|---|
| Exciting | ○ | ○ | ○ |
| Stimulating | ○ | ○ | ○ |
| Active | ○ | ○ | ○ |
| Calm | ○ | ○ | ○ |
| Tender | ○ | ○ | ○ |
| Secure | ○ | ○ | ○ |
| Degnified | ○ | ○ | ○ |
| Contemplative | ○ | ○ | ○ |
| Defiant | ○ | ○ | ○ |
| Intense | ○ | ○ | ○ |
| Cold | ○ | ○ | ○ |
| Warm | ○ | ○ | ○ |
| Hot | ○ | ○ | ○ |
| Privacy | ○ | ○ | ○ |
| No-Privacy | ○ | ○ | ○ |
| No Feeling | ○ | ○ | ○ |

Other (please specify)

**6. What type of technology do you normally use in this area?**

**7. What is the general quality from the following elements according to the impact to your activities in this space?**

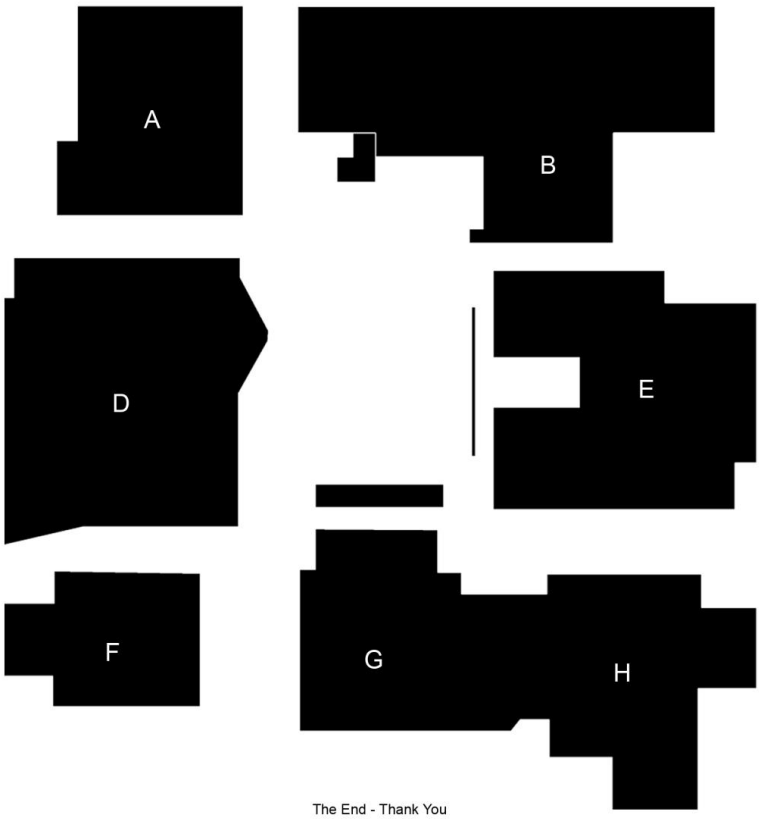
| | Important | Not Important | Excellent | Good | Adequate | Poor |
|---|---|---|---|---|---|---|
| Lighting | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Colour satisfaction | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Landscape | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Technology | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Space arrangement | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Other (please specify)

**8. What do you suggest to improve the design environment of this area?**

**9. Please indicate your circulation path through this space**

--------- Walking Path
x Stop point




The End - Thank You

2012 QUThinking Conference, School of Design, QUT, Brisbane, 09 November 2012

# REJUVENATING LOST AND DISUSED SPACE WITHIN FORTITUDE VALLEY:
## A Study into the Effectiveness of Urban Greenery in Subtropical Public Space

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*ABSTRACT: An issue gaining prominence in our urban environments in the notion of lost space, the undesirable urban areas that are in need of redesign, commonly caused by a focus on development as individual architectural entities, without a greater view of the urban environment as a holistic entity.*

*Within the context of South East Queensland, the suburb of Fortitude Valley has been earmarked for development as an extension of the current CBD. With lost and disused spaces already existing throughout the suburb due to rapid growth and mismatched developments, recent planning regimes have proposed rejuvenation in the form of proposals that echo typologies from other Australian regions, such as the laneway typology from Melbourne. Opportunities exist in these spaces for design approaches that relate specifically to the individual and unique subtropical character of the area.*

*This research explores the relationship between innovative approaches towards urban greenery as a means to rejuvenate lost and disused public space, and its suitability within a subtropical climate, specifically focused within the suburb of Fortitude Valley. A trend gaining prominence is the notion of biophilic cities; cities that integrate urban greenery as a means to provide vibrant public spaces, and meet the growing aesthetic, social, cultural and economic needs of our cities. Through analysis of case studies showcasing greenery in an inventive way, observations of public using subtropical public space, and a discussion of the current policy frameworks at place within Fortitude Valley, innovative uses of urban greenery is proposed as viable placemaking technique in subtropical urban environments.*

*Keywords: lost space, disused space, South East Queensland, Fortitude Valley, rejuvenation, subtropical, placemaking, biophilia, urban greenery, innovative design*

## INTRODUCTION

Fast paced development, in conjunction with a focus on the automobile and public transportation systems has led to cities developing into disjointed urban environments. Due to this fragmented development of urban milieus, underused and deteriorating spaces have formed, creating cracks in what should be a unified city environment. For designers, it is these lost spaces that provide interesting opportunities to reclaim crucial land within our city centres, and introduce new social and symbolic spaces to regenerate the city and its character.

The notion of lost space has been discussed broadly in literature. Whilst there is thorough analysis of how lost space occurs, there is little development in regards to specific solutions. Whilst Jane Jacobs first discussed the concept behind the idea of lost space in her 1961 text "The Death and Life of Great American Cities", in which she outlined societies incompetency to create viable urban settings that integrate automobile uses with the urban fabric successfully, it was Roger Trancik who first developed this concept into the term 'lost space'. Within his text, 'Finding Lost Space: Theories of Urban Design' (1986), Trancik discussed in great detail the negative impact the automobile has had upon the urban fabric of cities, particularly in regards to the displacement of focus on external functional space towards internal building organization. As stated by Trancik, "we have transformed the city of collective spaces into a city of private icons" (1986, 17). This has in turn forced city dwellers to create a social life based on personal, controllable territory, instead of engaging with community existence centred around the street; a substantial criteria within placemaking ideologies (Trancik 1986).

This emphasis on internal environments, in conjunction with an increased focus on vehicular transportation systems, resulted in these 'lost spaces';

"the undesirable urban areas that are in need of redesign – antispaces, making no positive contribution to the surroundings or users" (Trancik 1986, 3). These spaces are typically ill defined, and fail to connect elements in a coherent way. Examples of such spaces are given as surface parking lots, edges of freeways, abandoned waterfronts, train yards, deteriorated parks, and forgotten laneways. Lost space can even include lifeless walls of buildings, or poor linkages between the ground plane and high-rise buildings (Trancik 1986, 3). It is necessary to rethink this mono-functional realm of infrastructure, discusses Mossop, stating, "it is time to engage with these landscapes that have been so poorly served by design. They have been a kind of shadow city, inhabited only by default" (2006, 173).

Within the context of South East Queensland, the fastest growing region in Australia, fractures are already becoming apparent in the inner urban fabric of the capital city, Brisbane. Whilst some of these 'lost spaces' are earmarked for redevelopment and rejuvenation by taskforces such as 'Urban Renewal Brisbane', design approaches commonly lack an ingrained understanding of the unique aspects of these lost spaces that could potentially inform a greater, more sensitive and innovative way of use. The subtropical character of these environments is sometimes disregarded when approaching the rejuvenation of lost or disused public space, in favour for proposals that mimic typologies from other (climatic) regions in Australia, such as the Melbourne laneway typology (Feeney 2012). Whilst such proposals may seem a viable option for the rejuvenation of lost and disused spaces, they lack an embedded connection to the specific place, and character of the space itself.

Inspired by a key aspect of subtropical environments, vegetation, the notion of incorporating greenery into urban environments is providing to be a beneficial tool in not only enhancing public space visually, but also within its function. The widespread benefits of greenery in urban environments has been widely discussed, primarily stemming from the term 'biophilia' which refers to the hypothesis developed by Edward Wilson in which "nature holds the key to our aesthetic, intellectual, cognitive and even spiritual satisfaction" (1984). Humans seem to have an instinctive connection with other living systems, becoming a "paradoxical part of the human spirit" (1984, 10). This hypothesis has found its way into the architectural realm as a way to improve the built environment. Whilst the incorporation of greenery in public spaces is unmistakably already a popular notion, the opportunities involved with incorporating innovative uses of greenery, particularly into lost and disused space as a placemaking technique, is currently undervalued.

The purpose of this study is to decipher the successfulness of innovative uses of greenery in previously lost or disused spaces, through case study analyses of proposals against public place theories. These case studies are coupled with observations in regards to the responsiveness of the public to greenery in urban public spaces in an inner city suburb of Brisbane. The findings of this research contribute towards a greater body of research in aid of a possible development of a new framework for the treatment of these lost and disused spaces in subtropical urban environments, with particular focus upon the Fortitude Valley suburb of Brisbane.

## EXISTING LITERATURE

With the increasing urban populations across the world, inner city lost space is an essential aspect in creating a more compact and collective urban pattern. When discussing urban environments and public spaces, it is crucial to understand that there is more to a city than its buildings (Gehl 2010). Streets and in between spaces should be spatial entities, rather than what is merely left over after the buildings are built. An understanding of the importance of these public spaces between buildings is crucial to positive urban design within city environments in the future. An in-depth background study into urban public space theories, alongside research in regards to biophilic benefits within urban environments, provides theoretical insight into successful public spaces and how these can be enhanced through urban greenery. As public space plays an important role in the social, environmental and economic fabric of all cities, for a public place to succeed it is essential the space provide appropriate facilitation of the needs of the users, and a connection to the place in which the public space is located. For this reason, the following theoretical research is discussed in regards to two greater categories; the needs in public space, and placemaking in public space.

### Needs In Public Space

The value of public space as areas for people to use in a magnitude of ways is vital in ensuring public spaces can function to serve societies needs. As discussed by Sieh and Tiesdell, "good places have good connectivity, mixed uses, active frontages and are pedestrian friendly. More than this however, good places are sustainable and successful: they are places where people want to live, work, rest, play and invest" (2010, 39). Discussing public space from a human perspective, Sieh and Tiesdell (2010) continue to discuss the symbolic function of public space, and how value should be placed on these spaces due to the interaction within day-to-day life it facilitates.

This notion of designing for the human perspective is supported by Carr, Francis, Rivlin and Stone (1992), who discuss the importance of public places functioning to serve these needs. An understanding of public places, and their use by people is essential in order to speculate and design for such qualities. Carr, et. al. (1992) calls attention to the needs for spaces that are comfortable and properly oriented, spaces that account for people's needs in public spaces; focusing predominantly on the areas of comfort, relaxation, passive engagement with the environment, active engagement with the environment, and discovery. The place itself must provide the stimulation that enables users' interest to endure for an extended period of time, or the space will fail (Carr et. al. 1992). Gehl (2010) promotes similar ideologies within his discussion of the lively city and the lifeless city. Gehl states that "life is a city space is all-encompassing: from momentary glances to minor events, to the largest collective manifestations. Walking through common city space can be a goal in itself – but also a beginning" (2010, 29). This supports the notion that there is a crucial link between the human dimension and how one perceives the general quality of city space. Through the treatment of city edges and to activate street frontages, minor changes that can impact ones perception of a space can reinstall new life into an urban environment (Gehl 2010). Through renovation of a single space, people are invited to a totally new pattern of use (Gehl 2010).

Urban greenery can be used as a way to respond to this aspect of human perspective; Kaplan, Kaplan and Ryan's text 'With People in Mind' (1998) discusses the role of everyday nature as a means to enhance and provide interest in every day life. As discussed by Kaplan, Kaplan and Ryan, "people tend to be fascinated with natural processes, such as growth, succession, predation, and even survival itself" (1998, 20). Using greenery to reinforce the areas of comfort, relaxation, passive engagement, active engagement and discovery can help reduce stress and refresh the mind. By providing restorative settings experienced through greenery, one can recover from the "mental fatigue of urban life" (Kaplan, Kaplan and Ryan 1998). This notion of restorative benefits is supported by Brengman, Joye, Willems and Wolf (2009) who discuss the healing effects greenery has upon human individuals. By emotionally relating to natural elements in positive ways, the mind is able to refresh and restore the ability to focus and direct attention (Brengman et.al. 2009). This is also echoed by Kellert (2005), who documents the diverse psychological and health related benefits of peoples contacts with nature; including reductions in stress, increased peace of mind, enhanced coping mechanisms, improved physical fitness and greater creativity levels. With studies showing that green environments are consistently preferred over non-green urban settings or environments dominated by artefacts, there is substantial evidence to promote the use of greenery as a strategic tool, particularly within urban environments (Kellert 2005).

**Placemaking in Public Space**

An important aspect of public space design is the structure and underlying dynamic activity; it is crucial to conceptualise fully what the meaning of place within an urban environment means. The notion of placemaking and sensory experience in relation to how one perceives a space reinforces the importance that activities, events and the sites' relationship to the greater context holds in regards to influencing ones perception.

Jane Jacobs' 'The Death and Life of Great American Cities' (1961) discusses the notion of placemaking within cities as fuelled by intricate and close-grained diversity of uses that give each other constant, mutual support. Urban quality is produced through this mutual relationship, thus the cities are given the capability of providing something for everybody (1961). This layer of supported activity within urban environments creates lively, diverse and intense cities, which "contain the seeds of their own regeneration, with energy enough to carry over for problems and needs outside themselves" (1961, 448). Kevin Lynch discusses this concept somewhat similarly in 'The Image of the City' (1960), stating that this support network is based upon the inhabitants individual perceptions. As stated by Lynch, "nothing is experienced by itself, but always in relation to its surrounding, the sequences of events leading up to it, the memory of past experiences" (1960, 1). Lynch discusses the notion of individuals producing 'mental maps' which use their sense to decipher if a space is inviting or successful (Lynch 1960). This discussion positions public space as an object that must have some meaning to the observer, fuelling further production of properties that can create such meaning; the use of paths, edges, districts, nodes and landmarks within urban environments (Lynch 1960). The outcome of Lynch's discussion is a spaces ability to change, its open-endedness, and the opportunity for individuals to "continue to investigate and organise reality" (1960, 9).

This notion of a connected network within a city environment can be achieved through the incorporation of greenery. As discussed by Wall (1988), landscape within urban environments can be seen as an active surface, which structures the conditions for new relationships and interactions among the things it supports. Wall emphasises the urban surface as dynamic and responsive; "like a catalytic emulsion, the surface literally unfolds events in time" (1988, 233). Through looking at urban greenery as a network of connected spaces, "it allows for the transformation of the ground-plane into a living, connective tissue between

increasingly disparate fragments and unforeseen programs" (1988, 235).

Individual exploration within public space is supported by Montgomery's (1998) discussion on what constitutes quality within public space, and the sense of space. Montgomery discusses that whilst physical elements produce urban quality (for example, architectural form, landmarks, vistas, meeting places, etc), the notion of place is produced through the social, psychological and cultural dimensions of a place (1998). Based on a correlation of prior studied conducted by Jacobs, Gehl and Lynch, Montgomery outlines the three crucial aspects that create a successful urban space; activity, image and form (refer to Figure 1.) By combining these three crucial aspects, a sense of place, and therefore a diverse and engaging public space can be created.

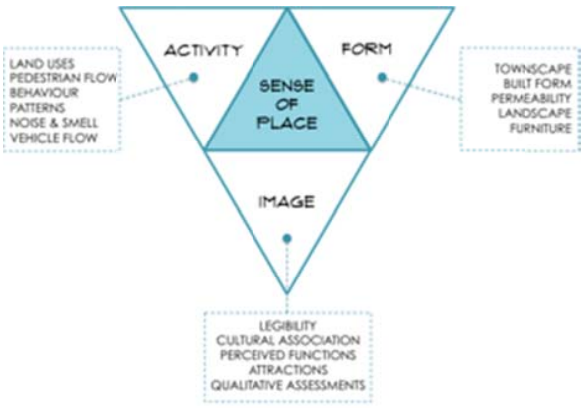



*Figure 1. Components of a sense of place (Redrawn from Montgomery 1998, 96)*

This analogy is supported by Bain, Gray and Rodgers within the book 'Living Streets – Strategies for Crafting Public Space' (2012), who state that placemaking springs from understanding the local conditions of an area, and recognising the opportunities that the conditions and culture can offer. It is the unique local culture of a space that provides a sense of place, and a setting to which inhabitants can centre themselves (Bain, Grey and Rodgers 2012). Bain, Gray and Rodgers (2012) place emphasis upon placemaking incorporating the ability to cultivate connectedness; the interchange of ideas and shared experience brings vibrancy to a place. As public spaces are "important hearts of civic life" (2012, 22), emphasis should be placed upon the connection between inhabitants and the physical city itself, as well as between the people in it.

Urban greenery can provide opportunities for sensory experiences within the urban environment. As discussed by Beatley "experiencing nature in cities is as much about hearing, smelling and feeling as it is about seeing" (2011, 36). This incorporation of senses is a crucial factor in the creation and success of public spaces. As supported by Kellert (2005), biophilic city design can improve society's sense of connection, affiliation and attachment to the places they work and reside; it can enhance people's physical and mental connection to nature and culture.

**Biophilic Cities**

In order to discuss innovative methods of urban greenery integration, it is essential to discuss how greenery has been positioned and discussed in regards to urban environments. Previously, too much emphasis has been placed upon open space being placed within urban environments; open spaces that are only green in the sense of being somewhat vegetated. As discussed by Turner (2005), it is essential to create networks of environmentally sustainable public space throughout our urban environments. Biophilic cities allows man to coexist with nature in an urban context; "too often one has the feeling that our civilisation is obliterating the natural environment" (Turner 2005, 275). Turner (2005) continues to discuss the importance in each space having its own special character; it's role within the city, with qualitative rather than quantitative demands. As stated by Kellert (2005, 123);

"We will never achieve an ethical architecture that is beautiful and sustainable until nature is integral and at the core and at the substance of being of the architecture, not added on. If it aint beautiful, it can't be sustainable. Buildings must shelter and inspire."

Nature must be integral to our urban spaces in order to provide a space full on vitality, diversity and identity.

Greenery must be considered as a critical system within our cities. Spirn (1985) discusses the need to understand and design for both the natural ecosystem, and the social system that is driven by cultural, political and economic processes. The city's physical environment is the common ground between the natural ecosystem and the cultural, political and economic processes; it is this environment that becomes most crucial to reinvigorating urban space (Spirn 1985). Landscape has come to encompass much more than simple parks or gardens; engaging disused space and the exploding needs of the population - landscape is replacing architecture as the basic building block of contemporary urbanism (Waldheim, 2006).

Literature suggests that nature holds the power in helping humanise and reinvigorate distressed cities and built environments, whilst still bringing out the best in humanity. As stated by Kellert, "despite the evident connections, contemporary society still fails to recognise and defend the importance of healthy and diverse natural

systems to sustaining the quality of people's lives, especially in urban areas" (2005, 3). It is these spaces surrounding buildings and streets that present the opportunity to inject and insert natural elements. Whilst it becomes increasingly difficult to reimage the existing hard surfaces of our built environments as opportunities for inserting green life, opportunities exist in vertical and horizontal surfaces to infuse nature. Green walls, elevated environments and sidewalks provide the possibility of reintegration of greenery in urban settings where it is least expected in society's lost and disused spaces, producing profound positive impacts within our urban environments that respond distinctively to the context of each space (Kellert 2005).

## RESEARCH CONTEXT: FORTITUDE VALLEY

In the context of the South East Queensland region, there have been recent initiatives to rejuvenate and revitalise overlooked and forgotten spaces in Brisbane. The 'Vibrant Laneways and Small Spaces' program, initiated by Urban Renewal Brisbane, aims to create places that celebrate the creative arts, improves pedestrian access within the city centre, and promotes shopping, dining, mixing and mingling (BCC 2011). Whilst this scheme can be faulted for only focusing on the laneway typology, it is a distinct step forward for discussions relating to lost and disused space in the context of South East Queensland.

