Chapter 21
Re-imagining Urban Leftover Spaces

Jasim Azhar, Morten Gjerde, and Brenda Vale

Abstract In most developed cities, leftover spaces in the urban fabric can be seen both as having potential and as threatening. Researchers have pointed out the issues, conditions, and importance of the positive utilisation of leftover spaces. However, there is insufficient information available on how to go about using such spaces. The revitalisation and aesthetic quality of leftover spaces could expand the dynamism of a city through strategic design interventions. This study seeks to understand the potential of different types of urban leftover space to be used in more effective ways than they are present. This paper, therefore, examines how such leftover spaces are defined and can be redesigned to become part of a built environment. The paper reports on affective and aesthetic responses that could lead to a better understanding of human perceptions of such spaces. A visual preference study, utilising semantic differentials for reimagined leftover spaces, was carried out to understand the differences between participants' preferences. A further comparison between participants who had occupations in built environment areas, and those who did not, showed that for both groups, the most preferred spaces were those that included vegetation. T-test analyses of the correlation results confirmed that participant professional expertise is not a preference factor when it comes to the design of leftover spaces, and in this respect, the study contradicts theories that hold that there are differences in the ways experts and non-experts perceive the environment.

Keywords Urban leftover spaces · Environmental perception and aesthetics · Visual preference approach

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21.1 Introduction

The capital of New Zealand, Wellington, expects a significant population growth of 200,000–250,000 inhabitants from 2015 to 2040 (DIA 2015). This rapid population growth is a problem numerous cities face worldwide. New Zealand's population increased by 1.9% in 2015 (Statistics New Zealand 2015), outpacing Australia, which had a 1.4% increase in the same year (ABS 2016). Of the New Zealand population, 87% resides in 138 recognised urban centres, ranging in size from around 1000 people to more than 1000,000 (DIA 2015). Globally, the shift from rural to city living has increased the demand for resources, including water, food, and energy for urban populations (Satterthwaite et al. 2010). The growth and quality of future urbanisation will, therefore, have a massive impact on international resource availability and sustainability, affecting the quality of life for many people. There is an urgent need to design, test, and implement effective policies to address these issues. Like many other places, Wellington's development growth plan has been set up with a focus on achieving sustainable solutions, conserving natural environments, maintaining livability, keeping the city compact, and achieving maximum affordability.

Urban growth varies from area to area, making it almost impossible to follow only one development model (Turok and McGranahan 2013). To that end, any development will depend on the current infrastructure, traditional and cultural desires, topography, financial resources, and the institutional scope for planning and political stability for growth management. As cities expand across productive arable land, it is essential to investigate the potential value and usage of unused land or leftover spaces in currently developed areas of cities. An urban setting exists not only as a physical environment, but also as a shared space for personal perceptions and experiences, such that a city can be studied as an episode resulting from a continuing relationship between the built environment, civic processes, and human experience. When considering urban development, it is vital to understand the potential purposefulness of leftover spaces. The redevelopment process, including space assessment, has layers and structures from reading space to interpreting it and generating meanings through diverse activities. Capturing and engaging with the qualities of the intermediate, often invisible phenomena of the city, suggests the need for an alternative approach to utilizing leftover spaces efficiently and productively. Urban leftover spaces invite many possibilities for the integration of new techniques from integrating natural attributes to tactical solutions for the built environment.

This paper investigates the potential value of redesigning semi-public urban leftover spaces in more creative ways within the Wellington urban fabric. By 2040, the Wellington city council aims to reduce the presence of cars and car parks in the city centre by making it more compact, and leftover spaces have a great potential to be utilised strategically as part of this process. What is required are practical design solutions for the usage of semi-public (privately owned but the public can use that) urban leftover spaces. The visual preference study reported in this paper investigates design initiatives that could be more compelling for the public

in terms of preferred design solutions. The key concern of this study is to explore and evaluate different design options with different attributes that influence people's perceptions of the usage of such outdoor spaces.