Laneways are crucial spaces within cities across the world. More recently, as discussed by Farquharson (2009), they are being positioned as opportunities for internal urban growth that promotes increased density, preventing sprawl. As they make up typically 20 to 30 percent of urban space, there are substantial opportunities for laneways to add to the vibrancy of neighbourhoods and downtown areas (Farquharson 2009). However, as discussed by Guaralda and Kowalik (2011), planning programs and initiatives in the South East Queensland region have been faulted in the past for creating typologies that are then delivered in fragmented ways without an overall strategy or consideration of site identity. This has created a somewhat doubtful response to such schemes.

As discussed by Fenney (2012), Brisbane locals have voiced concerns in regards to the capacity for such proposals to flourish within the local environment, and the blatant copying of the laneway typology at place within Melbourne. With the Brisbane laneway scheme fuelled primarily through government support, there has been concerned raised about the urban quality that may result from such initiatives (Fenney 2012). Criticisms have also been made in regards to the segregated nature of the program which focuses only on the inner CBD of Brisbane, and disregards the neighbouring Fortitude Valley suburb, which is in just as much, if not more, need of rejuvenation (Calligeros 2009). Whilst there are other regeneration schemes for the suburb of Fortitude Valley, these do not place emphasis on the lost and disused spaces scattered throughout the suburb. Proposals that nurture the individual identity of each space are necessary to ensure vibrant spaces that embrace the subtropical nature of the region.

Identity, in conjunction with understanding the use of the space is paramount in this research area; when discussing lost space within the urban environment, it is extremely important to understand the difference between lost space and disused space. Whilst disused space may display similar qualities to lost space, they are still providing a functional aspect to the urban quality, thus are crucial to the urban fabric. Disused spaces, such as laneways, must be considered with utmost diligence to provide spaces that display a sense of identity and place, whilst still performing their functions.


*Figure 2. Fortitude Valley Location (Google Maps 2012)*

Fortitude Valley, located one kilometre from the central business district is one of Brisbane's oldest suburbs, well known for its entertainment precinct, which consists predominantly of nightclubs, bars and markets (refer to Figure 2). Development in Fortitude Valley has been heavily influenced by the railway line, which runs through the centre of the suburb. Consisting of residential, industrial and commercial developments, Fortitude Valley has been a focal point in many urban rejuvenation schemes over recent years, however these are focused on key traffic areas of the precinct, and disregard many sectors of the Fortitude Valley suburb. Currently, there are multiple lost and disused spaces within Fortitude Valley, many of which are located within service access areas, or disused corners of streets (refer to Figure 3). Future planning directions for Fortitude Valley earmark the suburb as a continuation of the CBD, with higher density developments scattered throughout the suburb. With development projects growing steadily within the area, it is crucial to ensure positive and innovative approaches are made towards

public space in Fortitude Valley, especially in regards to lost and disused space opportunities. Due to the opportunities presented through redevelopments within the area, Fortitude Valley has been chosen as the primary site for discussion of urban greenery initiatives in lost and disused spaces for this study.

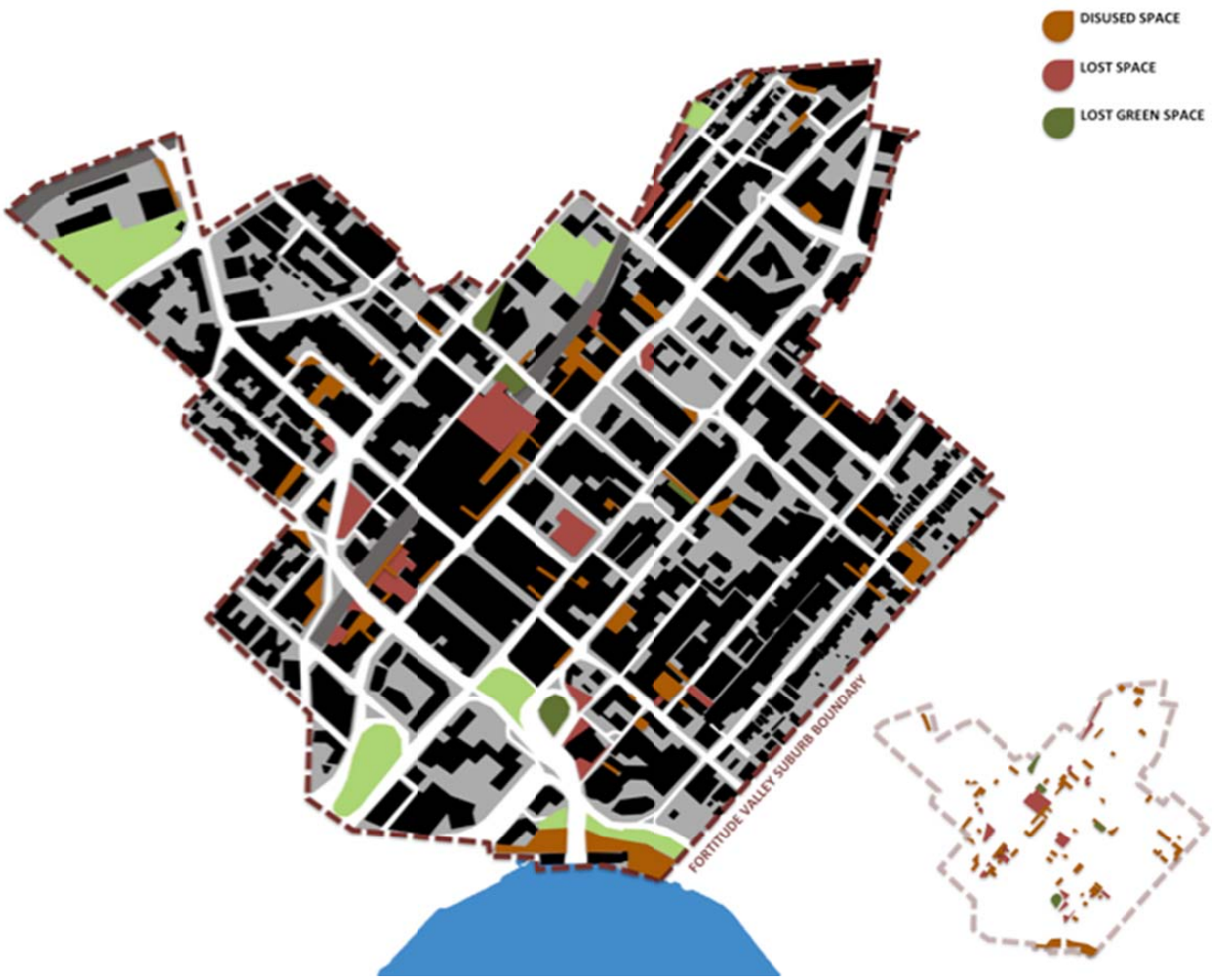



*Figure 3. Lost and Disused Space in Fortitude Valley*

## METHODOLOGY

Whilst it is invigorating to see government initiatives supporting the rejuvenation of disused and lost space within Brisbane, current proposals tend to disregard the unique, subtropical character of the region.

In order to develop a greater body of knowledge in regards to the opportunities for incorporating innovative uses of greenery into the Fortitude Valley environment, research investigations focus on analysing exemplars in which greenery has been used to rejuvenate a previously lost or disused space. There is a growing body of projects that incorporate the reinvigoration of lost or disused space through the integration of urban greenery, however many of these are located in an international context, displaying different climatic, cultural and social values to those apparent within the subtropical environment of South East Queensland. This research paper aims to analyse these projects purely based on their success and approach towards what was a lost space, and their incorporation of greenery in an innovative way. In order to gather suitable knowledge on the appropriateness of greenery in a subtropical environment, public spaces in Fortitude Valley have been observed and analysed in order to gain an understanding in regards to how greenery informs a change of use within a subtropical public space.

### Case Study Analysis Framework

An analysis framework has been developed to assess the case studies to ensure a thorough understanding in regards to how greenery can be used, and how it is relevant to reinvigorating dense urban environments. For the purpose of this study, the analysis framework has been developed based upon past studies undertaken by experts within the public space and placemaking fields. Table 1 outlines the analysis framework, including informing literature and greater explanation of each criterion.

| **Case Study Analysis Criteria** | | |
|---|---|---|
| ***Public Space Needs*** | | |
| Connectivity | Connections to outside uses, and uses within the space | Sieh and Tiesdell, 2010 |
| Mixture of Uses | Multifaceted approach towards space design and use | Sieh and Tiesdell, 2010 |
| Stimulation | Arousal of the user experience | Carr, Francis, Rivlin and Stone, 1992 |
| Ingrained Understanding of Use | In depth development and understanding of previous use, and the needs associated with the space | Carr, Francis, Rivlin and Stone, 1992 |
| Human Dimension | Scale appropriate design | Gehl, 2010 |
| Renovation of Use | Innovative and respectable reinvigoration of use | Gehl, 2010 |
| | | |
| ***Placemaking Techniques*** | | |
| Web of Diversity | Multiple layers of activity and purpose within the greater space | Jacobs, 1961 |
| Relationship to Surroundings | Physical and mental connections to surrounding uses | Lynch, 1960 |
| Psychological Dimension | Meaning to the observer, interpretation of image | Montgomery, 1998 |
| Social Dimension | Understanding of social groups and purposes – who uses the space? | Montgomery, 1998 |
| Cultural Dimension | Response to unique local conditions | Montgomery, 1998 |
| Interchange of Ideas / Experiences | Open arena to facilitate communication | Bain, Gray and Rodgers, 2012 |
| Sensory Experience | Experience extending to sight, sound, touch, smell and taste | Montgomery, 1998 |

*Table 1: Case Study Analysis Criteria.*

### Case Study Selection

The below case studies have been chosen for the purpose of this research, as they each represent a unique and innovative approach towards the rejuvenation of a previously underused or lost space. The case studies range from permanent and fixed structures, through to greenery initiatives that are transportable and mobile.

| Case Study | Location |
|---|---|
| ***Promenade Plantée*** | ***Paris, France*** |
| Fixed viaduct structure which has been reallocated as a public park. | |
| ***Guerrilla Gardening*** | ***Worldwide*** |
| Greenery initiative that focuses predominantly on derelict spaces; no extent to what can or can't be done | |
| ***Parklets*** | ***San Francisco*** |
| Transportable and removable installation to reinvigorate parking spaces | |

*Table 2: Case Study Selection.*

Information pertaining to each of the case studies has been gathered through a combination of;

- Analysis of existing literature discussing the spaces, their previous use and the transformation to their current use.
- Experiential descriptions of the spaces.
- Information from designers and governing bodies that outline the purposes of the space.

This variation in data allows a thorough understanding of qualitative and quantitative values associated with the case studies, and if in each individual case, greenery succeeds in achieving the requirements of what constitutes a successful public space.

**Observations**

In order to understand the current attitudes towards greenery in a subtropical environment, public spaces in Fortitude Valley, Brisbane have been observed. These observations have been used to develop an intricate map of how users use public space within a subtropical environment, focusing predominantly on the relationship between urban greenery elements and how the public use the space. Observations are used to map areas within the public spaces in which nodes of activity take place, and how this correlates with the integration of urban greenery in the environment. Observation locations have been chosen due to high activity levels in the spaces, not due to their success as a public space.

Two locations have been chosen, one with significant and one with moderate amounts of greenery, to determine the affect varying levels of greenery have within a public space. Names, locations and descriptions of public places to be observed are listed in Table 3.

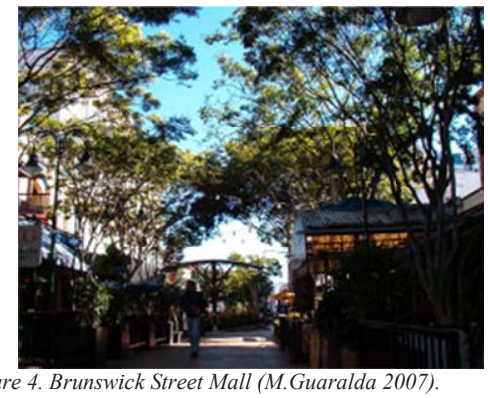
| **Fortitude Valley Observations** | | |
|---|---|---|
| ***Name*** | ***Location*** | ***Description*** |
| Brunswick Street Mall | Brunswick Street, Fortitude Valley. Observed weekday only (due to markets on weekends), during fine weather. | The main public space in Fortitude Valley, the Brunswick Street Mall acts as a thoroughfare, as well as a meeting place. The Mall depicts a significant incorporation of greenery throughout its environment. |
|  | | |
| China Town Mall | Duncan Street, Fortitude Valley. Observed weekday and weekend, during fine weather. | Recently redeveloped, the China Town Mall depicts an integration of culturally significant locations with moderate dispersal of greenery elements. |
|  | | |

*Figure 4. Brunswick Street Mall (M.Guaralda 2007).*

*Figure 5. China Town Mall (The Lighting Society, 2011).*

*Table 3: Fortitude Valley Observation Locations.*

The analysis of the aforementioned case studies, in conjunction with the observations discussing the effect greenery has upon use in public space has been used to develop a greater understanding of the impact and benefits of greenery within lost and disused space, and to determine if it is applicable particularly within a subtropical environment such as Fortitude Valley.

## CASE STUDY RESULTS

Information pertaining to each case study, as well as a list of resources used to gather such information, has been included within Appendix 1.

### Promenade Plantée, Paris

Located in the twelfth arrondissement of Paris (the Arrondissement de Reuilly), the Promenade Plantée is an elevated greenway which runs 4.7 kilometres through Paris, on which used to be known as the Vincennes railway line (Mairie de Paris 2012). Whilst many more recent urban parks, such as the High Line in New York have taken inspiration from the Promenade Plantée, it is still the only urban park that in located on a viaduct.

The reinvigorating use of the viaduct has created an innovative use with the elevated parkway above (which displays several different "rooms" along the parkways length), and shops below in the viaduct arches. Not only has the Promenade Plantée created a viable public space that incorporates greenery for Paris, it has also revived the commercial and cultural aspects previously lost with the disestablishment of the Vincennes railway line.

*Figure 6. Promenade Plantée (Blaser, 2009).*

***Public Space Needs***

| | |
|---|---|
| Connectivity | - Linear nature, fuelled from the reuse of the train viaduct, enhances connections between the park and out into Paris<br>- Stitches the different segments and communities of the city together |
| Mixture of Uses | - Uses are fuelled by the unique structure of the viaduct<br>- Retail and commercial spaces in the arches of the viaduct<br>- Elevated public parkway realm above<br>- Open space and activities mutually fuel each other<br>- Intricately intertwined uses; life is fuelled from one another |
| Stimulation | - Greenery enhances the experience and stimulation<br>- Various 'outdoor rooms' create paths that are filled with endless possibilities<br>- Formal and informal landscape design enhances the inspiration and purpose of the greenway |
| Ingrained Understanding of Use | - Understands the notion of 'escape' associated with the Promenade Plantée<br>- Acting as an outlet that incorporates biophilia principles to rejuvenate those who use the space |
| Human Dimension | - Celebrates the pedestrian<br>-Integrates the needs of the public with the needs of a public space<br>-Landscape styles and sizes emphasises the spatial experience and enhances awareness |
| Renovation of Use | - Refashioned into a vibrant public space<br>- Connection retained to its original purpose, rather than a complete redesign or demolition<br>-Enhanced connection and understanding underlies the purpose of the space<br>- Valuable connection between past and present; impacts on the publics perception of the space |

***Placemaking Techniques***

| | |
|---|---|
| Web of Diversity | - Relationship between the functions of the greenway and the commercial activities<br>- Mutually beneficial connection created<br>- Purposes are enhanced; feeds off one another<br>- Life created from commercial, peace created from greenery |

| | |
|---|---|
| Relationship to Surroundings | - Emphasises the history of the district<br>- Recalls the original purpose of the neighbourhood (artisans and craftsperson's)<br>- Restores connections to the past purposes in the arches of the viaduct<br>- Creates vistas and unique connections to neighbouring buildings, commonly unseen from street level, enhancing experiences and relationships |
| Psychological Dimensions | - Height and purpose of the Promenade Plantée enhances the "escape" notion associated<br>- Biophilic elements enhance this; psychologically rejuvenates and relaxes those who visit<br>- Visitors can become removed from ever day life; finding joy in naturalistic environment |
| Social Dimensions | - Multiple uses helps connections between locals and tourists<br>- Ownership felt by all members of the community<br>- Improved communication through the positive feelings the success generates |
| Cultural Dimensions | - Supports the romantic stereotype associated with the Paris environment and culture<br>- Recalls and recreates the presence of artisans; enhances community character and identity<br>- Culture enhanced through contrast of what used to be, and what it now is |
| Interchange of Ideas / Experiences | - The success of the public realm allows greater and more open connections between members of the community<br>- Shared experiential values through the popularity of the greenway |
| Sensory Experience | - Greenery elements respond to all sensory experiences; the smell, touch, taste, sound and sight. |

**Guerrilla Gardening, Worldwide**

Guerrilla gardening is a worldwide movement gaining popularity through the reinvigoration of land owned by another individual (most commonly a government organisation). Guerrilla gardeners display motivation from a variety of areas, predominantly political or health related, developing the movement into a form of proactive activism (Khankhoje 2007).

Most guerrilla gardening cases involve an area of land that has become derelict due to a misunderstanding of ownership or a disregard for the purpose of the land. Due to the movement being considered illegal, guerrilla gardeners predominantly reinvigorate the spaces during the night to avoid apprehension or termination of the activity from legal forces (Miguel 2009).

Guerrilla gardening aims to understand the use of a space, or the community where it is located, to ensure the outcome is a space that is useable, successful and tailored to the community's needs. The incorporation of biophilic principles along with community garden initiatives in some projects ensures the guerrilla gardening projects provide multifaceted benefits to the greater community.


*Figure 7. Guerrilla Gardening in Toronto (Miguel, 2009).*

***Public Space Needs***

| | |
|---|---|
| Connectivity | - Restores what was previously a disused space into something which serves the greater community<br>- Perceived connection to community through individuals working together to make something of a derelict space |
| Mixture of Uses | - Designs commonly provide more than one purpose to the space; eg. Reinvigorating a bus stop to incorporate gardens, food, or activity centres for the local community |
| Stimulation | - Many designs incorporate strange or unique adaptations to previous use; allows users to think and interact with the spaces<br>- Greenery enhances the user experience through biophilic type connections<br>- Stimulates individuals to become better connected with their own community |
| Ingrained Understanding of Use | - Sites are generally refurbished by local members of the community who understand the needs of those in the area<br>- Designs also respond to the lack of |

| | |
|---|---|
| | ownership in some spaces, using hardy plants to flourish more successfully |
| Human Dimension | - Use of space creates and enhances experiences for the general public<br>- Purpose is to produce more vibrant spaces for the greater community<br>- Responds to the human mind; positive outcomes create positive outlooks |
| Renovation of Use | - Key criteria for selection of spaces is if it is deteriorating or lost<br>- All design reinvigorate the use of the space, sometimes paying homage to what it once was<br>- Creating something beautiful where it otherwise may not occur |

***Placemaking Techniques***

| | |
|---|---|
| Web of Diversity | - Facilitates a web of guerrilla garden spaces across a wider community; may not have a specific web of diversity within the one project, but plays an integral part in the greater guerrilla gardening scheme |
| Relationship to Surroundings | - Spaces are generally revitalised by members of the community who feel the space is in need of help<br>- Designs are sensitive and relate to the community and wider environment |
| Psychological Dimensions | - Biophilic principles are beneficial to community members, as well as the guerrilla gardeners<br>- Through integrating 'green' beauty, psychologically one feels closer to peace |
| Social Dimensions | - Enhances the community's feeling of purpose, or what could be achieved<br>- Aims to create viable spaces for all, in a very public realm |
| Cultural Dimensions | - Promotes a utopian vision of society<br>- Responds to the direct needs of the culture in question as it is created by individuals |
| Interchange of Ideas / Experiences | - Guerrilla gardening can incorporate greater messages and notions; using greenery as a tool to communicate values or beliefs<br>- Creates a greater, more holistic connection between those in neighbourhoods, locals feel like they are making a change towards a better future |
| Sensory Experience | - Biophilic elements respond to all sensory experiences; the smell, touch, taste, sound and sight of the greenery. |

**Parklets, San Francisco**

Parklets originated within San Francisco as a way to revitalise street life through refashioning the use of parallel parking spaces along streets. Now appearing in many cities across the world, including the Australian city of Adelaide, Parklets display an innovative refashioning of use within underused spaces through installations that are not always necessarily permanent (Pavement to Parks 2012).

This mobile aspect of Parklets design provides an interesting case study into how to ensure some spaces that may be lost or disused, but still require some form of access (such as laneways) can be reinvigorated for public use in a way that does not inconvenience the underlying use of the space. The temporary nature of the Parklets also provides an opportunity for creative and innovative thinking from a variety of individuals who may not always have the opportunity to design a public place within an urban environment.

*Figure 8. Parklet in San Francisco (Mission District, 2012).*

***Public Space Needs***

| | |
|---|---|
| Connectivity | - Enhances connection between the street and commercial dwellings; pulls public aspects into a predominantly private atmosphere<br>- Creates a greater network / connection to Parklets across the city<br>- Connection improve between communities and businesses |
| Mixture of Uses | - Supports both businesses and communities through providing space that enhances the environment, its purpose and the economy.<br>- Purpose of the Parklets can vary from something relatively commercialised, to a Parklet that promotes solitude in a community environment |
| Stimulation | - The unique nature of the Parklets stimulates the mind, inspiring more innovative solutions to spaces people commonly overlook |
| Ingrained Understanding of Use | - Mobile Parklets understand the requirements of some disused spaces, and the service requirements they |

| | |
|---|---|
| | embody.<br>- Mobile aspects allow community use during down times, with the primary purpose of the space (as a service bay) reinstated during applicable hours. This creates a more effective and useful urban environment. |
| Human Dimension | - Concept is focused around enhancing street life, and provided spaces for the public to call their own.<br>- Cultivation of a pedestrian lifestyle in an urban core. |
| Renovation of Use | - The change in use improves walkability, pedestrian environments and perceptions of streetscapes. |

***Placemaking Techniques***

| | |
|---|---|
| Web of Diversity | - The greater Parklet scheme involves creating a large number within certain areas, with locations of each easily available – creating a holistic entity of small public spaces across the city in what seem to be unusable spaces. |
| Relationship to Surroundings | - Design tailored to the street and its uses<br>- General inspired, designed, initiated, built and planted by locals who understand the area and the street environment |
| Psychological Dimensions | - Psychologically, the innovative approach towards the reuse of a parking space creates inspiration within the minds of users<br>- The integration of naturalistic elements into a heavily urbanised and concrete realm creates a refreshing approach towards public space design |
| Social Dimensions | - The initiatives helps connect members of the community, and refashion a typical way of use<br>- Innovative solutions to small and disused spaces are promoted, creating greater public awareness and larger opportunities for enhanced environments |
| Cultural Dimensions | - The bottom up approach towards Parklets helps create a new dynamic within the community, enhancing local identity |
| Interchange of Ideas / Experiences | - Beautify areas where community members can congregate<br>- Facilitates interaction between community members in a way that enhances discussion of innovative approaches towards public space<br>- Begins a conversation in regards to what city inhabitants really want |
| Sensory Experience | - Biophilic elements respond to all sensory experiences; the smell, touch, taste, sound and sight of the greenery. |

## OBSERVATION RESULTS

### Brunswick Street Mall

The below dot points discuss the observations made while watching the public use Brunswick Street Mall. The findings have also been mapped to display the information clearly.

- The public tend to gather in areas close to clusters of greenery, particularly at either end of Brunswick Street Mall.
- Generally, the public do not sit and stay in Brunswick Street Mall, but rather gather and then move elsewhere.
- When travelling through the mall, the public tend to predominantly walk a route that is close to greenery at the western end, before walking through the central walkway at the eastern end of the Mall.
- Patrons dining outside of restaurants and bars, when given the choice tend to sit closer to planter boxes, despite these locations being closer to the main public thoroughfare
- Public do not tend to gather in the central "core" of the Brunswick Street Mall, but prefer to gather at either end of the strip
- When travelling through the "core", the public predominantly choose the route that travels close to the greenery barrier near the stage.

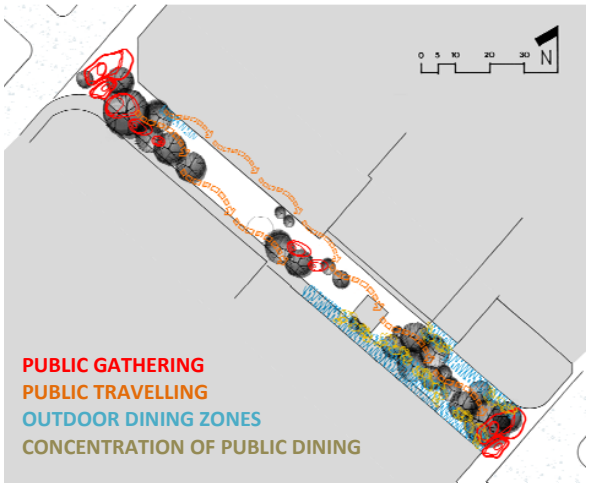



*Figure 9. Brunswick Street Mall Observation Analysis*

### China Town Mall

Observations of the public using China Town Mall has also been listed in dot point form, along with a mapping exercise to clearly display the findings.

- Greater body of public appear to sit and contemplate in the China Town Mall when compared to the Brunswick Street Mall.
- Sitting locations of the public, including smokers, tend to be around key greenery areas, most likely due to lack of exposure to the main thoroughfare path
- Despite the western end being a shared traffic zone, the public gather near greenery elements on the outskirts.
- Patrons dining outside of restaurants and bars, when given the choice tend to sit closer to planter boxes, despite these locations being closer to the main public thoroughfare
- Public travelling through the Mall tend to walk along the outskirts, in areas shaded by greenery or sculptural devices.
- Public tend to be attracted to areas with larger trees (providing shade), than shorter and smaller landscaping.

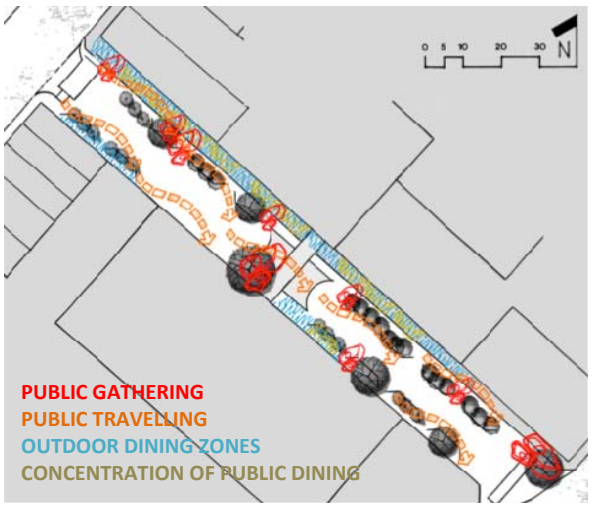



*Figure 10. China Town Mall Observation Analysis*

## DISCUSSION

The aforementioned analysis of case studies and observations provide new insights in to the opportunities for greenery initiatives as a placemaking tool in public space in Fortitude Valley, as well as possible innovative greenery strategies to be used to rejuvenate lost and disused space. The following discussion has been examined in three parts;

- The initial, key findings from the aforementioned case studies and observations;
- How these findings can be transposed into the context, and future direction of Fortitude Valley as a subtropical urban area, focusing on how these initiatives support and can be integrated into the key policy aspects behind Urban Renewal Brisbane; and
- Earmarking and discussion of possible integration and installation of such initiatives in specific lost and / or disused space in Fortitude Valley.

Determined through the case study analysis of a variety of innovative approaches towards lost and disused space, it has been found that urban greenery is a relevant approach towards rejuvenating dense inner city lost space. Integration of greenery into public spaces helps meet various principles of successful public space design, particularly within the aspect of placemaking, whilst also incorporating the benefits associated purely with greenery on its own ('biophilia'). The psychological, social and cultural benefits associated with greenery improve the public's perceptions of the public space, creating unique, successful and relevant public space design. Innovative uses of lost or disused space must be sensitive to the space's previous purpose, as well as the local community's needs, in order for an enhanced connection to occur. The human connection with greenery has the ability to enhance ones relationship to public space. Through incorporating greenery into public space, in conjunction with the already established, ingrained relationship between humans and greenery outlined within the biophilia hypothesis, meaningful spaces that provide innovative approaches can transpire. Opportunities exist in these spaces for more meaningful relationships across a variety of urban scales, with spatial and experiential qualities that are immeasurable to the user.

Research findings have also shown there is a direct relationship between the integration of greenery in subtropical public space, and how the public tend to use these spaces due to this relationship. In both cases of the observations, the public tend to (whether intentionally or inadvertently) alter their path through public spaces, based on the application of greenery. During times where a user may be waiting, sitting or dwelling in a public space, the location in which this takes place is also highly reactive to the incorporation of greenery in the public space. This is most likely due to sense of safety, cover or shelter that may be associated with various levels of greenery. The subtropical climate, a key factor in this study, tends to enhance this relationship. The typically clear weather and moderate temperatures associated with subtropical climates enhance the need to associate ones comfort (in terms of body temperature) with surrounding shade devices, which in most public spaces is provided by greenery. This is also supported by larger congregations of the public occurring within areas of dense greenery, rather than smaller or softer landscaping.

**Integration and Relationship to Fortitude Valley Policy Framework**

As discussed previously within the body of research, Fortitude Valley is currently earmarked for development as a continuation of the Brisbane CBD, and is currently undergoing urban regeneration projects that enhance the urban environment associated with Fortitude Valley. Whilst there are several 'laneway' proposals for Fortitude Valley, these are still currently under construction. For this reason, Brisbane's first rejuvenated and now functioning laneway, Burnett Lane, has been briefly analysed against the case study framework to pinpoint which aspects of public space are currently lacking in these developments.

***Public Space Needs***

| | |
|---|---|
| Connectivity | - Creates a connection between Albert Street and George Street; a link which was previously unusable by the public |
| Mixture of Uses | - Predominantly provides hospitality functions (cafes, etc), alongside the key access use. |
| Stimulation | - Use of different colours and artworks to provide stimulation |
| Ingrained Understanding of Use | - Sometimes misunderstands why the public would use the space; still places too much emphasis on the access purpose of the laneway, stamping out other users at times.<br>- Lacks innovation in finding a way to take advantage of the unique climate in Brisbane |
| Human Dimension | - Space is designed around truck and car access (despite this only being needed for a few hours each day), and at times lacks the human perspective. |
| Renovation of Use | - The space has not necessarily been renovated; just made more accessible. The original purpose is still associated. |

***Placemaking Techniques***

| | |
|---|---|
| Web of Diversity | - Simplistic layers of social and economic functions. |
| Relationship to Surroundings | - Some artworks relate to the namesake of Burnett Lane, James Charles Burnett. |
| Psychological Dimensions | - Unique artwork creates an interesting environment within the CBD of Brisbane.<br>- Begins to establish a sense of escape, but does not quite achieve this. |
| Social Dimensions | - Provides opportunities for interactions at cafes. |
| Cultural Dimensions | - Provides some educational aspects into the history of who the lane was named after. |
| Interchange of Ideas / Experiences | - Opportunities provided only in cafe settings; no real opportunities for out of the box experiences. |
| Sensory Experience | - Sight, sound and smell are the predominant sense within Burnett Lane due to artwork and cafe surroundings. Other senses are disregarded, or only achieved minimally. |

It has been found that these laneway approaches undervalue the opportunities associated with lost and disused space in Brisbane, focusing predominantly on simplistic outcomes that do not effectively create a relationship to the individual context of each site. By using greenery as a technique to achieve and enhance placemaking within these urban spaces, frameworks can be improved to provide more social, economically and physically sustainable urban spaces. The following discussion aims to first discuss how these innovative ideas can be integrated within the current framework in Fortitude Valley, and to also outline some opportunities within the suburb for these proposals.

Urban Regeneration Brisbane (URB), the taskforce behind urban regeneration schemes within the inner 5 kilometres of Brisbane, are responsible for preparing strategies and planning frameworks that embody "sustainable urban design right through from the overarching urban structure, down to neighbourhood level and local placemaking" (Urban Renewal Brisbane 2011, 6). The following discussion aims to;

- Examine the existing URB framework, which has informed such policies as the 'Fortitude Valley Neighbourhood Plan' and the 'Vibrant Laneways and Small Spaces Program';
- Determine the similarities between the strategies of the URB framework, and the outputs of urban greenery initiatives as found within this body of research; and
- Propose innovative urban greenery approaches as an initiative to meet the requirements of the URB strategies, with basic proposals for urban greenery initiatives moving forward.

The URB framework places emphasis on urban environments at a variety of scales; from master planned areas with interlinked uses, down to the character of small urban spaces. These key strategies can be grouped into two sections; the quality of spaces, and governance. The key strategies under these sections are paramount to the success of the URB's proposed positive urban environments;

- *High quality architecture and public spaces*
  - Local character
  - Mixed uses
  - Green infrastructure
  - Creativity and cultural expression
  - Placemaking
  - Urban consolidation
- *Sustainable urban governance*
  - Relationships and involvement with key stakeholders
  - Engagement with the community

With the key themes within URB's framework displaying strong correlations to the analysis framework used within this body of research, it can be stated (from the findings presented within this paper) that urban greenery is capable of providing positive and successful solutions to the strategies outlined. Whilst schemes are generally executed by design and planning agencies (and sometimes altered in favour of larger organisations, over the needs of the community), opportunities arise for the inhabitants of Fortitude Valley to be inspired by innovative greenery uses – promoting a new, place specific typology of use. Urban greenery, in a subtropical environment, provides particular outcomes that represent strong personal relationships between the user and the environment. The use of greenery as an innovative proposal for reinvigorating lost space supports URB's strategy to consolidate and strengthen inner urban environments through appropriate, site specific developments.

The approaches to lost space outlined in the case study analysis provide some possible opportunities for innovative installations within Fortitude Valley that respond to the aforementioned needs currently lacking in the URB framework. Using previous mapping studies of lost and disused space in Fortitude Valley, various locations for such installations have been noted. Locations have been determined based on the underlying purpose of the space – whether it is community oriented, a space which required vehicular movement, or a space with historic relevance. Whilst these spaces noted provide opportunities for installations similar to those discussed within the case studies, it is important to understand that these are generic examples that can be altered and improved to ensure the individual qualities of each site are considered. It is proposed that the examples suggested be used as a basic guide on the type of installation, with more research developed into the individual needs and context of the site (refer to Figure 11).

This research article provides a foundation for inspiration and formulation of possibilities surrounding the integration of innovative urban greenery installations.

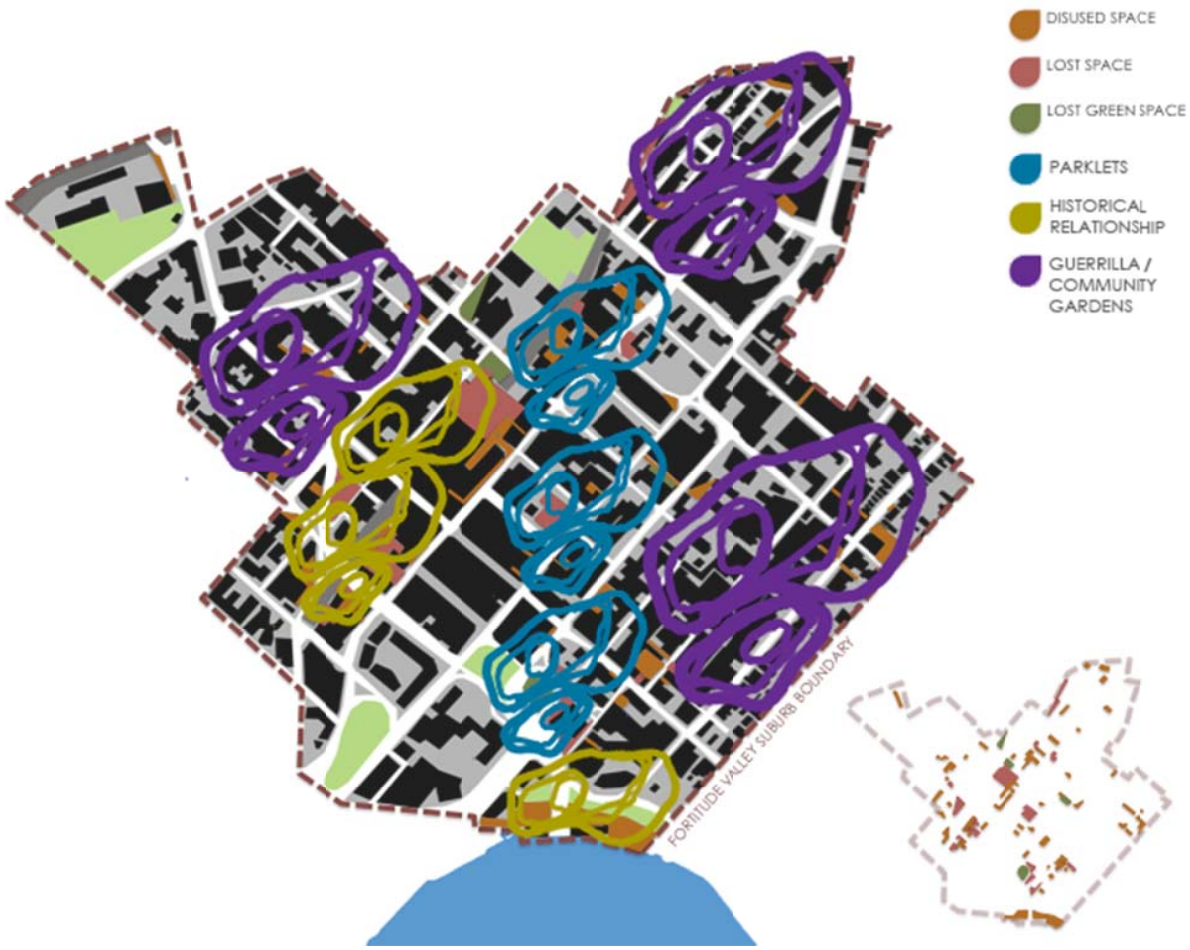



*Figure 11. Lost and Disused Space Opportunities*

Case study exemplars can provide a starting point for innovative greenery installations. Laneways provide opportunities for reinvigoration through the incorporation of Parklets, which have been designed to facilitate the unique and specific needs of the laneway. Practical aspects, such as servicing needs are able to be facilitated through the mobile aspect of the greenery initiative. Historical structures, such as the walls of existing heritage buildings provide opportunities to enhance the unique, mix matched architecture within Fortitude Valley through the contrast of greenery. Vacant green spaces and corner sites have the chance to be revived through small community gardens that improve the residents' perception and relationship to the site. Endless opportunities exist to revitalise, rejuvenate and inspire a new urban life in Fortitude Valley. Creating a sense of place through greenery techniques provides valuable opportunities to enhance social, political and environmental aspects associated with dense urban environments.

## CONCLUSION

This research study has aimed to provide an exploration into the use of greenery as a placemaking tool, with particular focus on innovative uses of greenery and its ability to reinvigorate lost and disused space. Through the examination of case studies and observations of the public in subtropical public space, relationships between the impact of greenery within subtropical environments, and the success of innovative approaches towards lost and disused space design has been established. With vegetation seen as a key attribute in subtropical public space, using greenery as a solution to poor public space design provides opportunities for future proposals. Analysis of current Fortitude Valley policy frameworks has provided an understanding of how innovative urban greenery initiatives can succeed in meeting these strategies. Mapping of lost and disused spaces in Fortitude Valley, in conjunction with opportunities for possible installations in such spaces, based on the analysis and information presented within this body of research, aims to create a wider public discussion in regards to the future of these under looked spaces and how they can be reinvigorated for public use.