21.2 Urban Leftover Spaces

Trancik (1986) started theoretical research into urban leftover spaces approximately 30 years ago. He investigated their aspects and referred to them as 'lost space', as such spaces were ill-defined, had no significant outlook, and had a negative impact on the built environment. Furthermore, he argued such spaces had no definite or measurable boundaries and created division in use through policies or zoning. Urban leftover spaces are a fundamental part of an urban system and can occur next to planned development, along with and under highways or railway lines, are often stumbled upon unnoticed, and are known as no man's space, or land set aside for development. These are spaces of uncertainty (Muller and Busmann 2002), which are considered to be meaningless by a large segment of the community (Akkerman and Cornfeld 2009). Lacking officially assigned uses, leftover spaces are abandoned spaces that lie outside the rush and flow, as well as the control regulations of a city (Qamaruz-Zaman et al. 2012). In the name of 'progress', they are commonly considered as places devoid of function (Doron 2008). These spaces are vacant, unkempt, and underutilised with no defined function, often being between stages of formal development but indefinitely waiting for future use. Leftover spaces have been given different names throughout history, but the scale, spatial quality, and usability remain the real parameters with which to describe them. The literature employs different names for leftover spaces, often with varying scales, but no authors have dealt with or tested possible solutions for future regeneration from within. As some of the names suggest, these spaces seem vague and unloved. The critical issue of time and temporality is entirely excluded from the official definitions of leftover spaces. Azhar and Gjerde (2016) have categorised urban leftover spaces into six types that can be seen as having the potential for usage. These are between enclosed by buildings on 2 or 3 sides, in front of a building, at the back of a building, underneath a building, and on a rooftop. These spaces intervene between adjacent objects and often become problematic for the physical and social fabric of the city. There is thus a need to search for transformational opportunities. Urban leftover spaces exist because of several factors and are present in every major city, and often adversely affect the urban centre by disrupting the flow of neighbourhoods and districts, creating visually unappealing places, and reducing pedestrian interest in the surrounding businesses. Moreover, such spaces do not contribute to successful processes within cities, by neglecting to provide significant programmatic and social functions.

21.3 Perception of an Environment

Psychology plays a vital role in investigating the science of interaction between humans and their natural environment (Keniger et al. 2013). The field of psychology evolved in the early nineteenth century. However, it was not until the mid-twentieth century that the importance of understanding the human-built environment became vital. Wilson and Baldassare (1996) describe the built environment as the relationship of people's needs to their surroundings, but that it also has to provide symbolic and functional needs. Environmental psychology encompasses the natural and constructed setting for human existence.

Furthermore, the main objective of environmental psychology is to enhance and upgrade the physical conditions for humans in the constructed setting. It also encourages the improvement of the human-nature relationship. 'Experience' and 'Perception' are the most commonly used keywords in an understanding of environmental psychology (Gieseking 2014). Experience relates to the transaction between intuition and already assessed knowledge. It differs from person to person and produces social contrasts, whereas perception is about identifying and interpreting the knowledge by using different senses. Rapoport (1982) claimed that the interdependence of a person to his/her environment is most essentially linked to sensual experiences and perception, while Gibson (1997) elaborated the idea of perception more deeply. He claimed that human perception was not just attached to the environment, but also accounted for the potential outcomes of that environment for human benefit and usage. However, Brebner (1998) argued that human thoughts, emotions, and feelings are influenced, both physically and emotionally, by what surrounds them. Wohlwill (1976) stressed the importance of the visual aspect and its effect on human psychology. Taylor et al. (2008) differentiated the two facets of perception: the dimension of sensory passiveness (or the idea of having any sensual experience), and the physical response that involves the action of a body. However, Seamon (2010) contradicted this idea by emphasising that both aspects were intertwined with each other. He said that in a day-to-day routine, both bodily actions and sensory responses are working continuously. The actions are coupled outcomes instead of a separate response and should be viewed as an integrated response.