### Limitations

Due to the limited time constraints associated with this study, this research has been strictly limited to ensure only appropriate depth into the chosen field of study. Observations and research focuses predominantly on the relationship between the use of public space and urban greenery, thus in turn neglects other urban design elements, such as street furniture, materials, shading devices and so forth. Whilst it would also be beneficial to physically apply the outcomes and findings of this research in a detailed, physical design proposal for a lost or disused space in Fortitude Valley, time and funding constraints prevent this from occurring. Instead, basic propositions for lost space "types" have been noted.

### Implications for Further Research

The findings of this study provide many opportunities for further study. Whilst innovative use of greenery has proven to be successful in many cases, it may not be entirely appropriate in some climates. Further studies into how the public use public space in relation to greenery elements could be undertaken in different climates, to provide a wider range of analysis for comparison. Whilst this study maps current lost and disused space in Fortitude Valley, additional study could further analyse the specific needs of particular lost spaces in Fortitude Valley. This analysis could help develop a framework for establishing where varying levels of innovative greenery initiatives could occur.

With imminent redevelopment and rejuvenation on the horizon for the Fortitude Valley suburb, it is essential that vibrant public spaces are provided for the greater community; public spaces that understand the underlying use, place and purpose of each individual space, and its relationship to the greater community. Opportunities exist in the lost and disused spaces of subtropical urban environments across the world for innovative approaches that enhance the natural, subtropical environment of the region. With renovation of these spaces through the incorporation of greenery, people are invited to experience these spaces in an entirely new and stimulating pattern of use, creating lively spaces that benefit the greater community physically, socially, economically and mentally.

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## APPENDIX 1

**Case Study Resource Information**
The below information outlines the multiple resources used to gather information on the case studies used within the research. Resources chosen provide personal experiential descriptions, as well as quantitative data.

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# Life on the Edge:
## The Effects of Building Façade Three Dimensionality on Public Social Behaviour

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*ABSTRACT: Links between the built environment and human behaviour have long been of interest to those involved in the fields of urban planning and architecture, but direct assessments of the links between the three-dimensional building façade form and human behaviour are rare. Much work has been completed on subjects' responses to the aesthetic of architectural frontages but this has generally been conducted using two-dimensional images of structures and in no way assesses human responses when in the presence of these structures. This research has set about observing the behaviour of individuals and groups in the public realm and recording their reactions to architecture which has a distinct three-dimensional character, with particular reference to the street level façade. The behaviour was recorded and quantified and indicated that there is significant differences in human behaviour around these various types of architecture.*

**INTRODUCTION**

A growing desire to live an environmentally sustainable lifestyle, in combination with the rapidly increasing costs of commuting to work, have precipitated an upsurge in the popularity of inner-city living. As a result, the demand for high quality public urban space is increasing.

Despite this, the ability of designers to consistently produce popular Urban Public Spaces (UPS)'s has often proved to be difficult. The purpose of this research is to answer the question, "does the three-dimensionality of buildings at street level effect the social behaviour of people using the UPSs surrounding these buildings?"

The hypothesis suggested is that buildings which have a significant degree of three-dimensionality will encourage users to populate the immediate area. This will increase the frequency and quality of social interactions which occur in these areas and thus encourage users to stay longer.

To determine if there is a link between the three-dimensionality of buildings which surround UPSs and the social behaviour of people within the immediate vicinity, a number of UPSs were located which were bordered by, or contained architecture which displayed some degree of three-dimensionality. These spaces were observed over several weeks and observations regarding the behaviour and distribution of people with regard to the architecture, were noted and examined.

The results of this research may act as a guide for architects as they endeavor to design buildings which boarder UPSs and the resulting architecture may hence benefit the users of these future spaces. As a result, all residents and visitors to the city will benefit from a more pleasant environment and a more livable city.

The subjects of these observations will be selected from within the city of Brisbane, in Queensland, Australia and from images and videos of cities overseas with which the researcher is familiar and about which, related media is available via the internet.

This work continues and expands the research in the field of urban design exploring an as yet unexamined aspect. As a result, it is a preliminary investigation into the existence of any such phenomena. Much of the research presented and reviewed in this paper proposes many guiding factors associated with the design and use of UPSs but rarely does more than imply any relationship to three – dimensionality, if indeed any mention is made at all. The contextual background component of this paper focuses on important previous studies that reflect the history and importance of UPSs, as well as research regarding the significance of architectural design and engagement within these spaces. This in turn, seeks to highlight the lack of research into the relationship between three-dimensionality and public social behavior.

## LITERATURE REVIEW

Urban Public Spaces in the form of parks and plazas are an essential ingredient for creating a liveable city. They act as lungs, reconditioning a city's air; an escape or refuge from the pace of the city and, possibly most importantly, as a social hub which allows city dweller and visitors alike to connect with their fellow human beings (Moughtin, 1992. p.87).

Despite this, many UPSs in cities across the world are barren inhospitable places where people are reluctant to go. Why is it that some UPS thrive, while others of similar design are abandoned? And what role if any do the buildings which surround these places play in the success or failure of them (Moughtin, 1992. p.87)?

Historically, UPSs have long been associated with civilised, liveable cities. They were established as an economically and socially vital part of the city during the classical period by the Greeks and perpetuated and disseminated into Europe by the Roman Empire (Moughtin, 1992. p.87).

Throughout the history of UPS the architecture surrounding these spaces has been essential for its role in the provision of a sense of enclosure and the establishment of the spatial quality and character of UPS.

During the first half of the twentieth century, UPS fell out of favour due to the influx of mass-produced motor vehicles into the city. More recently however, a new public attitude toward the protection and enrichment of the natural environment and sustainable development, along with an increase in the cost of commuting, has precipitated a renaissance in inner-city living and an increase in the perceived value of urban public open spaces. City residents often see these spaces as a welcome respite of greenery which add character to a city and provide an opportunity to enjoy the pleasure of being among people. If free from obstructions, a public urban space is also a valuable venue for a number of public uses which help to vitalise city spaces (Initiative, 2011).

Since the residential exodus of our cities in the 20th century, there have been a number of changes in the factors affecting the design of successful public urban space. During this time, buildings have increased in height, thus plunging many street level areas into shadow. The increased capacity of these taller buildings has resulted in an increase in population density within these urban environments which is particularly apparent during lunch breaks. Despite the increased cost of fuel, our cities continue to be inundated with vehicular traffic which adds to the ambient noise levels. As a result, simply providing open space within a city, such as that illustrated below, is no guarantee that it will be used.

Park - Bothwell Street, Leith, England.
Source: http://www.greenerleith.org/greener-leith-news/tag/parks accessed on 15/09/11

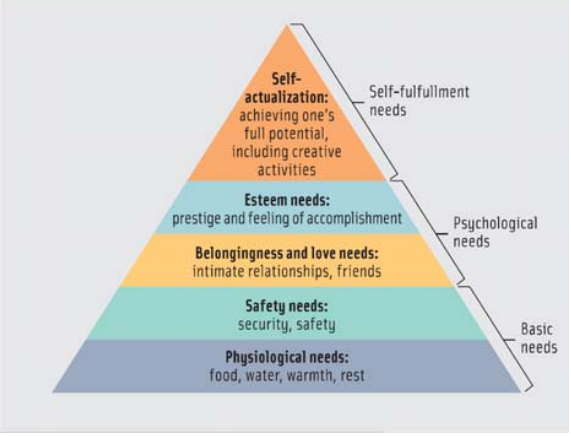
In the early 1960's, Jacobs warned against what was then and still appears to be, a commonly held view that urban parks and open spaces possess a self-evident virtue. Through her observation of UPS in the United States, she noted that many of these spaces have become neglected and shunned sites of sordid behaviour and explains that "…people do not use city open space just because it is there…" (Jacobs, 1961. p.42).

The milieu of the modern city has presented urban designers and architects with a challenge which frequently goes unanswered. In response to the elusive nature of the enigma that is successful UPS design, researchers have investigated the reasons why some public spaces are popular while other seemingly similar spaces, such as that illustrated above, are shunned.

One such body of research revealed that producing a successful UPS design is not simply a case of copying a successful design from one situation to another. This, in no way guarantees success as the new site is likely to have site specific needs and requirements. Furthermore, transplanting designs from differing regions or countries will fail to take into account variations in culture and climate (Moughtin, 1992. p. 88).

This begs the question, what does make a UPS a site people will not only attend, but seek out and enjoy? Part of the answer may lie in Maslow's Hierarchy of Needs. Maslow proposed that humans require basic needs to be fulfilled for them to be comfortable, happy and productive. Moreover, he proposed that these needs were hierarchical with the lower ones requiring fulfilment before the higher ones.

FIGURE 1.1: MASLOW'S HIERARCHY OF NEEDS




*Source:* http://www.chiron.valdosta.edu/whuitt/col/regys/maslow

Vitruvius's somewhat more simplistic solution was that "…it (a public space) should be proportionate to the number of inhabitants, so that it may not be too small a space to be useful, nor resemble a desert waste for lack of population" (Moughtin, 1992. p. 93).

This idea of suitability for purpose is expanded upon by Cullen (1971), who suggests that the design of the square and surrounding buildings should suit its specific purpose or alternatively, the square and its intended purpose should be complimentary to the function of the surrounding buildings. Developing on Cullen's ideas of the design suiting its surroundings, Fredrick (2007, p.10), suggests that a UPS design should not only be commensurate with its surroundings but also discover and enhance its 'genius loci', literally genius of place. If done well, this will create a place that is deeply memorable for its architectural and experiential quality.

Of significant importance to the success of a UPS is the consideration of for whom the space is being designed. Clearly identifying the user groups allows a designer to tailor the design for their specific needs. Studies conducted by Levy (1976) and Delor (1982) indicated that the people using UPS have changed. What once was the dominion of the elderly and poor has increasingly become a haunt of young and affluent individuals and groups. As a result the design of these public spaces should evolve to support these new needs (Serfaty-Garzon, 1988).

On way of achieving this was proposed by Winilkoff (1995, p.42) who suggested that involving the users and residents in the design process would allow designers to integrate their ideas into the final design of the UPS. Doing so would aid the designer in tailoring the space to suit the users and produce public spaces which are both inspiring and have strong local character. An added bonus is that this process fosters in those participating, a sense of civic pride.

TABLE 1.1:KEY ATTRIBUTES OF SUCCESSFUL PLACES

| KEY ATTRIBUTES | INTANGIBLES | | MEASUREMENTS |
|---|---|---|---|
| COMFORT AND IMMAGE | Safety<br>Charm<br>History<br>Attractiveness<br>Spirituality | Sittability<br>Walkability<br>Greenness<br>Cleanliness | Crime statistics<br>Sanitation rating<br>Building conditions<br>Environmental data |
| ACCESS AND LINKAGE | Readability<br>Walkability<br>Reliability<br>Continuity | Proximity<br>Connectedness<br>Accessibility | Traffic data<br>Mode split<br>Transit usage<br>Pedestrian activity<br>Parking usage patterns |
| USES AND ACTIVITY | Realness<br>Sustainability<br>Specialness<br>Uniqueness<br>Affordability<br>Fun | Activity<br>Usefulness<br>Celebration<br>Vitality<br>Indigenousness<br>'home-grown' quality | Property values<br>Rent levels<br>Land-use patterns<br>Retail sales<br>Local business ownership |
| SOCIALABILITY | Co-operation<br>Neighbourliness<br>Stewardship<br>Pride<br>Welcoming | Gossip<br>Diversity<br>Storytelling<br>Friendliness<br>Interactivity | Street life<br>Social networks<br>Evening use<br>Volunteerism<br>Number of women, children, and elderly |

Source: Carmona et.al., 2010. p 100

Carmon, Tiesdell, Heath and Oc (2010) however, suggest that it is possible to generalise about the design of a UPS, as many preconceptions are the result of culture and upbringing. As a result, urban environments can be tailored to a particular cultural situation. To this end, Carmona provided a list of checks and measures for a successful UPS design as outlined in Table 1.1.

Hence as more research is taken into consideration, it begins to become apparent that there is no simple solution to the problem of creating a successful UPS. While acknowledging that the behaviour of UPSs is a complex and highly site specific mechanism, Morris (1994) suggests that a good indicator of the quality and success of an urban public place is the frequency of use by people. He goes on to suggest that the presence of people will encourage others to join. As a consequence public space can stimulate interaction through the presence of music, art, food, discussion and festive day celebrations.

Through observations of her neighbourhood in the United States in the 1950s and 1960s, Jane Jacobs was also able to draw a number of astute conclusions with regard to urban design. Among them were a number of general principals which she claims can deeply affect the destiny of UPS.

Jacobs (1961) established that a public space which is not only occupied but busy throughout the whole day and into the late evening, will provide a passively enforced security and the powerful attraction of being around other people.

This passive security, referred to as "eyes on the street" is the sociological imperative of people not wanting to be

seen doing the 'wrong' thing. This phenomenon could be part of the reason for the second principal which suggests that people want to be around other people, however it is more likely that this stems from a narcissistic desire to be seen or a voyeuristic urge to observe the lives of others. As the Bard laments, "all the world's a stage and all the men and women merely players" (Craige, 1993).

In his film, "The Social Life of Small Urban Spaces," Whyte (1988) asserts that watching human public social activities is the primary reason people attend UPS. Becoming a player in this urban show takes only a poor second place. As a result, there needs to be a compelling reason for individuals or groups to populate or at least pass through a space and there needs to be a gallery from which to watch the show.

The problem which arises is of course how to populate a public space constantly for an entire day, day after day? No one single user group will be able to achieve this and therefore it is essential that public urban space cater for and attract a wide variety of users to establish a diverse multi layered culture (Jacobs, 1961).

Through her observation of safe, well-populated public spaces, Jacobs garnered six elements which are common to these spaces. She refers to these as Intricacy, Centring, Sun, Enclosure, Exclusivity and Demand Goods.

Intricacy refers to subtle expressions of differences at eye level which make the space interesting enough to make people want to return. Centring is the creation of a point within the space where one feels they have reached the spiritual centre, crossroad or climax of the space. Jacobs also notes that the provision of a variety of levels of direct and filtered sunlight is essential for attracting people. Enclosure in the form of buildings surrounding a public place is also important as they give the public space its shape and create contrast between the city and the space so that it appears as an important event in the city scene. Exclusivity within an urban area is suggested as a requirement for a public space to be well patronised. The final factor discussed by Jacobs is the presence of a demand good. These include such things as a pool, sporting fields, fishing, carnivals or carnival-like activity, music, plays and a performance area or other specialised facilities. These demand goods can exercise an attraction significant enough to populate a space despite many other negative issues with that space (Jacobs, 1961).

Kevin Lynch also examined the urban design of cities in the United States in the 1950s and 1960s. He, unlike Jacobs, achieved this through interviews with the inhabitants of these cities.

Lynch (1960) established five elements which combine to make up the image of a city. He called these paths, edges, districts, nodes and land marks. Through a study of these elements individually and in relation to each other, he was able to draw a number of conclusions regarding the form and function of these factors.

Of these elements, UPS fall into the node category which Lynch defines as a "…strategic foci into which the observer can enter." Lynch goes on to explain that despite being conceptually small, these may in fact be large public squares, shopping malls or even large central garden districts.

Lynch views nodes as junctions or breaks in the flow of locomotion. He noticed through his interviews, that at these junctures people heighten their attention to aid the decision making process and as a result, observed nearby elements with heightened clarity. Consequently, a strong physical form is not essential to the recognition of a node but where the space has some distinctive form, its impact is much stronger.

Through his interviews, he concluded that the most successful nodes are those that stand out as being unique while intensifying an attribute of the surrounding area. This may be established by "…the singular and continuous quality of the walls, floor, detailing, lighting, vegetation, topography or skyline of the node" (Lynch, 1960. p.182).

**The Significance of Architecture and the Importance of the Edge**

While the guidelines and suggestions presented by these researchers are many and varied, they each share a consideration of the buildings which surround and define UPS. Frederick (2007, p.7) explains that in the suburbs, buildings are elements within space, while buildings in the city actually define space. Cullen (1971) refers to the ways in which buildings divide the city's public realm as closure.

Of the factors mentioned above that are considered to increase the potential of producing a successful UPS, many can be satisfied with well-designed surrounding architecture. Such well-considered designs could then provide:

- a boundary or border which defines the urban space,
- building details and finishes which provide a unique identity and work toward enhancing or establishing genius loci,
- facilities and vendors housed in the podium levels which attract individuals to the area and
- shelter, comfort and anchorage to those wishing to spend time here.

The significance of the role architecture plays in the success of UPS is indicated in the prevalence of the prescription of active frontage in urban redevelopment schemes. Through the inclusion of the phrase "active frontage," developers hope to inspire the design of

buildings which will enrich and enliven the public spaces. This is an acknowledgment that a lack of edge activity in public spaces makes for a dull spatial experience (Sanders and Schroder, 2008. p.132). One example of this planning trend can be seen in the National Capital Plan for Canberra. It states in Amendment 60 that "blank facades to public streets are to be avoided"… noting that ground level frontage should be active and enliven public spaces.

In addition to this, surrounding building facades provide many of Jacobs' requirements such as a clear demarcation between what is public space and what is private space, the notion of "eyes upon the street" and spaces with a continuous flow of users through them (Jacobs, 1960. p. 45).

Human behaviour in the public realm is largely influenced by what the environment facilitates. People will not generally look through a window that does not exist or sit on a chair that is not there. As a major element in the UPS, building facades can provide opportunities for interaction and activity or alternatively, a blank surface which discourages activity (Carmona et al., 2010. p. 106).

Cullen (1971, pp. 97-105) observed that a fixed object acts as a magnet to movable objects: the most movable object in town is the human being. Humans need anchorage in their various outdoor activities such as trade, recreation and social life. Urban open space is essential but it needs to be furnished to encourage people to form groups. These objects may provide shelter or shade but due to their immovability, these anchors provide a recognisable rally point. Opportunities therefore surely exist for building facades to provide some of these anchors.

**Engaging With Building Façades**

Lynch (1960. p.8) suggests that to form a useful environmental image, the discrete environment requires a distinctive identity, a sense of structure and some significance to the observer. This implies that the principal element responsible for a sense of identity in UPSs is the surrounding buildings and particularly their façades. Thus it may be implied that to create a sense of identity through the design of building facades, necessitates the examination of how we experience and interpret these elements.

Our aesthetic appreciation of the urban environment is primarily visual and kinaesthetic, involving our awareness of the movement of all parts of our body (Carmona et al., 2010. p.130). To truly experience a space however, it is necessary to engage the contact senses, also referred to as 'intimate sensing'. These senses include the haptic sensory system which refers not only to touch but also the subcutaneous perception of surface texture, contour, pressure, temperature, humidity, pain and visceral sensation. As Menin (2003, p. 45) surmises, environmental perception engages our full capacity for sensory perception in an interpretation of our body in context. Hence, to know a place is to experience that environment.

It can also be argued that perception of an environment depends not only on what an individual perceives but also how they interpret it. That is to say, reality may be engaged in two ways; subjectively, by which one presumes a oneness with the object of concern; or objectively, by which a detachment is presumed. Fredrick (2007, p 23) clarifies this by stating that "*Objectivity is the province of the scientist, technician, mechanic, logician, and mathematician. Subjectivity is the milieu of the artist, musician, mystic, and free spirit. Citizens of modern cultures are inclined to value the objective view….but both modes of engagement are crucial to understanding and creating architecture*." In western society, individuals generally engage objectively with their environment at first and as it becomes more familiar, they can move into a more subjective analysis of their surroundings. At this point, the experience depends on the values, expectations and pre-conceptions an individual brings to the perceptual experience. It is however, possible to generalise to some extent, as many of these preconceptions are the result of culture and upbringing. As a result, urban building facades can and should be tailored to accommodate a particular cultural situation (Carmona et al., 2010).

Carmona, Tiesdell, Heath and Oc (2010) also suggest that the aesthetic aspect of a façade may also be imbued with some extent of symbolism. This symbolism may be culturally based or more universal and has the potential to denote the purpose of a building or even the importance of the activities which take place within.

At the beginning of the 20th century, Adolf Loos argued that the human race had evolved beyond the need for ornamentation as it was costly and time consuming to create and offered no additional value to the objects it adorn. He went on to draw parallels between the violent culture of Papuan tribesman, their facial tattoos and the ornamentation of modern buildings, suggesting that to adorn modern building with unnecessary embellishments was not only a waste of time and money, but also the social and moral equivalent of killing and eating ones neighbour (Loos, 1998. P.168).

This anti-ornamentation paradigm gained support through the designs and writings of Le Corbusier who professed that simplicity was a basic principal of architectural design. He went on to argue that simplicity was not equivalent to poverty as it was a conscious choice. Le Corbusier repeatedly advised architects to

avoid arbitrarily complicated forms, explaining that if we let the silhouette of a house look like the silhouette of a city and increase the number of these housed in a street, the result would be a "cacophony…a disastrous: turmoil of jagged edges" (Guiton, 1981, pp. 33-36).

Cullen (1971, p. 155), in a modernist assertion reminiscent of Le Corbusier and Loos, suggests that the texture is the maximum effect possible from a wall and walls, as a result, should be painted white to gain maximum appreciation of their texture.

Although somewhat understating the potential of the humble wall, Cullen's comments regarding texture do present a valid point, in that the texture a wall presents to the public realm is one of its most significant attributes. The texture of a wall however, is comprised of much more that simply the form of the material used to create it. The true visual texture of a wall is comprised of the location and shape of the windows and doors and the treatment of the corners and intersections of materials, along with many other small-scale details which are part of its form. This texture is the most critical factor to consider when locating a new building within an existing built context (Tucker and Ostwald, 2004. p 3).

Contrary to the opinions of Loos and Le Corbusier, recent research has indicated the people prefer the look of a more complex building façade (Heath et al., 2000). Research through interviews has also revealed that subjects found elements such as scale, symmetry, texture and ornamentation can create a sense of richness within a building's façade which those viewing it often prefer (Tucker and Ostwald, 2004. p. 7). These detail elements within the façade are also the same as those associated with what generates the ineffable 'character' of a building (Stamps, 1999. p. 452).

To this end, much research has been conducted into what it is that makes a building façade attractive to the general public. Tucker and Ostwald (2004, p. 9) considered the visual relationship of the component parts of the building to one another and the face of the building in its entirety, as well as the use of ornamentation and visible textures and the scale of elements within the composition. Their findings suggest that adherence to a set of ratios can precipitate pleasing combinations.

Using a mathematical method of establishing relative scale called Van der Laan septaves, Stamps (1998, p. 21) generated several two dimensional building facades with varying levels of detail and asked subjects to identify their preferred façade. The results indicated that individuals had a preference for greater levels of detail particularly regarding door and window trim.

Utilizing computer-aided modelling to examine how streetscapes were perceived by people at different distances or scales, Tucker and his colleagues found a similar public preference for detail in these views.

**Literature Summary**

Of the studies completed regarding the appeal of building facades, the common trend appears to be that the public have a preference for more complex designs. These studies also suggest a shortcoming in the research in that they address the issue of the façade as a two dimensional one. That is to say, they have examined the composition of facades as a two dimensional elevation rather than a three dimensional object in space. In the light of the research regarding how people experience space, this appears to be a major oversight.

Historically public urban spaces have served as somewhere for children to play, a place for enjoyable walks and unplanned interactions and also as settings for individuals to rest, meet and exchange ideas, for group and individual self-expression and as a staging point for protests public addresses (Morris, 1994. p. 89). It would now seem that with recent trends towards increased residential occupation of our urban centres, the need for quality urban pubic space is as significant now as it ever has been. As Web notes, "actors and décor have changed but the need for a stage remains. In public space, pedestrian is king" (Morris, 1994. p. 45).

The literature suggests that building facades which surround UPS are acutely important as they serve many important utilitarian functions as well as providing the aesthetic qualities that good designs bring to these environments.

The literature also suggests that richness of the aesthetic quality of these façades improves the quality of public urban spaces and implies that the three-dimensional nature of these façades may be a significant factor in the richness and usability of these spaces. The relationship between these however, appears to be a topic that has scarcely and only anecdotally been investigated.

As a response to this need, this research has attempted to take initial steps into identifying the significance of this aspect of urban design.

The study has also taken into account Baker's Ecological Psychology (Bell, 2001. p. 124 ff) which professes that environment and inhabitants create a "behaviour setting" which dictates a group's behaviour within that setting.

Individuals have varying levels of stimulation requirements which will change within each person depending upon mood. For this reason, individuals and

groups will locate themselves in a position which most closely satisfies their requirements for stimulation.

Although this initially suggests a conflict with the theories espoused by Maslow, they are not mutually exclusive. Individuals will locate themselves in a position which most closely satisfies all of their psychological and physical requirements. That is to say, they will find a position which will be physically comfortable as well as satisfying their psychological need for stimulation (Bell et.al. 2001).

## METHODOLOGY

The aim of this research was to establish the existence of a link between the three-dimensionality of buildings, be it facades or associated structures, and human social behaviour. The research takes into account both qualitative and quantitative research frameworks. A scientific approach considering control, operational definitions and hypothesis testing was utilised in conjunction with qualitative analysis which considered the importance of the subjective, experiential world of human beings. The study was structured so as to consider the processes of defining a problem, forming a hypothesis, designing a study, selecting samples, gathering and analysing data, drawing conclusions and reporting results. It did however, also consider ethnographical research methods that construct a picture of a groups cultural and perceptual world. The work was also based on a model of action research suggested by Lewin (Burns, 1990. p. 223), in that it may be utilised as a method of applying fact finding to practical problem solving in a social situation with a view to improving the quality of action within it. In that it is intended to inform future architectural design of UPS, the research aims to improve the practical judgement in concrete situations and the validity of theories it generates depends not so much on scientific tests of truth, as on its usefulness in helping people function more intelligently and skilfully.

To guide the research design and clarify the intent of the research, the question was posed, 'does the three-dimensionality of buildings at street level effect the social behaviour of people using the spaces surrounding these buildings?' This precipitated the hypothesis that the buildings surrounding UPSs which possess a high degree of three-dimensionality at street level, are more likely to encourage people to congregate and therefore increase the opportunity for social interactions.

To clarify the purpose of this research and the structures being investigated, built environment elements were classified as:

1. **Support**: three dimensional elements such as stairs, ramps, fixed seating, rails ledges, etc. extending into the public realm.
2. **Shelter**: three dimensional elements such as awnings and other overhead structures extending into the public realm.
3. **Sheer** surfaces: walls with no penetrations or extensions into the public realm.
4. **Open**: horizontal surfaces - open flat surfaces with no nearby building facades where nearby is classified as within 3 metres as suggested by Jacobs (1961, p. 83).

Because of the preliminary nature of this inquiry, investigation techniques which provide a broad understanding of what is occurring were to be employed.

Appropriate UPSs were selected based upon the presence of structural three-dimensionality. The spaces utilised for the purpose of this research are King George Square, Brisbane Square and Queen's Park, all of which are located within the Central Business District of Brisbane City.

Observation techniques have been selected as they provide an opportunity to observe behaviour in environmental conditions.

To reduce the chance of observational errors, the behaviours observed were limited to observable behaviours such as eye contact, conversation and physical contact. Other activities such as smoking, eating and interacting with mobile electronic devices were also recorded as it was considered that they may provide further information at the time of analysis.

Armed with a map of the UPS, a clip board and a pen, the researcher walked through and around around the UPS under observation, noting on the map the location of individuals and groups within the space and utilising a code system, observing their social activity. One pass of the spaces only was made within each time period for each day and people passing through the spaces without stopping were not considered.

Five observations were taken each day in each of the UPSs under observation, one in each of the five 1½ hour time periods throughout the day from 9 am to 4:30 pm.

As the primary objective was to ascertain if there exists a relationship between architectural form and social behaviour, correlation analysis was employed. This involved the data gathered being entered into a spread sheet and analysed using simple percentage calculations and visual analysis of the resultant graphs.

Descriptive research as defined by Bell, (1978. p. 13) was also recorded during observations. These results were subsequently reviewed and points of interest noted to aid with later analysis.

As available resources and time limited the variety of UPSs which could be visited, the investigation was divided into two parts.

In Part 1, maps of three Brisbane UPSs were generated from aerial photographs (see appendix A). The maps were used to record the distribution and activities of people populating these areas during the morning, mid-day and afternoon on weekdays and weekends.

In addition to the map records, anecdotal notes were made, recording any additional points of interest or trends that were not initially evident within the statistical analysis.

These results were then tabulated and examined for the presence of trends in the distribution of people within the space in relation to the architecture present

The intention of Part 2 was to broaden the scope of the investigation. In an attempt to do this, web cams, You Tube clips, Google Earth street view pictures, Google image search results and other publicly available media showing a variety of public urban space at a variety of times of day and in a number of seasonal conditions, were accessed.

These images were analysed and the number and type of social interactions taking place were recorded and tabulated in relation to the three dimensional nature of surrounding structures.

The number, distribution and types of interactions were analysed in relation to the types of building façades near which they took place. These results were graphed and analysed and compared with the results found in the Brisbane UPSs to ascertain whether or not these results may be internationally and seasonally consistent.

These results were summarised as indicative samples only. To allow a clearer level of understanding of the spaces investigated, the results were taken from three international public spaces with which the researcher is familiar and which are comparable with the local spaces in terms of size and presence of structural three-dimensionality.

The following are images of the six UPSs utilised within this research paper. They were accessed via internet sources to ensure ethical requirements were considered.

Brisbane Square: Accessed at http://www.lonelyplanet.com/australia/queensland/brisbane/images/brisbane-square-brisbane$26098-28 on 16/10/2011

Queens Park Brisbane: Accessed at http://www.galenfrysinger.com /brisbane_australia.htm on 16/10/2011

King George Square: Accessed at http://www.abc.net.au/local/stories /2009/10/21/2720306.htm on 14/08/2011

Makartplatz in Salzburg, Austria: Accessed at http://www.travelpod.co.uk/ travel-photo/chaletaria/3/1297724136/makartplatz.jpg/tpod.html on 12/08/2011

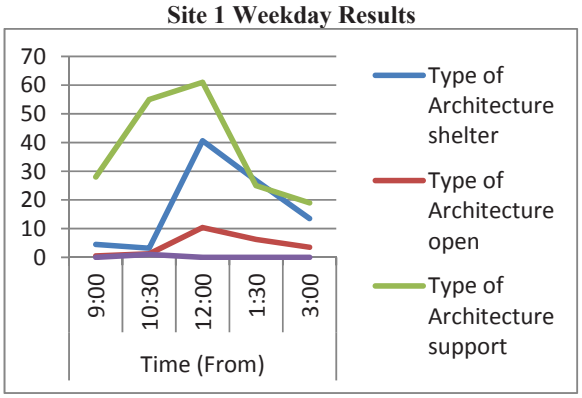
Marktplatz in Bonn, Germany: Accessed at http://www.stephaneisel.de/start/Textarchiv/Archiv-allgemein/news/Ein-Blick-auf-Bonns-verborgene-Schaetze.html?xz=0&cc=1&sd=1&ci=2050 on 12/08/2011

## RESULTS

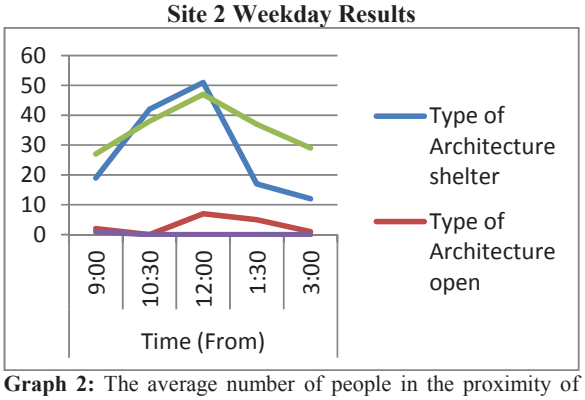
The following results are records of the number of people recorded within the close vicinity of the indicated structures.

### Part 1

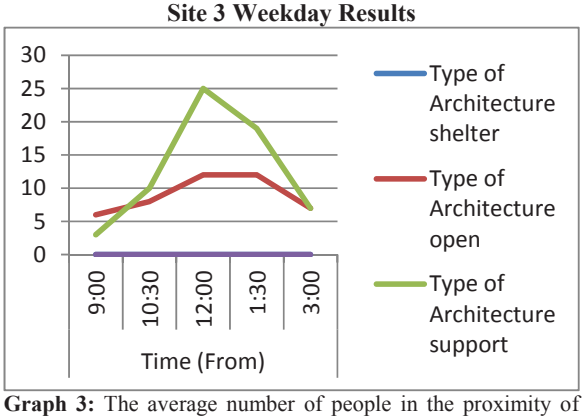
Graphs 1 to 3 show the results recorded in Brisbane, Queensland. Graph 4 shows the total numbers of people as a percentage of the total number within the space.



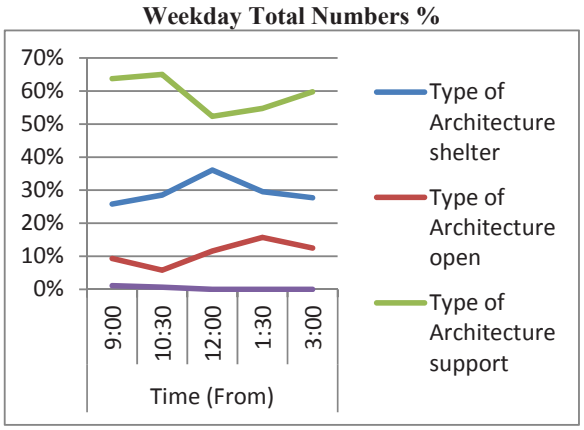

**Graph 1:** The average number of people in the proximity of types of architecture in Brisbane Square on weekdays.



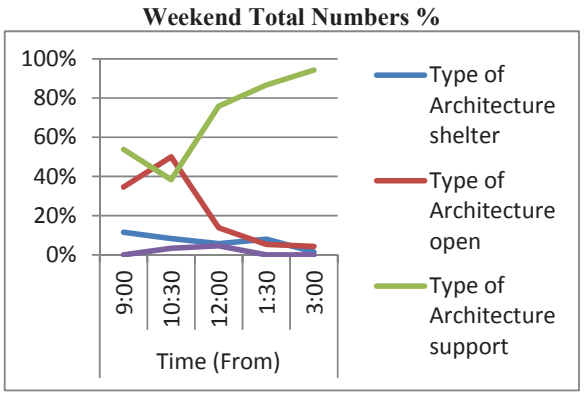

**Graph 2:** The average number of people in the proximity of types of architecture in King George Square on weekdays.



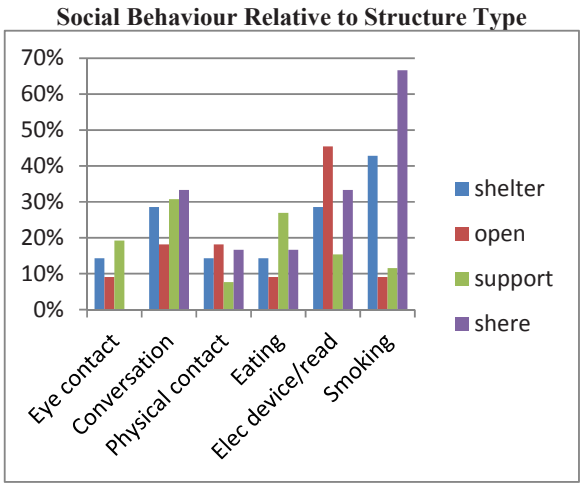

**Graph 3:** The average number of people in the proximity of types of architecture in Queens Park on weekdays.




**Graph 4:** The number of people in the proximity of types of architecture in Brisbane UPSs as a percentage of the total number in the space on weekdays.




**Graph 5:** The number of people in the proximity of types of architecture in Brisbane UPSs as a percentage of the total number in the space on weekends.




**Graph 6:** The types of social behaviour taking place in the proximity of types of architecture in Brisbane UPSs as a percentage of the total number recorded in each architectural proximity.

Master of Architecture Research Conference, School of Design, QUT, Brisbane, 9 November 2011

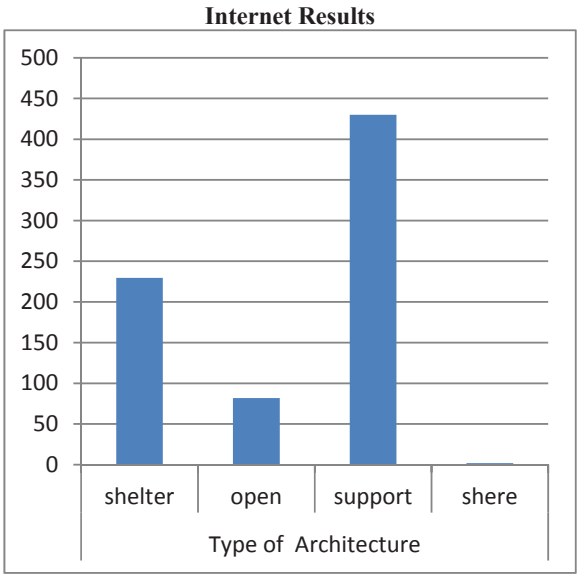
The table below is a summary of the anecdotal notes taken during observations of the UPSs in Brisbane.

**Table 1**

| Time | Queen Victoria Park | Brisbane Square | King George Square |
|---|---|---|---|
| **Before 9:00** | Generally empty save for through traffic. | Predominant behaviour is sitting alone smoking. | Predominant behaviour is sitting alone smoking.<br>These results were compiled and summarised as an indicative sample only. These were intended to provide an international and cross-seasonal perspective to the study. |
| **9:00 & 10:30** | Increase in social pairs and parent and child groups. | Slight increase in pedestrian traffic, increase in quality of interactions between individuals, increase in social pairs and groups sitting talking and eating and window shopping. | Slight increase in pedestrian traffic, increase in quality of interactions between individuals, increase in social pairs and groups sitting talking and eating and window shopping. |
| **10:31 & 12:00** | Generally similar to previous observations. Some individuals and groups seeking spaces to sit on the ground under trees. | Significant increase in pedestrian traffic, increase in relative number of individuals and pairs standing in the open, increase in social pairs and groups sitting talking and eating and window shopping. | Significant increase in pedestrian traffic, increase in relative number of individuals and pairs standing in the open areas, increase in social pairs and groups sitting talking and eating and window shopping. |
| **12:01 & 1:30** | Increase in number of people located in open sitting on the grass in groups or on own, seating utilisation stable. Occasionally individuals can be found against the sheer walls reading or interacting with electronic devices. | Pedestrian traffic has levelled off, support areas populations increased predominantly pairs and small groups. Standing in open spaces has reduced with the reduction in pedestrian traffic (could be due to reduced sense of anonymity or perhaps they were looking for someone and have found that person) reduced occurrence of individuals smoking on own. | Traffic has levelled off support areas populations increased predominantly pairs and small groups. Standing in open spaces has reduced with the reduction in pedestrian traffic (could be due to reduced sense of anonymity or perhaps they were looking for someone and have found that person) reduced occurrence of individuals smoking on own. |
| **1:31 & 3:00** | Generally similar to previous observations. Some individuals and groups seeking spaces to sit on the ground under trees. | Significant increase in pedestrian traffic, increase in relative number of individuals and pairs standing in the open, increase in social pairs and groups sitting talking and eating and window shopping. | Significant decrease in pedestrian traffic, increase in relative number of individuals and pairs standing in the open areas, increase in social pairs and groups sitting talking and eating and window shopping. |
| **3:01 & 4:30** | Some social pairs and small groups remaining. | Slight increase in pedestrian traffic, high quality of interactions between individuals, social pairs and groups sitting talking and window shopping. | Slight increase in pedestrian traffic high quality of interactions between individuals. |
| **General** | • An increase in pedestrian traffic in all spaces toward the end of the day but no corresponding increase in social interactions.<br>• Quality of activity during off peak times is better (i.e. more talking, less sitting alone smoking)<br>• Some evidence of hierarchical filling of spaces with support filling first (to a point) and sheer spaces last. When sheer reach a certain capacity then the other areas begin to fill even further in feedback loop type fission.<br>• These observations do not take into account the relative amount of each type of space available. Variations here may result in different holding/saturation populations for each.<br>• Less desirable furniture is not consciously visible until more desirable spaces are gone.<br>• Some spaces feel sheer despite having an element of shelter because the wall at street level has no fenestrations (doors or windows) but may contain doors which read like walls.<br>• King George Square: surprisingly better spatial quality - larger variety of spaces | | |

**Part 2**

Graph 7 represents the total numbers recorded from internet resources referring to Marktplatz in Bonn, Germany; Piazza della Cisterna in San Gimignano, Italy and Makartplatz in Salzburg, Austria.