21.3.1 Aesthetic Assessment

The idea of beauty or beautifying by the processing of human cognition and perception is known as aesthetics (McWhinnie 1968). This also includes emotional behaviour. People react varyingly to different environments around them, depending on their past occurrences and experiences, their closeness to all the views, and their expectations and the duration of exposure. Ulrich (1983) stated that aesthetic response is about the individual preference that provides a feeling of happiness or

sadness and works through cognitive activity by visual confrontation. The aesthetic quality of any built or natural environment is a measure of a viewer's visual perception and responsiveness to that area (Company and York 2009). McWhinnie (1968) used aesthetics as a benchmark to explain the responsiveness of people towards a visual stimulus. Whether the stimulus is beautiful or not, it creates an analogy of aesthetics through human cognition. Also, if a specific visual appearance is more beautiful or pleasing, the preference is automatically diverted to it. Beauty rating is a result of this hypothesis. It is argued that visual impacts can be explained through various elements and not just a single factor. These include visual character and quality (e.g., form, line, colour, and texture), visual exposure, the viewer's idealised mental image, and the number of viewers who are expected to see the project (Hagerhall et al. 2008).

21.3.2 Visual Preference Study

Preference understanding is a vital element used to analyse how people judge an environment, including how they characterise and project it. This judgment can be different from person to person based on individual preferences. Habe (1989) confirmed that visual elements in a building are essential for a space preference. His study found evidence that photographs, responsiveness, and multi-dimensional scaling were essential in deriving the dimensions of perception. In visual preferences, photos of an environment are used as substituent agents for the original (Arriaza et al. 2004). Researchers like Kaplan and Kaplan 1989 and Sanoff (1991) have studied the reliability of this procedure. Nasar and Stamps (2009) suggested that showcasing photographs of a scenario or environment induce the same response in people as if the pictures were real. Tversky et al. (2006) found that the visuals of an environment exist in the human cognition, and can be as significant as real expressions. Furthermore, in 1957, Osgood, Suci & Tannenbaum used a linguistic analytical approach. They created a bipolar grouping to testify the efficacy of affective domains. As a result, photomontage became a way of creating altered images, by coupling or omitting elements to form a well-composed picture of future reality (Waldheim 2006).

21.4 Method

This visual preference study used photomontages to represent three alternative design modifications for six different types of leftover spaces in Wellington. All one-point perspective photos were treated in Photoshop to reconstruct the specific visions while emphasising one attribute in each context, and noting that these attributes changed with the context. All leftover spaces were designed without changing the current usage of the site. Concepts of providing more vegetation,