**Graph 7:** The average number of people in the proximity of types of architecture as suggested through internet sources.

**DISCUSSION**

The results illustrated above in Graphs 1 to 3 indicate that people within UPSs in Brisbane prefer to locate themselves around three-dimensional structures. Furthermore, a strong preference appears to exist for support type structures. This preference is made even clearer when the results for each of the sites are combined and represented as a percentage of the total population of the spaces, as illustrated in Graph 4.

Some variations in results can be observed between the three spaces. Visitors to Queens Park, for instance, show a much higher preference for the open spaces than in the other UPS. This is likely due to the fact that much of the open space within Queens Park is lawn, thus making it a more attractive and comfortable place to sit or lie down. The anecdotal notes in Appendix B further support this hypothesis.

Although there appears to be a lack of use of the shelter within Queens Park, the anecdotal notes in Appendix B suggest the some individuals were seeking shelter under the trees within the park.

Another apparent variation between the spaces is a higher preference for shelter at King George Square. This may be due to a combination of the immaturity of the trees in this space and the availability of a large amount of structural shelter provided by the roof of the café area.

Despite these variations, Graph 4 illustrates that there is a significant preference for support structures, the demand for which is maintained throughout the day. Shelter structures are the second most popular, with an increase in preference for these structures in the hotter parts of the day. The population of these spaces generally tended to avoid sheer structural and open spaces during these observations.

Graph 4 also indicates that the popularity of support structures drops somewhat in the middle of the day. This could be a result of a social saturation threshold being reached. This is not to say that all available space was occupied but rather, a maximum level of social comfort was reached, as indicated by Baker. This may also be a contributing factor to the increased presence of individuals standing in the open spaces during peak times.

Results from internet sources show similar distribution patterns to those found in Brisbane. This not only supports the findings in Brisbane but also indicate that the trends may be similar in other countries and during different seasons. As noted previously, these observations were based on only three UPSs which are comparable in size to those studied in Brisbane and which would require further investigation to validate their effectiveness as comparative spaces.

The anecdotal notes and the survey results regarding social behaviour demonstrate that the distribution of the observed behaviours changed throughout the day. As can be seen from these observations, the morning and evening peak times are more commonly associated with non-interactive behaviours such as smoking or interacting with mobile phones. During the weekends and off peak times, there is a higher prevalence of eye contact, talking and touching. This is also the case during the midday peak period but it is offset somewhat by the population increase and resultant increase in non-interactive behaviours.

One curious observation was also made here, in that the number of people standing in the open increased significantly as the population increased during the beginning of the midday peak. This could be explained by the Theory of Staffing (Bell, 1978. pp. 126-128), which suggests that the environment and the population of that environment interact to produce a "behaviour setting". The behaviour setting is preserved only while the population remains within a maintenance range.

Based on this theory, it could be postulated that the maintenance range for one behaviour setting, that is, the

one where individuals avoid the open areas, is exceeded thus forcing it over a threshold and creating a new behaviour setting in which standing in the open is an acceptable behaviour.

The apparent preference for support structures is congruent with Cullen's assertion that people require emotional and social anchorage. In addition to this, they also provide physical comfort in the form of somewhere to sit or lean. This may enable longer stays and involvement in other activities such a eating or reading which are hence made easier through the presence of somewhere to place food or books.

While previous investigations by Jacobs and Lynch have revealed some of the macroscopic concepts which contribute to the success of UPSs, this study has delved deeper into the influence of the structures which define UPS. It has attempted to go beyond the cursory two-dimensional influences of building facades on individuals studied by Stamps, Tucker and Ostwald to investigate the public's reactions to the three-dimensional aspects of these structures.

As a preliminary investigation into the influence of these aspects, these findings are not without limitations. As this study consisted primarily of correlation research, the possibility that the observed relationship may be caused by a third, unexamined factor cannot be ruled out (Bell, 1978. p. 10). As the investigation was based on real world observations, it has not been possible to control or manipulate variables. As a result, this research has a relatively low level of internal validity (Bell, 1978. p. 11). However, because they do occur within the real world, they have a high external validity.

In this study, no account has been made of other influences such as the attraction and self-regulation of levels of social stimulus, the relatively limited number of observation days and sites, variations in the amount of each type of space available, or activity after dark and throughout a variety of seasons.

The internet material consisted primarily of still shots and videos of subjects within UPSs. As a result, they may be of limited value due to the lack of background information, depth of understanding of the surroundings and other factors which may be impacting on the social activity.

This data also provide limited insight into the qualitative aspect of this study related to social interactions, length of stay, completeness and accuracy of captured data and the like.

It was possible however, to garner enough information from this data to reveal the existence of similar trends as those observed in the Brisbane UPSs.

Also, the research methodology used here does not provide any insight as to why people are choosing to be where they are. This may be beneficial as the subjects may not be consciously aware of their reasons but it could be overcome by the inclusion of an interview with selected subjects.

## CONCLUSIONS

The intended goals of this study were to determine if there may be a link between the three-dimensionality of buildings which surround UPSs and the social behaviour of people within the immediate vicinity.

The results indicate that there is indeed a link which suggests that people are more likely to seek out spaces which provide support. They are more likely to linger in these spaces and as a result, increase the chances of social interaction occurring.

Furthermore, as a result of the second phase of this investigation where internet sources from around the world were accessed and assessed, it can be asserted that these results may be indicative of an international trend. Restrictions include the fact that observations were based on only single moments and results were summarised on single graphs to present data and draw comparisons. They were also all European based and hence have not taken into consideration cultural differences that may affect behaviours in Asia, Africa or the Americas.

Due to the preliminary nature of this investigation, there are many limitation including, most significantly, the limited breath and length of this research. As a result, it is recommended that further investigations be undertaken examining these relationships in more detail.

Despite these limitations, there is significant support for the hypothesis that the form of the architecture surrounding and within an UPS, effects the distribution and social activities of individuals and groups within these areas. As a result, it may be suggested that designers of UPSs should include supporting and sheltering structures in the design of the façades of buildings which adjoin UPSs.

These findings are preliminary in nature and are intended to provide a starting point for further investigation in this area.

Further studies could include investigation via self-reporting measures that involve subjects reporting why they behaved in the way they did. This would need to be supported with further evidence as responses may

include bias on the part of the subject or an ignorance as to what they were doing or why they did it.

Further research could also endeavour to establish the existence of a relationship between the location of support structures, public occupation of these structures and their relationship with visual stimulation. It may also be viable to investigate the different types of support structures and to determine which are more attractive to the public and why.

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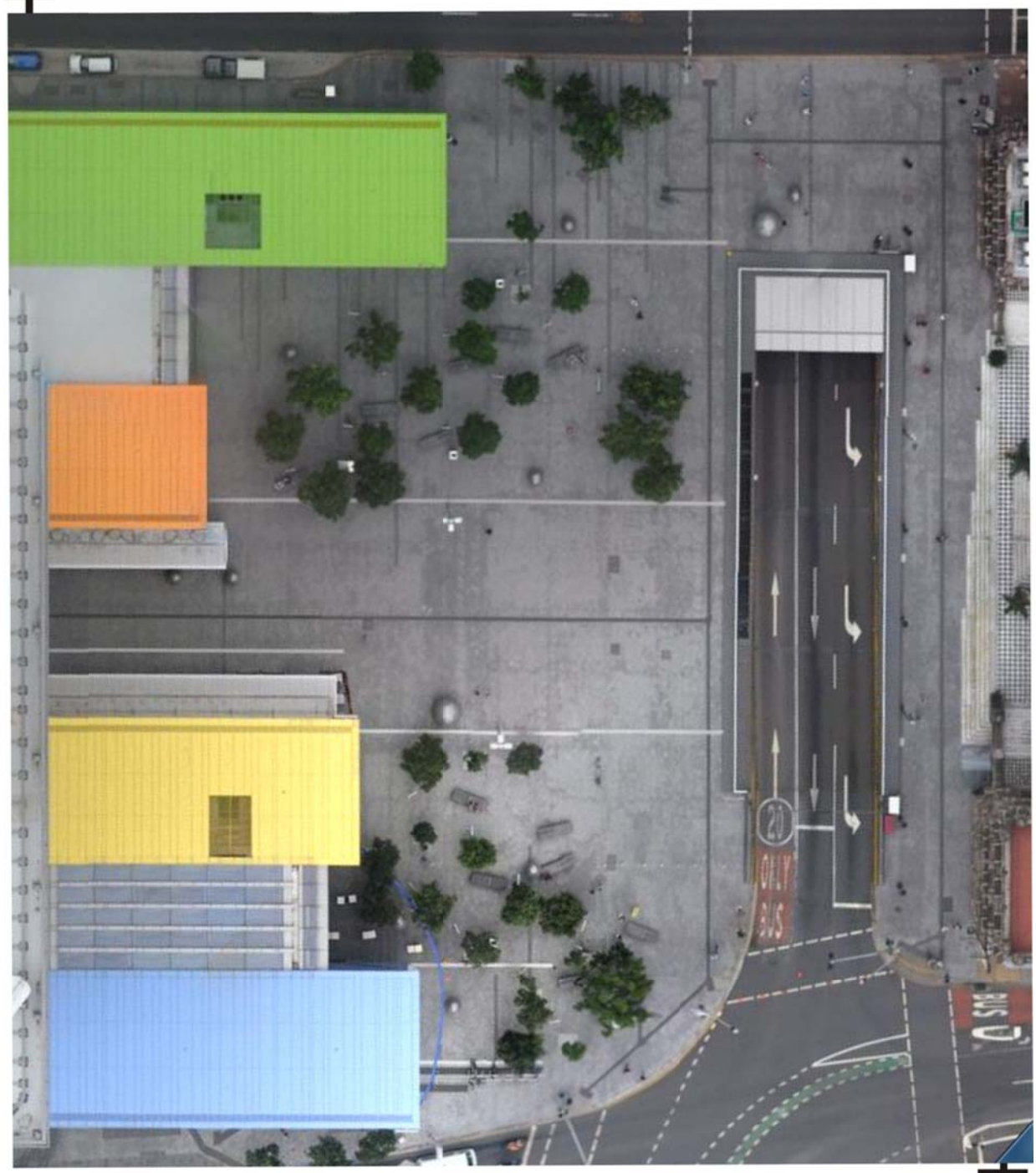
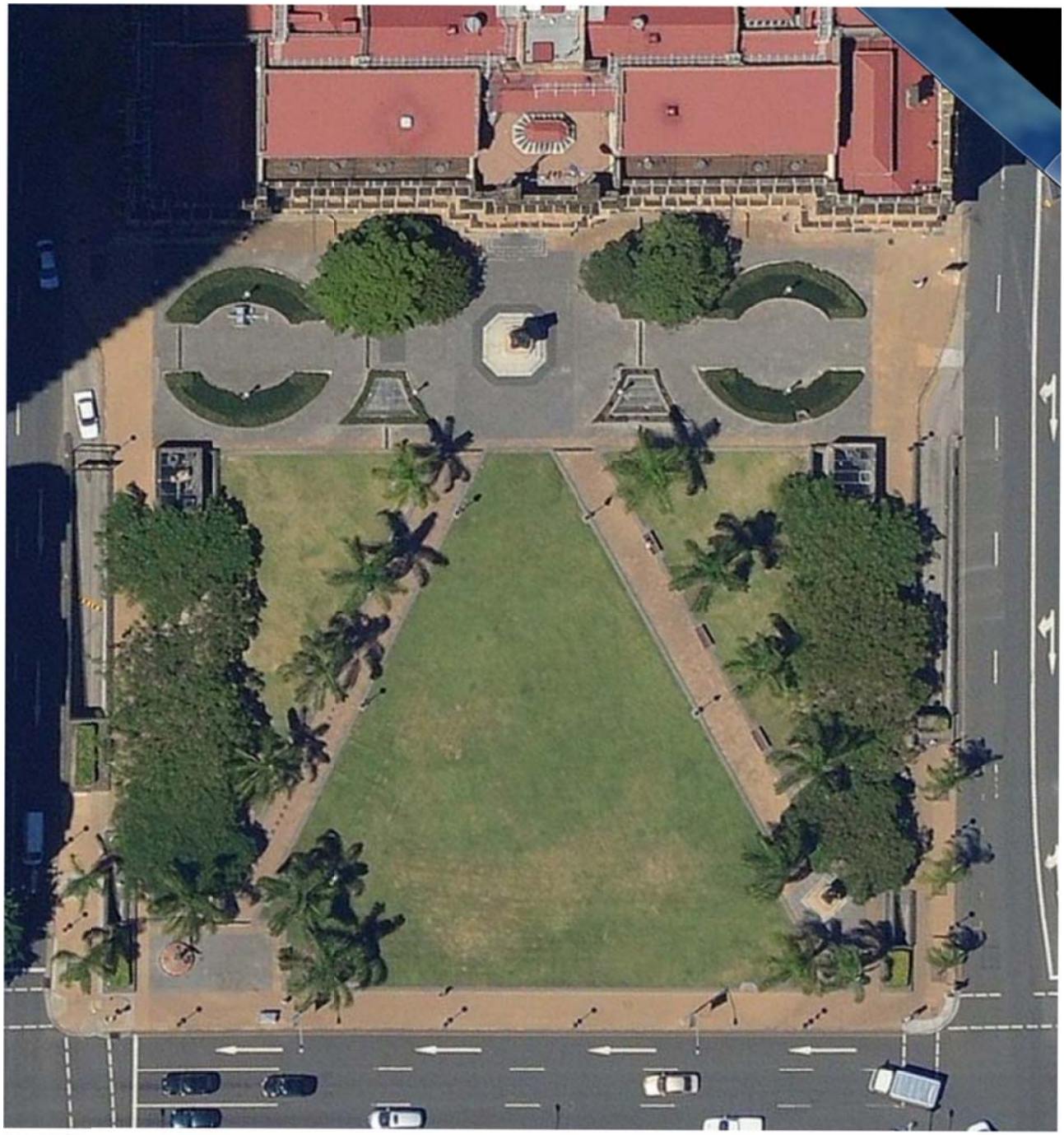
**APPENDIX A**



BRISBANE SQUARE

Master of Architecture Research Conference, School of Design, QUT, Brisbane, 9 November 2011

Master of Architecture Research Conference, School of Design, QUT, Brisbane, 9 November 2011



QUEENS PARK

Master of Architecture Research Conference, School of Design, QUT, Brisbane, 11 November 2011

# Sensuous Geography:
## The role of sensuous experiences and their contemporary implications in public squares, a Lefebvrian approach

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*ABSTRACT: This paper explores the sensuous relationship amongst people and the physical elements located in public squares. The research focuses on the study of sensuous geography and its social implications in contemporary city context. Case studies were drawn from various Western countries. A Lefebvrian approach was utilized to analyse the research findings. The study has generated a preliminary sensuous geography checklist for public squares that can predict the degree of popularity and experiential qualities of public squares. However, limits existed in the paper as sensory experiences are conditioned by individual, socio-cultural and climatic influences. The study suggests further integrated approach is needed in this field of study. The research findings indicated that better knowledge of sensuous geography is important in the design and planning disciplines.*
*Keywords: Public square; Lefebvre; Sensuous Geography*

## INTRODUCTION

To date, the significances of multisensorial qualities have been commonly acknowledged and applied among various sectors and entities. Examples of such areas includes landscape architecture, product design, health related developments as well as in the marketing industries. In the topic of place-making, the relevance of the five senses has also been studied and examined in the past. However, existing literature indicates a general lack of well developed precedents and methodological approaches to define, create and link the embodied multi-sensuous qualities of place. Past researches have called for more built forms of "non-visual sensory modes" (Porteous 1990, 5). Charles Landry for example, argued that urban economic related growth of "short-term, landmark events endanger more creative, imaginative and inclusive forms of city-making" (2006, cited in Rogerson & Rice 2009). As a result, the social fabric of sensuous qualities (other than visual) has been diminished (Madaniporur 2003; Degan 2008). In response to the material and ocular oriented phenomena in most contemporary cities, this study aims to enquire human responses and perceptions related to urban sensuous geography in the context of public squares.

Lefebvre's conceptual triad and Rhythmanalysis were utilised as the main theoretical framework of this study. The sensorial and socio qualities of physical entities located in public squares will be examined and studied to exemplify the importance of human senses in the design and planning disciplines. The research argued that the study of sensuous experience and its relationship with urban city settings can provide politicians, planners and designers new insights regarding the development and planning of public spaces.

This research paper has been structured in the following way: firstly, the theoretical bases of sensuous geography, existing research frameworks and a brief overview of the social importance of public spaces within the context of this research. Secondly, the research methodology will be discussed and the data collected from case studies will be presented and examined in order to form a hypothetical framework that would be tested and modified in the follow-on section. Lastly, theoretical, social and built-environmental implications, as well as research contributions and limitations would be summarised to conclude the article.

## SENSUOUS GEOGRAPHY

Senses mediate between self and the built environment, concept and material, they also actively intervene between the mind and the physical body. Rodway has described the five senses as "geographical in that they contribute to orientation in space, an awareness of spatial relationships and an appreciation of the specific qualities of different places" (1994, 37). For human geographers, understanding the role of space, place and the experience of the environment are the foci of their studies. In the early works of Tuan, he noted the important role of human senses, suggesting that "[a]n object or place achieves concrete reality when our experience of it is to-

tal, that is through all the senses as well as with the active and reflective mind" (1977, 18). The following points summarises the role of each senses in the city, its application and social implications:

1. **Touch:**
   The sense of touch enlightens people about "being" in the world (Rodaway 1994). It is of a "sensorial snail" (Classen 1998), as touching does not capture the qualities of entities momentarily. The sense of touch is a gradual discovery of the outer world. It is considered as the sense that has the most potential in developing democratic spaces. For example, different societies and cultures defined the distance of personal space differently (Hall 1969; Rodaway 1994; Degan 2008). The sense of touch, hence, offers an opportunity to help planners and designers to shape or mask certain socio-values of places.

2. **Sound:**
   Soundscapes in the city represent a variety of social, cultural and political roles. The sense of sound involves people with the external world, as Rodaway noted, people "do not merely hear", people "actively listen" (Degan 2008, 43). However, for individuals, sound cannot be easily screened out like sight. Consequently, the control of soundscapes has often been employed by authorities to achieve certain atmospheric effects and social order. As described by Borden, "[s]pace can be demarcated by sound and intensified as for example with a street festival where the street obtains a particular identity through the diverse 'audioscapes' caused by the event" (cited in Degan 2008, 44). Moreover, sound may act as linkage or barriers between places, for example the internal space of building and the road noise from traffics (*ibid).* In sum, sense of sound may act as an audio-control tool to introduce, include/exclude, or to foster/hinder certain social interactions.

3. **Smell:**
   The sense of smell is often linked with taste; it is "the most evasive sense to describe. A feature that always escapes; it is formless, it cannot be articulated, it cannot be defined in static terms" (*ibid)*. As described by Bauman, "[s]mells share with Simmel's stranger the upsetting habit of coming unannounced, outstaying their welcome, arriving now and refusing to go away later (1993, 24). In the contemporary world, smells are often utilised to differentiate social classes and create certain identity, in which artificially scented objects are considered more civilised than primal smells of human odour. In addition, sense of smell is linked to the brain's limbic system that is connected to emotions (Porteous 1985, cited in Degan 2008). As a result, odours can aid in identity shaping of spaces and further links the social space with the inhabitants. "They subvert the immediate experience of place by making individuals relate to other places and time"(*ibid,*45).