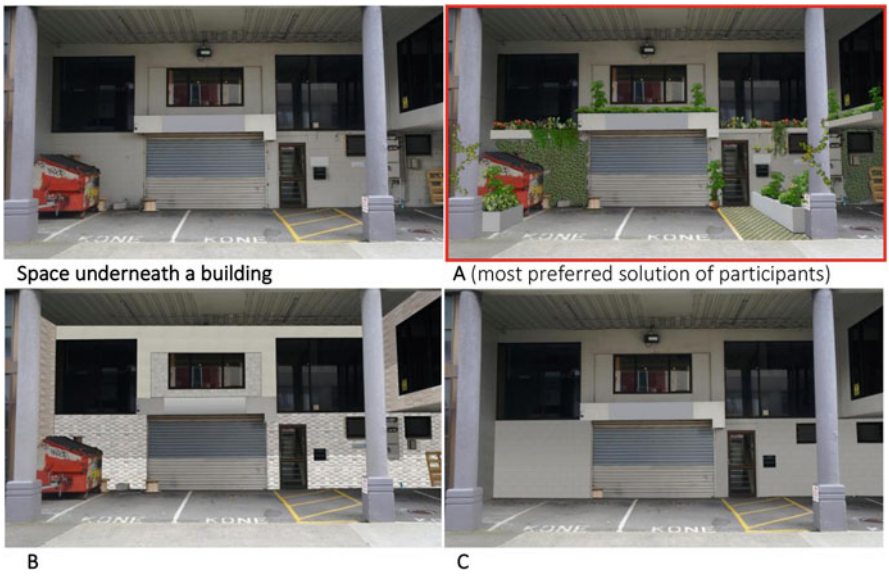

Fig. 21.1 Example of a redesigned leftover space

creating seating space, improving cleanliness, changing surface materials, removing the boundary walls, creating clear pathways, and installing wind turbines or solar panels were photomontaged for different types of space (Fig. 21.1). These concepts were extracted from a previous study, where participants gave their suggestions for designing such sites. Each photo was rated using a 3-point Likert scale to reveal the differences and to understand the data more efficiently (1 Dislike, 2 Neutral, 3 Like). Benson (1971) recommended using a 3-point Likert scale for its practical convenience, and some claim as few as two response categories might be adequate in practice (Jacoby and Mattell 1971). The second part of the study was related to the semantic differential measures, which sought each participant's reaction to the redesigned space through a series of stimulus words/concepts. The concepts (adjectives) were evaluated through a 5-point bipolar rating scale. This section investigated reactions using the concepts of attractiveness (ugly-beautiful), satisfaction (annoying-pleasing), buildable (impossible-realisable), usability (boring-interesting) and mood (constrained-energetic). The adjectives were chosen according to how they best fitted the research aims and were consistent throughout the study. The Likert-scale reveals how much people agree or disagree with a particular statement, whereas the semantic differential scale decides how much of a trait or quality the item has, as rated through the bipolar scale defined by adjectives (Osgood and Snider 1969).

21.4.1 Participants

The participants responded to an interactive web-based survey made using Qualtrics. The study was initiated after approval by the human ethics committee. Invitations to participate were sent through email and by putting up posters in local cafes. The invitation emails were sent to administrators in the different Schools of Victoria University, Wellington City Council, New-Zealand Institute of Architects, University of 3rd Age[1]1, and Wellington City Library with a view of inviting both adults and students to participate in the study. By the end, data were collected from 121 individuals and imported into the Statistical Package for the Social Sciences (SPSS) software for analysis.

21.4.2 Sample Demographics

Overall, 96 participants completed the survey and 25 partially completed it. In terms of gender, 42.7% of respondents were male, 55.5% female and 1.8% did not answer. Participants with built environment knowledge formed 23.6% of the sample, with the remaining 76.4% being from different fields. Just over half (52.7%) of participants had an NZ European background compared to 47.3% with contrasting cultural ethnicity. In terms of formal education, 68.0% of respondents had a postgraduate qualification.

21.4.3 Procedure

The first step investigated the preferences for the whole sample of 121 respondents and identified the most appealing attributes (semantic differential) for each redesigned leftover space. The second step investigated the subgroups of 26 (23.6%) built environment participants compared to 85 (76.6%) respondents from other occupations, to see if there was any difference in preferences. Arnheim (1977) pointed out that built environment experts not only see what a building or a place looks like but also deconstruct it to understand how it was built and works. It is also claimed that built environment professionals perceive differently from other people and have different preferences (Posner 1973).

[1] An international movement founded in 1973. It focuses on improving living standards and helping the personal development of older or retired people (Marcinkiewicz 2011).

21.4.4 Data Analysis

Different methods of analysis were deployed to understand the relationships between the sample groups. The mean preferences for the most and least preferred redesigned photos were measured on the Likert scale (1–3) by using a descriptive frequency test in SPSS. The simple technique of calculating the mean, standard deviation (±SD) and percentage of the most preferred design was used. Kendall's tau-b (τb) correlation test was conducted between the most liked images with the respondent's attitude (semantic differential scale). Kendall's tau-b (τb) correlation coefficient calculated the strength and direction of association in a nonparametric measure, such as exists between two variables measured on an ordinal scale (Laerd Statistics 2016). A comparison was made to evaluate the alignment of the built environment with the non-built environment participants. The percentages for the most preferred design on a 3-point Likert scale were calculated for participants from different fields of study. The Cronbach alpha (α) reliability test was used to check the internal consistency of several variables for the semantic scale 1–5 before independent sample T-tests were carried out. Cronbach's alpha (α) was 0.81 and indicated a high level of internal consistency. The averages of semantic differential responses were calculated to find the difference in preferences among the respondents through an independent sample T-test. The differences of opinion between the built environment and the non-built environment participants were analysed using independent sample T-tests.

21.5 Results

21.5.1 Whole Sample (n = 120)

The preference value on the 3-point Likert scale fluctuated, but the most preferred design solution among all participants related to adding more vegetation to all leftover spaces (Fig. 21.2). A Kendall's tau-b (τb) correlation test for different images revealed that the most likeable image had a strong, positive association with all affective appraisals (semantic differentials) except for the bipolar category of "impossible to realisable". This suggested this category was independent of the association and was not influenced by the image's likability.

The space in front of a building had a different preference ranking among all participants. The first preference was for removing the boundary wall, whereas the second most preferred design was providing more vegetation. The Kendall's tau-b (τb) correlation test revealed the most likeable image in front of a building had a weak, negative association with the one affective appraisal category of "boring to interesting".

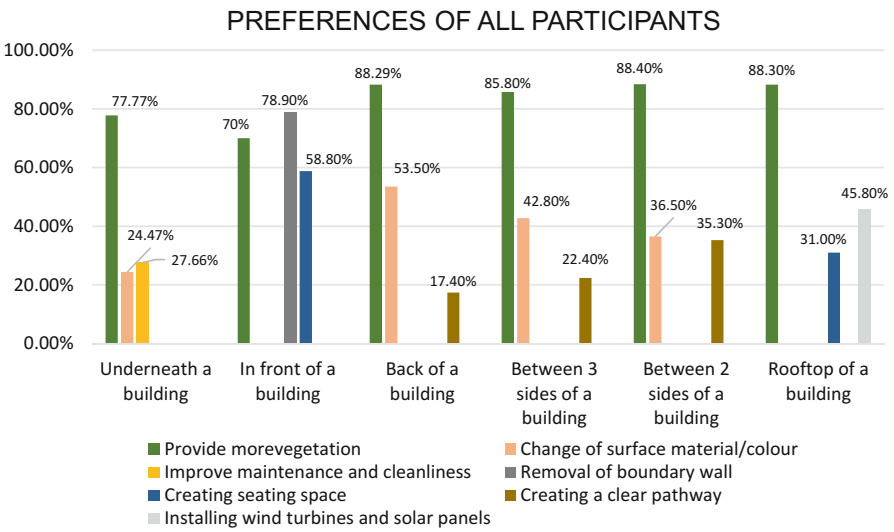

Fig. 21.2 Preferences of all participants

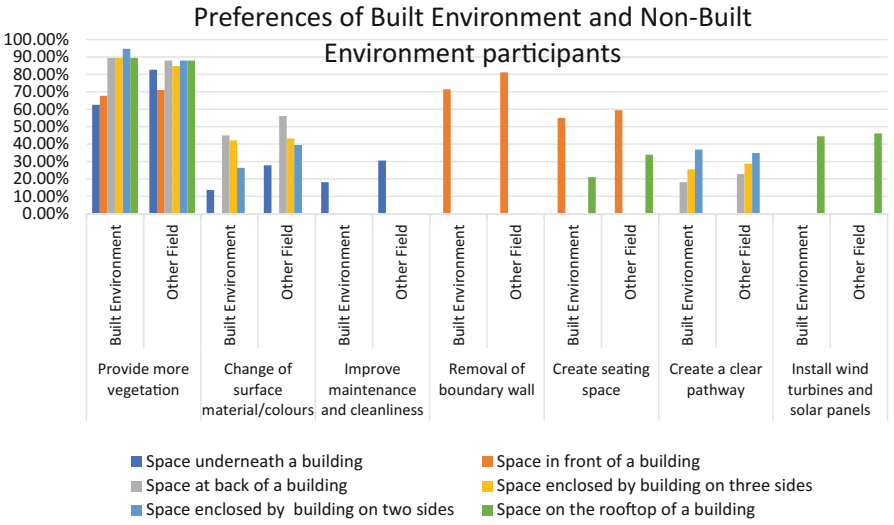

Fig. 21.3 Preferences of Built Environment participants and others

21.5.2 Built Environment and Non-built Environment Participants

The most robust agreement for both groups was for spaces that had an element of vegetation in them (Fig. 21.3). The space at the back of a building, enclosed by the

buildings on three sides, enclosed by the buildings on two sides, and a rooftop space all with the introduction of vegetation were valued higher by BE than NBE participants.

An independent sample T-test for both the groups confirmed that there was no statistically significant difference in opinions between the built environment and non-built environment group ($P > 0.05$) for all redesigned leftover spaces. The space in front of a building with the removal of boundary walls was liked best by both groups. The option with vegetation was the second most liked design for both BE and NBE participants. An independent sample T-test for both groups confirmed that there was no statistically significant difference in opinions between the BE and NBE participants ($p > 0.05$) for all redesigned leftover spaces.

21.5.3 Discussion

The quantitative study demonstrated (1) an overall desire for incorporating nature into built environments and (2) that there was no difference in preferences for the built environment and non-built environment participants. The preferences for all six examples of leftover spaces were similar for each scenario. A study by Ulrich (1981) found that natural environments are usually evaluated as having a high rate of aesthetic quality over built environments, and have relevance to the aesthetic response. At the same time, Ulrich's study also suggests that incorporating vegetation is not always practical and can be expensive since it comes with maintenance, care or stewardship issues. Respondents also exhibited preferences for visual openness, as