4. **Taste:**
   The sense of taste is the hardest one to comprehend from the observer/analysis point of view, as "what the individual eats, no one else can eat under any circumstance' (Simmel 1994, 346). Taste is a relatively timely process that is culturally acquired. Different taste and smell of exotic food provides sense of "otherness" (Degan 2008, 46). As noted by Zukin, "[r]estaurants have become incubators of innovation in urban culture. They feed the symbolic culture – socially, materially, and spiritually (1995, 182). The rising of café culture may be an example for this.

5. **Vision:**
   Lastly, sense of sight is the most immediate and most elaborate sensory dimension in the urban geography. Vision is a subjective sense (Featherstone & Frisby 1997) as seeing involves selective framings of landscapes/views. Throughout the time "it promotes fast and immediate appropriation of the surroundings/objects" (Degan 2008, 46). The ocular sense upholds the most immediate pleasures of senses, where inhabitants can be drawn easily to the difference of built forms and colours. Moreover, like other senses, socialness is embodied within the sense of sight. As Simmel says, "vision is an important component in facilitating everyday sociability in public spaces, as when people's eyes meet this produces the 'most complete reciprocity', and as this sensuous interaction momentarily engages two or more people" (Featherstone & Frisby 1997, 111). The visual dimensions have always played a dominant role in representations of urban geography and the objects within it; whilst, masking out other sensuous aspects of spaces resulting in less dynamic socio-public spaces through mono-focusing on the development of aesthetic pleasure.

Moreover, sensory geography has provided an enriched focus on both the built environment and its sensuous experiential components. In order to correctly map out the relationship between sensuous qualities and physical entities, it is important to have an underpinned theory of what spaces and places exactly are. There are currently a variety of theoretical positions in regards to space and place (refer to Table 1). Of all, Lefebvre's approach "goes beyond the fetishisms of observable appearances

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Table 1 – Agnew's Summary of the Four Approaches to Understand space/place (contents cited in Rogerson & Rice 2009, 133)

| Type | **Description** |
|---|---|
| Humanistic & Agency-based | Places are parts of spaces and spaces provide the resources and the frames of reference in which places are made. |
| Postmodern and Feminist Approach (less agency-focussed) | The diversity of experience of place ( and the openness and multifarious identities of such places) is emphasized. |
| Contextualist-performative Perspective | The approach emphasizes the materiality of places as "open spaces" made by practices and shaped in their passing. In so doing, the focus is less on what exists and more on how we know. |
| Lefebvrian Approach | "[A]bstract space" has colonized social life through spatial practices and representations of space and it is through resistance and (re)capturing of such spaces in opposition to the colonizing tendencies of capitalism that place (concrete space) can be signified. |

Table 2 – Lefebvre's Conceptual Triad & Related Frameworks (modified from Carp 2008, 133)

| | ← MORE CONCRETE | | MORE ABSTRACT → | |
|---|---|---|---|---|
| Field | **Aspects of Triad** | | **Examples** | **Human Being** |
| Physical | ***Spatial Phenomena*** | **Spatial Practice** | Routes, destinations, way-finding, modes of transport | ***Body*** ↕ ***Mind*** ↕ ***Direct Experience*** |
| | ***Process Phenomena*** | **Perceived Space** | Smelling, seing, hearing, tasting, touching, movng, attending, dissociating | |
| Mental | ***Spatial Phenomena*** | **Representations of Space** | Plans, discourse, concepts, theories, government bodies, tourism industry, academic disciplines | |
| | ***Process Phenomena*** | **Conceived Space** | Thinking, reflecting, systematizing, ideating, imagining, interpreting, measuring, categorizing | |
| Social | ***Spatial Phenomena*** | **Representational Space** | Public squares, public open-space, office, home, bed | |
| | ***Process Phenomena*** | **Lived Space** | Living "in the moment", loving, fearing, creating, witnessing, finding, intersubjectivity, joining in, recognizing limits, remembering | |

(the visual) to trace the inner dynamics of sensory urbanism" (*ibid*). Thus, Lefebvre's framework was utilized for the purpose of this research due to its stronger linkage with urban sensorial experiences that also have a diverse embedment of socio-qualities (refer to Table 2 for details of this approach).

## LEFEBVRE'S CONCEPTUAL TRIAD

For Henry Lefebvre, the human body is considered to be a crucial "mediator of the coexisting, concording and interfering relationship between the three elements that constitute the social production of space: spatial practices, representations of space and spaces of representation" (Simonsen, cited in Degan 2008, 19). The conceptual triad developed by Lefebvre proposed a way to interpret the sensorial and socio-qualities of spaces. The conceptual triad works collectively in the creation of social spaces; each constitution in space is enlightened by and created through the other two spaces. "Spatial practice, representations of space and spaces of representation are best conceived of as analytical spaces that contribute differentially to the production of place, vary according to local conditions and fusing with different intensities" (Dear cited from Degan 2008, 19-20).

When linking the conceptual triad with sensory urbanism, several points can be extracted. The following summary provides brief explanations of each concept as well as its relevance and implications for the research of urban sensuous experiences (refer to Table 2):

1. **Spatial practice:** refers to the mundane/daily routines of "sequences, habits and patterns of movement in and through physical places" (Carp 2008, 132) that generate sociable aspects of spaces. The physical structure of the place/space can be directly sensed by human body through the five sensory receptors. As noted by Shields, the repeated habitual process is often being perceived as the "taken-for-granted and unreflective practice" (1989). For instance, "while planners and architects designate urban spaces to be used in particular ways, individuals' perceptions may induce them to use the very same urban spaces in different ways" (Rogerson & Rice 2009, 150).The importance of this trialectic element lies on its capacity to generate differing sensory responses.

2. **Representations of space:** refers to the abstract yet rational space defined by "planners, bureaucrats and architects" (*ibid*).Representations of space conveys the conceptual mindset from the views of the *authorities*. This also suggests a sense of social order. When this space is being engaged by the users, it is considered as a "conceived space" as it involves "thinking, imagining, reflecting on an idea, analysing, planning…shaping and reshaping an inchoate thought into expression, as either individual or collective activity, including both ideational synergy and conflictual perturbations" (Carp 2008, 134). This element of social space production is appropriate for the topic of sensory urbanism as it highlighted "ways in which the design of 'public' spaces has the potential to satisfy public needs, but does not always do so" (Rogerson & Rice 2009, 150).

3. **Representational space:** refers to the personal/individual aspects of social space in the sense that the particular spatial entity is first experienced, conceptualised and finally *lived* through the unifying of the material space with individual's psychological space. The space is of the "imaginary geographies" (Lefebvre 1991; 39) that is actively generated through personal comprehension of that particular spatial entity. It is through this superimposition of one's own experiential reflection towards the tangible spatial entity that one turns the space into a *lived* one. These reflections includes various social scales of mental processing; ranging from broader "societal representations" (Carp 2008, 135) of certain discourse or ethnic groups, to a more individualistic style of personal representation. They are subjective living experiences that have a "felt relationship to past, present and future (*ibid).* Hence, the social life of the inhabitants are deeply linked and connected to the representational space. Opportunities and interpretations of this social space, open up prospects to draw people together with places, making and designating meanings to the urban geographies.

The conceptual triad of social spaces imposts the relevance of sensory geography, "…[t]here is no way in which to understand the world without first detecting through the radar-net of our senses" (Ackerman 1990, xviii). Furthermore, sensuous relationships are difficult to be mapped and understand through conventional recording media, as they are framed with the recorder's particular interest; thus, resulting relatively subjective and biased documentations (Lucas 2009, 174).

## LEFEBVRE'S RHYTHMANALYSIS

Lefebvre's *Rhythmanalysis,* generates an alternative approach to analyse the intangibleness of the sensorial reception and manifestation process. As suggested by its name, this analysis method involves the studying and measuring of the rhythmic characteristics of urban geography and the consequent experiences created through the individual sensory receptors of each inhabitant. More specifically, two groupings of rhythms are identified, that is rhythms in the context of the space/place specific reoc-

curring human activities; and rhythms in the context of corresponding sensorial experiences (Lefebvre 2004; Degan 2008). This method of analysis, however, has been causing for debate among some critics. For example, Lucas argued that the rhythmanalysis approach "encourages a certain aloofness, like an early detached ethnographer" (2009, 177), the method of observation is considered by Lucas "as a balcony with a good view of the area in question". Lucas proposed to further include "action of memory" along with Lefebvre's approach (*ibid*). Similarly, Degan has combined the analysis of physical space with the rhythmanalysis technique to further enhance and anchor "the [almost] aloof method…proposed by Lefebvre" (2008*).*

While the senses may be subjected to the physical boundaries that the built environment offers, a significant amount of the sensory usage is the result of "learnt behaviour[s]" through culturally acquired experience and knowledge (Rodway 1994, 25). Drawing back to the 1970's, scholars such as Tuan (1974), Carpenter (1973) & Bergen (1972, 1980) all acknowledge the significance of culture having an impact on the way we sense the world. Pollock for example, has defined culture as the "social practices whose prime aim is signification, i.e. the production of sense or making orders of sense for the world in which we live (1988, cited in Rodway 1994, 22). In a more contemporary example, Nisbett investigated perceptual differences between Eastern and Western countries (2007, 62). When linking back to the study of sensuous geography, Nisbett's work highlighted the importance of cultural differences in which the same built environment may possess different sensory stimulations and meanings for different cultural groups. While the importance of these aspects is recognised, this paper focuses solely on the Western societies in order to minimise the cultural impacts on sensuous perceptions.

**Public Spaces vs. Sensuous Geography**

To date, Urban public spaces of Western countries, "particularly in large cities, form part of the everyday urban fabric where tourists and locals share communal space for purposes embedded into the urban lexicon of experience" (Hayllar, Griffin & Edwards 2008, 11). The five senses are one such category of experiences that contributes towards the making and understanding of urban spaces. The study of sensuous geography in public spaces may provide valuable insights to design disciplines as these places are the social foci that often adapt and foster range of social activities. Urban public spaces encompass dynamic opportunities that allow a variety of social interactions. A number of research projects have been carried out to set out guidelines and handbooks in designing public open space, in a sense to enhance and promote more quality usage of these public spaces. The two underlying points are "(i) an ability to control use and function in such spaces though design, and (ii) to emphasise on the physical components in such spaces" (Rogerson & Rice 2009). However, these suggestions and guidelines often existed for a designated outcome of physical forms, providing physical horizontal and vertical boundaries to shape certain parts of the urban geography into an entity that hosts a variety of functions; thus, resulted in an end product that "is stripped of its emotional and cultural value, which is developed only through people's use over time" (Madaniporur 2003, 148). Furthermore, the continued pursuit of visual qualities over other sensuous activities has affected the diversity of other sensuous qualities in the city**.**

**Public Squares vs. Sensuous Geography**

The growing awareness of the multi-sensorial qualities have sparked a variety of discussions on various artefacts utilising the five senses "as a key to understanding…meaning and significances" (Buchli 2002, Bull & Back 2003, Tilly 2001; 2004, Howes 2005; Classen 2005, cited in Tilly 2006, citied in Tilley 2006, 312). However, in the design and planning sector of public squares/plazas, little information has been provided in regards to the different sensorial dimensions of physical entities and their significances towards the social usability of the place. Activities happening in public squares are often influenced and filtered by various social, cultural and individual layers. Past studies of squares and plazas have suggested that presence of people, social dimensions of usage activities and frequencies are some key elements to understand the experiential meanings of spaces (Whyte 1980, Lennard & Lennard 1984, cited in *ibid*). As written by Tilly, "taking on board the differing sensorial dimensions of things allows us to appreciate more fully the thickly constituted and multidimensional phenomenological experiences of artefacts, with which we always engage with the full range of our human senses, and the manner in which the things themselves become of such significance to our lives that they actively mediate how we think and how we act (2006, 312). Hence, sensorial patterns of physical entities located in public squares were observed and studied in this paper in order to gain a better understanding of the relationship between space/place and the multi-sensorial phenomena.

## METHODOLOGY

The research methodology is divided into two phases. In the first phase, observations and data were obtained purely through online sources; while in the second phase observations were made through actual onsite observations. The procedures to explore the sensorial relationships in public squares is summarised as followed:

**<Phase A>**

**1. Case Study Selections**
A total of four public squares were selected to be observed through online webcam from Norway, Germany, Denmark and Russia. These squares were selected under two criteria: webcam clarity and popularity of the place. All the case studies chosen were located at the centre of the town or adjacent to significant places that were often populated by visitors and the locals. Additionally, generic information regarding the four squares was collected from websites such as local city councils, newspaper and tourist information centre. These data were treated as the control variant in the research to assist the analysis of Lefebvre's conceptual triad. They informed the triatic element of *representations of space* from the authoritative perspective (i.e. government and tourism bodies) in the analysis section.

**2. Base Map Preparation**
Prior to the observations, each case study was premarked with symbols, indicating where different types of physical elements were located on a map. These maps became the 'base plan' for each set of observations. The classification utilised to differentiate different categories of physical entities were as followed:

- ***Aesthetical Elements*:**
  signature buildings, monuments, sculptures and sculptural stands.

- ***Natural Elements*:**
  presence of water, green open space, flower bed, trees, shrubs and animals.

- ***Utilitarian Elements*:**
  bicycle stands, traffic bollards, light poles, seating, stairs and steps.

- ***Commercial Elements*:**
  nearby outdoor/indoor dining, retail, restaurants and hotels.

**3. Mapping of Sensorial Rhythms**
This stage involved the researcher observing the rhythmic movements of sensorial responses through online public webcam. The sample size per case study was 15-20 people randomly selected within the online camera angle where each participant will be observed one at a time. Lefebvre's rhythmic approach have been utilised in a way that the flow of activities happening on site will be mapped against the pre-marked locations of each physical elements. During the observation, the researcher followed a randomly selected person and physically drew-out the activity patterns performed by that person on the base plan. Any remark that cannot be drawn out was noted on the side where applicable. Since data was collected through webcams, elements of auditory and gastronomic sensations were documented through presumptions made via observations. As described by Lefebvre, "It is through all the senses that a space can be experienced by human" (cited in Neil 1997, 132). The five sensorial responses in the results section were described as a whole rather than differentiating them into specific paragraphs.

**4. Analysis of Data**
The sensorial rhythms collected were tabulated in search for trends regarding the multi-sensorial qualities of different physical entities. Both the transcribed tables and the drawn sensorial maps were utilised to assist the analysis of data. A Lefebvrian approach was employed to extrapolate possible relationships existing among the artefacts and the five senses. Due to the nature of this research topic and its methodology (sensuous geography and online observation), the analysis will be strongly focuses on the findings and interpretations of the *spatial practices* of public squares, whilst *representational space* and *representations of space* are discussed in a more generalised manner.

The list of components being assessed through the utilisation of Lefebvre's conceptual triad of space is as follows:

- ***Spatial Practice (independent variant):*** sensuous qualities of various physical entity categories found through the sensory maps and transcribed tables.

- ***Representations of Space (controlled variant):*** cultural and social positioning of the squares/plazas from authoritative perspective point of view.

- ***Representational Space (controlled variant):*** selected public square case studies across four Western countries.

**<Phase B>**

**1. Sensuous Geography Checklist**
A preliminary checklist of multi-sensory qualities among different categories of physical entities was created from the analysed results in Phase A.

**2. Local Application**
Without doing any observations first, the sensuous geography checklist was applied to a local setting to testify the validity of the framework. King George Square (Brisbane, Australia) was selected for the local application as it shares similar qualities with the four case studies in terms of its urban location and user popularity. The preliminary checklist informed sets of predicted sensorial qualities embodied in the physical elements of the local square. Actual observations (base plan & sensory map)

were made after the predication had been done. A total of 15 randomly selected people were observed.

**3. Modification of the Checklist**

The final phase of the research was to modify the checklist framework created, critique and link back to the existing theories in the discussions section.

## RESULTS

The following section shows a summary of the observational results through the online webcams. The contextual information of the public squares was summarised in Table 3, while the sensuous usage patterns were presented according to the categories of the physical elements.

**Aesthetical Elements**

Generally, visually pleasing signature buildings along with monumental sculptures appeared to be regularly engaged by visitors in a way that the majority of users congregate around these physical entities very frequently. People gathered in front of these physical elements, having conversations, waiting for others, taking photos and observing the surroundings. However, the sensorial maps collected indicated that little physical interaction (i.e. touching) existed between people and these monumental artefacts. Exceptions occurred in Bonn, where part of the wall of the Old Town Hall became a resting place that people lean against while doing social activities, such as taking and waiting for others.

In terms of signature architecture, it was highlighted as one of the major attractions in the public area (ie. the historic Town Hall at the market square in Bonn). Visitors gathered and paused in front of the structure, taking photos in turns. Most people who walked at a slower pace appeared to pay much visual attention towards the historical building. However, this observation did not apply to all the population studied. For people who walked at a faster pace or people who were riding bikes, the building appeared to have less visual impact on them.

Unlike tall monuments and sculptures, users closely interact with the aesthetic physical elements that were below waist height with greater frequency. For example,

| Case Study | City, Country | Population Density (km$^2$) | Contextual Significances |
|---|---|---|---|
| Torgallmpaninge (City/Festival Square) | Bergen, Norway | 566 | The main public square of Bergen City in Norway. The square is located between Strandgaten and Ole Bulls Plass. It was originally designed for as a "large and broad commons [public routes]" that may act as means for fire suppression (Bergen City of History, cited in Steiro 2011). Moreover, the Blue Stone located within the square at Ole Bulls Plass is one of the most well-known meeting points in Bergen (*ibid*). Torgallmenningen has been positioned as one of the must-go city venue by Bergen City Council. The area is surrounded by various boutique retails, gourmet restaurants, historic theatre and hotels. |
| Marktplatz (Market Square) | Bonn, Germany | 2301 | The historic square dates back to the Middle Ages, is located in front of the Old City Hall of Bonn, Germany. The Old City Hall is of Baroque style, it has been listed in the World's Greatest Attraction travel video series as one of the main attraction point of Bonn City (GeoBeats Production 2011). Moreover, the Market Square is currently listed as one of the key area for historic sightseeing by the Council (Stadt Bonn 2011). |
| Town Hall Square | Varde, Denmark | 40 | The Town Hall Square is located in the central meeting place in Varde Municipality, Denmark. The place is comparatively smaller in scale, but nevertheless, it is the central urban space when people meet up and celebrate festive events such as New Year Celebrations (Varde Bibliotek 2011). Several significant civic and cultural buildings are also located within proximity, such as city library, churches and gourmet restaurants. Also, the intertwined water feature on the ground is a miniature representation of the river valley – Varde. |
| Central Square | Khanty-Mansiysk, Russia | 287 | The Central Square is one of the key tourist attractions of downtown Khanty-Mansiysk. The Rotonda Fountain, Victory Park, War Memorial and eternal flame are within/besides the square. Khanty-Mansiysk is a centre of universal skiing excellence, the Biathlon skiing centre is situated just besides the central square (Khanty-Mansiysk 2011). |

**Table 3. Generic Contextual Background of the Case Studies**

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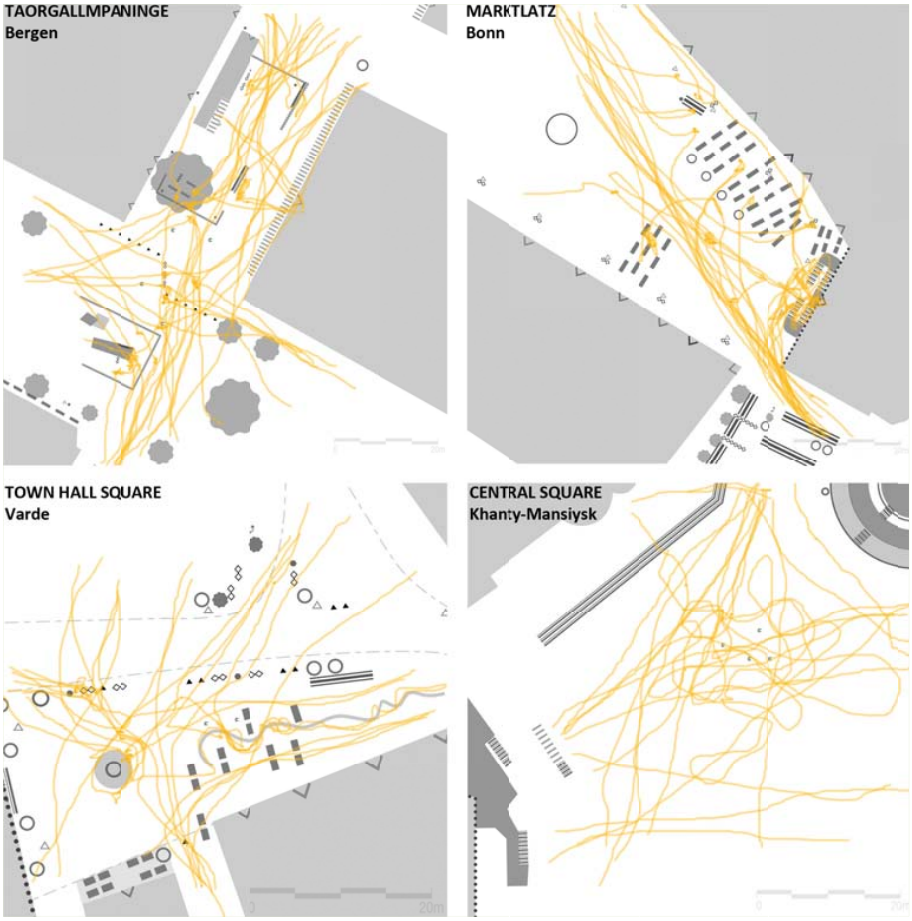


**Figure 1. Stylized Rhythmic Mapping of Sensorial Rhythm of each Squares**
(refer to the Appendix section for more details).

adults physically touched the artefacts through leaning, stepping and sitting. Whilst children further mingle with these elements via activities such as climbing and playing. In Torgallmpaninge, the Blue Stone memorial sculpture became a temporal play zone for some children. They climbed on it, ran on the area where it was accessible and treated the sculpture like any other playing facilities people might see in the parkland. Likewise, dogs took time sniffing and licking these built forms while their owners took the elements as a temporary resting place, relaxing, chatting and observing others.