evidenced by the preference scores for the scene depicting the removal of a boundary wall in front of a building. This result suggests that the entrance to a building should be designed to be open and inviting and creating areas that are perceived as claustrophobic should be avoided. Visual quality can influence a person's experience significantly because people react to what appears before them. Different needs and demands can be catered for to create positive settings for each type of leftover space, and this could enhance people's attitudes and behaviours. The most realisable solutions among all designs were related to vegetation, change of surface material or its colours, improving cleanliness, and creating pedestrian pathways and seating spaces. The comparisons between the preferences expressed by built environment participants and lay people were similar for all design solutions. This suggests both groups perceived the designed spaces similarly, and the sample T-tests for opinions of leftover spaces were the same. Also, the aesthetic judgments of preferences were aligned between all participants. Overall, it seemed that if a leftover space is designed with natural elements, this could induce a spatial preference. However, solutions regarding preferences for installing different types of plants (trees, shrubs, climbers, and ground cover) is nonexistent in the literature for leftover spaces, and this is a possible area for further research. Another issue that needs further exploration is the light exposure and scale when it comes to measuring preferences. In this study, only one view of each space was given, with an

attempt to have a similar level of light in each. Ephemeral qualities, such as light level, affect emotional responsiveness. However, it does appear from the analysis that human intervention with natural design solutions is a crucial aspect of how leftover spaces could be improved.

21.6 Conclusion

This study has examined and assessed three different design schemes for urban leftover space, by asking survey participants about their evaluations, to gain a fuller understanding of which solution is preferred. This study also suggests a direction for design schemes in that they should consider enhancing the aesthetic quality of space with the use of natural elements. For example, the use of urban leftover spaces could aid in mitigating climate change through urban food production, if both the owner and the public agree with such changes in use. The importance of leftover spaces between, over, and under buildings as part of the public realm should be realized by city stakeholders, managers and end users. It is not clear yet what future cities will look like with the implementation of sustainable measures that include emerging technologies, but it is vital to develop new strategies to cope with humanity's demands for resources and designing such spaces through stakeholder participation is a need for future cities.

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