**Natural Elements**

Elements of water features attracted different sensorial responses among various user groups. Water features share similar sensorial patterns with monuments and sculptures. People performed ranges of social activities around them but rarely physically interact with the physical entities. Adults with children or pets tend to engage with the water feature more. When children and pets were attracted to the water feature, adults would divert their original walking routes towards the water. While children and dogs touching and walking on the contour of the water feature edges, most of their caretakers followed their actions and followed their activity patterns. Kids and pets played and used their hands/paws to splash the water regardless of the feature was designed for playing or not. Also, usage activities were generally alike between traditional and organic geometric water features. However, observations have found organic geometric water elements (i.e. water feature in Varde) that spanned across existing social activity routes created more pausing moments for the users. Some people paid more attentions on walking, stepping on the right sets of areas to

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avoid foot trapped into the water. While others, particularly adults with kids/pets lingered around the organic shaped water feature, jumping back and forward across the element.

Moreover, existence of trees and shrubs seemed to attract less usage variations around them, whereas appearances of animals had greatly sparked a variety of sensory patterns. For all the sites, there were little differences in the preference of weather to sit/wait/eat/have conversations under/near the tress or not. Yet, the case studies have indicated that when there was birds presence in the area, many people were drawn to the specific spot. Some people come specifically to feed birds, while others shared bites of their lunches with the little animals. Children and adults with pets in areas (i.e. Bergon and Kanty-Mansiysk) where there were large amount of animals presence spent much time playing with the birds, running around and chasing them. This act of playing also became eye/hearing attractions for other users in the squares to observe.

**Utilitarian Elements**

Speaking of utilitarian elements in the squares, most of them, although not designed intentionally, accommodated multiple usages other than the designated functional needs. Large amount of visitors utilised elements such as bicycle stands, traffic bollards, stairs and steps as an area to sit, have conversions, take nap, meet for others and lean against. In Bonn, where the number of bicycles on site exceed the number of bicycle stands provided, light poles, railings and even the back of the seats became an instant stands for people to park their bicycles. The stairs, platforms and railings of staircase also afforded people with ranges of social activities. People walked onto the stairs to observe the sceneries, take photos or sit on it enjoying a temporal relief from the crowds. In addition, observations have found that smokers tend to congregate around rubbish bins. They chose to sit on or stand besides benches/artefacts that are closer to the bins.

**Commercial Elements**

Commercial entities located near or besides the squares were often part of the reasons people visiting the squares. For example, outdoor dining areas occupied large amount of spaces in squares located in Bonn and Varde. Hence, a majority of visitors who spent longer time there were people who dined at the outdoor cafes/restaurants. Connections also exist between retails/shopping precincts and the public area, where people rest in the squares in between each shopping spree. For passersby in the square, females appeared to be more visually attracted to the window display of the surrounding shopping facilities; whilst males often walked and facing directly to the area he was heading to without diverting his vision to the sides/window displays. Although audio cannot be observed via web camera, soundscape presumptions can be based on the presence of commercial elements in the square. The sound of music, smell of food and perfume also contributed certain sensuous qualities for the overall environment of the squares. (For details of tabulated sensory maps, please refer to the Appendix.)

**Key Findings from the Local Square**

Observational findings from King George Square were generally consistent with results collected via webcam. The front of the signature building was frequently congregated by visitors, whilst children and teens were more likely to lye, played and interacts with physical elements in the square. However, some interesting points that were not found online were discovered. Utilitarian elements, such as seats/steps that positioned towards certain scenery were occupied more regularly than seats that offered less interesting views regardless. At the same time, unlike other water features observed online, elements of water located on the edges of the open space in King George square was not visited, photographed by, and played with by any children and adults observed. Also, the position of the greeneries and shading devices seemed had little effect on the seating preferences.

## DISCUSSION

The findings from the observations indicated that there was a certain embodied sensorial consistency amongst each category of physical elements in the public squares. Occasional spontaneous usages were found more frequently on people who carried children or pets to the public area when dealing with aesthetic, natural and utilitarian physical elements. In addition, a significant number of populations visit the squares for the commercial entities. From the administrative perspective of the *representations of space* and *representational space* were consistent with the findings. In addition, three key multisensorial attributes concerning with the physical elements were identified at the end of this section.

**Spatial Practice of the Public Squares**

Overall, major trends that lead to different patterns of usage existed amongst the four categories of built forms. The observational results have highlighted some key attributes of physical elements, such as the ability to afford imaginations, interaction, and connectivity appeared to encourage fuller spectrum of sensorial experiences amongst the users. Individual factors such as gender and age also have an important influence on the way people utilise and interact in the space.

Similar to past research findings, the observations have indicated that visual spectacles and symbolic attributes were the major key to attract more secondary sensuous interactions between the built environments. The concept of aesthetic being as the "necessity sensory" (Dewey 1934, Bull et al. 2006, cited in Waskul, Vannini & Wil-

son 2009, Waskul, Vannini & Wilson 2009, 16) of all experiences was reflected in the findings. Both the local and online case studies have indicated that, for visitors, historic and memorial built forms were often the main attractions of the squares; whilst the visually pleasing built environment created certain atmosphere that welcomed and allowed the locals to have a break, stay and enjoy the urban public spaces. As Perrem depicted, "[t]he benefit of people spending more time in public spaces is that spaces then become more self-regulating entities, and also focal points for the expression of a city's particular identity and culture"(2009, 71). Thus, visually appealing physical elements, although most people would not come directly in contact with, strengthen a significant role in the making of the overall sense of place.

On the other hand, opportunities exist for direct/bodily interactions amongst people and the natural elements of current settings. Elements of water feature were a typical example of such opportunity. The water features in Varde and Khanty-Mansiysk located at key nodes of the squares were photographed, visited, played with by visitors on a regular basis. However, exemption occurred when elements of water were located at the edges of the space. None of the people observed had engagement with the water feature located on the side of King George Square. Possible reasons for this may due to the fact that the feature only spanned horizontally along the edge of the square away from main route, reducing chances of it getting noticed.

In terms of commercial elements, the findings have highlighted the importance of commercial elements as a supportive mean to sustain the usage popularity of contemporary public squares. The five senses were heavily influenced by these entities, as they provide opportunities to trigger all the senses at one time (i.e. touch/taste food, café music/smell and visually attracting dinning environment). The growing interest in multi-sensorial marketing has been reflected from the observations. This further signifies the importance of the sense of integration in public space planning. Hence, higher standard in overall design of commercial sectors around the public squares should be carefully maintained and vigorously reviewed by the council as commercial elements have the ability to either overarching or enhancing many sensorial qualities in public spaces.

Utilitarian elements on the other hand, showcase the importance of strategic positioning of physical entities in the design of public squares in order to support and facilitate the total usage of the place. For example, in King George Square, the shaded seating area above the café was almost deserted during the busiest hour of the square due to lack of considerations in terms of its vista selection. The aesthetic elements (historic buildings and sculptures) in the squares were either blocked by ads/posters or the shaded structure itself. The only unblock views were located south towards the concrete roof tops of surrounding buildings. The observational results have indicated that better located utilities encourage people to spend more time in the public squares, whilst functional facilities without a strategic positioning may incurred certain deserted zones.

In addition, the significance of cultural filter in the way people perceive the world is also reflected in the results. Although in this research, cultural influence was not intended to explore in details, however, a certain degree of behavioural differences are noted amongst different user groups (ie. gender and age). Different research methodology will be needed to further understand what kinds of perceptual trends and impacts each cultural group share and differ.

**Representations of Space & Representational Space of the Public Squares**

In terms of the other two aspects of the conceptual triad, existing squares were generally positioned by the council and tourism authorities as the social and cultural highlights of the city. Many festive events and attractions were being hosted in the four squares. This not only indicated a certain degree of dynamic usage of the public space, but also signified the socio-cultural importance of these squares amongst people who lived and travelled to those cities. The high usage populations amongst the squares investigated could be seen as a reflection of economic and tourism success from the governmental perspective. However, whether or not these places have become a significant venue and imprinted certain degree of personal attachment in people's mind and memory was another question that rose from this study. As quoted by Bloomer & Moore, "[t]o at least some extent every place can be remembered, partly because of it is unique, but partly because it has affected our bodies and generated enough associations to hold it in our personal worlds" (1977, cited in Rodaway 1994, 41). Thus, an integrated approach is needed to further understand the role of sensuous geography in the public design and planning sector. As different sexes, age and ethnic groups may also have their own unique way to perceive and create a *lived space*. People with special needs may also experience the world with slightly different approach. In addition, the degree of how effective it is regarding the self interpretation of the multi-sensorial qualities that places afford the visitors to perceive would also need to be further studied and comprehend at a deeper and psychological level. Furthermore, elements of nature "can be aesthetically and intellectually engaging in a way that symbolise" (Unwin 2003, 63) certain social, cultural and educational meanings that may further trigger positive social interactions (example of this utilisation can be seen in Cittàlow/slow living cities, Pink 2007).

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**The Three Key Attributes**

Overall, the above analysis summarized three key attributes that contribute higher multisensory affordability for physical elements in public squares. That is, the ability to afford imaginations, the capability to adapt interactions, and lastly, the capacity to connect to the environment both physically and psychologically. The significance of these attributes were summarised as followed:

1. **Ability to afford imagination (*spontaneity*)**
   While visual aesthetic is the most obvious sensory tactic, other senses, too, when triggered appropriately can be utilised to assist in creating certain atmospheric effects. Elements of surprise can be utilised through a multisensorial approach to foster and sparks imaginations. For example, aesthetic, natural, utilitarian and commercial elements can be combined and integrated in a way that challenge users' preconceptions of certain spaces. Hence, this affordability of imagination helped the visitors to shape their "imaginary geograph[y]" (Lefebvre 1991, 33) of the public square, attaching special meanings to the place.

2. **Ability to adapt interaction (*usability*)**
   Social interactions are other significant aspects that one should consider when dealing with the design and planning of physical elements in public spaces. As the results have shown, many social interactions were happening around and in between different categories of physical elements. The observations have implied that elements which have higher degree of freedom for users to perform a variety of activities will incur more abundant social interactions of that specific space. For example, below waist height structures offering two or three functions at the same time may allow users to perform wider ranges of social activities and resulting an increased usability of the element and the space.

3. **Ability to foster connection (*locality*)**
   The third key attributes that may contribute higher multisensorial affordability is "connection". Stronger physical and visual connections between each category of physical elements, not only provide a directional ease for the visitors, but also offers opportunities for people to observe and be observed by the others. Thus, it can be said that when there is a greater connectivity between each physical entity, there is a greater opportunity that the public square will be populated in a higher frequency. Moreover, as sensations are not received but produced by the users (Dewey 1967, cited in Waskul, Vannini & Wilson 2009, 16), the locality of physical entities in the public squares need to be arranged and presented in a way to further encourage and support the formations of such "psycho-physical" (*ibid*) experiential activities.

## SENSUOUS GEOGRAPHY CHECKLIST

Lastly, this paper proposes a *Sensuous Geography Checklist* that will help to determine and predict the overall sensuous qualities of the public squares. There are two major calculation categories that identify both popularity and the sensuous qualities of the space. Popularity is calculated through the degree of connectivity between different categories of physical entities; whilst sensuous qualities are determined through various influents that were previously identified in the discussion section (refer to Table 4 for an example of the checklist in use). Additionally, the checklist can be utilised as a comparative tool to access multisensorial affordability of several squares (refer to Table 5 for details).

In terms of the calculation, the *Popularity Index* is calculated as follows:

- *Popularity Index* = (sum of index no. per specific category) / (total sum of highest index no.) x 100%

- *Degree of Connectivity*:
  High=3, Medium = 2, Low = 1

The index indicates that the higher the percentage, the longer and more frequent that people will congregate around these elements. However, the degree of connectivity (high/medium/low) is subjected to the choice of the person conducting the checklist analysis. Further development of this section may be needed.

Similarly, the *Sensuous Index* can be estimated through the following formula:

- *Sensuous Index* = (sum of no. of ticks per specific category) / (total no. of possible ticks) x 100%

The figures obtained through the above calculation shows that the higher the percentage, the higher the embodiment of multi-sensorial quality the physical elements have.

In sum, the *Sensuous Geography Checklist* provides an indicative analysis tool that helps to examine and determine the overall sensuous qualities of public squares without doing a prolonged observational study. However, information regarding other factors, such as individual, cultural and climatic influents that may affect the overall sensory experiences will need to be obtained and assessed through other means of data collection.

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**Table 4: Checklist In Use – King George Square, Brisbane**

| Elements | Proximity to other elements | | | | Index (%) | Sensuous Opportunity | | | | Index (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Aesthetic** | **Natural** | **Utilitarian** | **Commercial** | | **Touch** | **Sound** | **Smell/taste** | **Vision** | |
| Aesthetic | □ High<br>√ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | √High<br>□ Medium<br>□ Low | 75 | □ Materiality<br>□ Nature | √ Music<br>√ Nature<br>√ People<br>√ Animal | □ Nature<br>□ Animals<br>√ Food<br>□ Scent | √ Historic<br>□ Memorial<br>□ Artistic<br>□ Cultural | 43 |
| Natural | □ High<br>√ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | □ High<br>√Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | 67 | □ Wind<br>□ Greenery<br>□ Water<br>√ Animal | □ Wind<br>√ Greenery<br>□ Water<br>√ Animal | □ Winds<br>□ Greenery<br>□ Water<br>□ Animal<br>√ Food | √ Horizontal (2D)<br>√ Vertical (3D) | 42 |
| Utilitarian | □ High<br>√ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | √ High<br>□ Medium<br>□ Low | 75 | √ Materiality<br>□ Wind<br>□ Greenery<br>□ Water<br>□ Animal | □ Spontane-ous | □ Spontane-ous | √ Historic<br>□ Memorial<br>□ Artistic<br>□ Cultural<br>√ Nature 2D<br>√ Nature 3D | 31 |
| Commer-cial | √ High<br>□ Medium<br>□ Low | □ High<br>√ Medium<br>□ Low | √High<br>□ Medium<br>□ Low | √ High<br>□ Medium<br>□ Low | 92 | □ Interactive | √ Music<br>√ Nature<br>√ People<br>√ Animal | □ Nature<br>□ Animals<br>√ Food<br>√ Scent | □ Historic<br>□ Memorial<br>□ Artistic<br>□ Cultural | 46 |
| Total (%) | | | | | **77** | **17** | **69** | **29** | **44** | **43** |

## CONCLUSION

In response to the ever increasing materialised cityscape, this paper recommended to the built environment discipline to incorporate a certain degree of sensuous geography studies in the planning of urban public spaces. The social aspects of sensuous perceptions have been discussed and studied in the past. However, when linking with the design of public spaces, a holistic basis of knowledge has yet to be firmly constructed. This research paper has enquired human responses related to urban sensuous geography in the context of public squares in an attempt to show case how better knowledge of sensuous geography can contribute to the current built environment discipline. The sensuous geography checklist developed in this paper has indicated that a certain degree of guidelines in regards to the inclusion of multi-sensorial qualities in the design of public spaces can be controlled at a certain standard. However, due to the vast socio-cultural factors that may influence sensuous perceptions, the checklist may not be applicable to areas that have different cultural and climatic backgrounds than the studied cities. As discussed in the previous paragraphs, sensuous responses and perceptions are difficult to analyse and comprehend due to wide range of attributes. The research has highlighted an integrated design approach is needed to further understand and allow human senses to be *put in-place* by the actual users of the space.

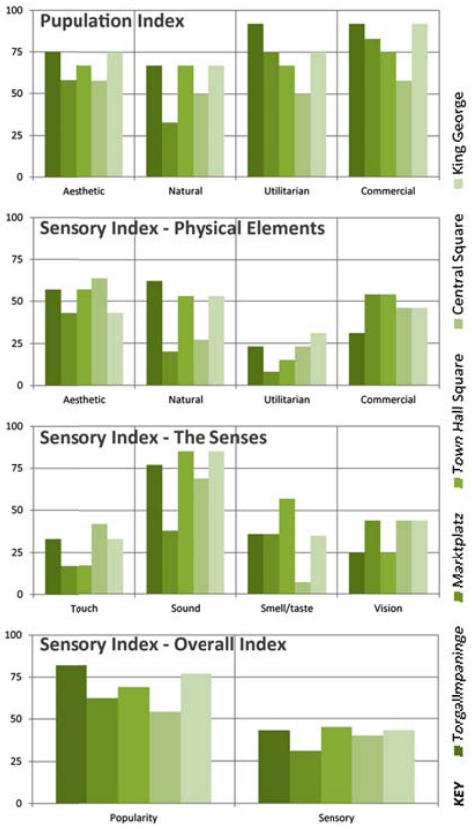


**Table 5: Comparative Graphs of the Case Studies**

## LIMITATION

In terms of limitations, the study undertook a qualitative investigation with specifically selected parameters to explore and enquire about the topic due to the tight timeframe of this research. The findings of this research may only be applicable to cities that share similar socio-cultural backgrounds, as cultural influence play an important role in the way people perceived and experienced spaces. In terms of individual influents, the research observation samples were based on the general public who have readily access to public urban spaces. People with special needs and people who do not share similar discourse may not be applicable to the findings study. Also, public squares with different typological and physical constraints may have incurred slightly different results. Moreover, since the study is a Brisbane based research, observations of sensory rhythms across various places was undertaken via online webcams. Possible limitations exist in camera angel selection, pixel qualities and olfactory/nostalgic audits. Future research could incorporate interviews, surveys and study of different cultural and discourse groupings to further understand the *representations of space* from the individual perspectives.

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