

Exploring preferences for urban greening in association with learning about sustainability in a museum-based urban ecology exhibit

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Introduction

Sustainable urban design and planning is grounded in understanding complex interconnecting relationships between human and ecological processes (Alberti & Marzluff, 2004). While compulsory education may provide an introduction to this subject, supplementary means are necessary in order to support citizen knowledge, interest and understanding of these complex relationships. Informal learning settings, such as museums, create opportunities for lifelong learning (Falk and Dierking, 2010) and can introduce, incorporate and link urban sustainability issues to provide an accessible and engaging introduction to the subject.

Sustainable responses to urban development point to the need for higher density neighbourhoods coupled with extensive urban tree canopy (Alberti & Marzluff, 2004). However, more research is needed to ascertain if these urban forms match the preferred settings of urban residents. A family science museum provides a unique setting to explore urban greening in residential settings and provides museum visitors with the opportunity to participate in social-science research.

Background/Literature Review

The aim of this study is to explore the nature of the relationships between preferences for residential density and urban tree canopy. This exploration takes place within the larger planning discussions of the value of green infrastructure and compact development, uses landscape preference research methods and is situated within an informal science setting.

Networks of green infrastructure have been proposed to complement our increasingly urbanized societies in order to improve quality of life (Chiesura, 2004; Lohr et al; Kuo and Sullivan, 2001) and ecosystem health (Wheeler, 2004). Planning for compact development and densification of existing cities arises from the trend of worldwide habitation towards urbanization (Wheeler, 2004). However, it is becoming increasingly clear that density is a relative, subjective and context-dependent concept (Churchman, 1999).

Landscape preference research indicates that not all settings are equally preferred: natural landscapes tend to be chosen over built ones, and buildings with vegetation tend to be preferred over those without (Kaplan and Kaplan, 1989). Stephen and Rachel Kaplan's (1989) foundational research landscape preference yielded a preference framework that includes the importance of exploration (legibility and mystery) and understanding what is seen (coherence and complexity).

Family science museums provide settings where participants engage in voluntary, free choice learning experiences; that are influenced by prior knowledge and experience; and experienced within a social-cultural context of leisure, learning and socializing (Schwan, et al, 2014; Falk & Dierking, 2010).

Goals and objectives

This study is associated with the development of the City Science exhibit at the EcoTarium Science Museum in Worcester, MA. In the City Science exhibits visitors are engaged in the practices of urban ecologists and planners. This unique collaboration between museum exhibit designers, landscape architects, and urban ecologists has developed a model for researching urban planning attitudes within a museum setting. This study allows museum visitors to engage in social science research while learning about the environmental implications of various planning decisions.

Building on previous research from a NSF funded urban ecology project in Boston, the current study in Worcester used landscape preference methodology to elicit local residents' preference for neighbourhoods that varied in density and urban tree canopy. According to previous research in Boston with stakeholders (Chang, Ryan, et al., in review) we expected trees to increase acceptance for higher density neighbourhoods. We also hypothesized that urban residents would be more accepting of higher density than suburban residents (West, 2008).

The findings in this exploratory study are from research conducted in Worcester, Massachusetts, New England's second largest city after Boston and the EcoTarium Science Museum located in Worcester which has 130,000 visitors per year.

Methods

We used a mixed methods approach to look at the question: How does urban greening impact preference for higher density residential settings?

Survey Instrument: The photo preference survey had 24 photos of residential and mixed use neighbourhoods in Massachusetts and Rhode Island. Some photos were manipulated to incorporate more greening (Figure 1) and some had been used in a previous project (Cheng et al, accepted). The images ranged from a photo of a single family house with lawn, to large, multi-level housing units. Vegetation on the images ranged in type and amount. A variety of building styles and setbacks were represented in the photos. Participants were asked to rate the photos according to how much they would like to live in this type of neighbourhood using a 5-point Likert scale: 1) not at all, 2) a little, 3) somewhat, 4) quite a bit, 5) very much (Kaplan and Kaplan, 1989). When the participants had completed the photo preference survey they responded to two qualitative questions asking them to describe the photos that they rated the highest and lowest.



Figure 1. Some photos (bottom row) were manipulated to incorporate more greening

Survey sample: The surveys were completed on five occasions during 2015. In order to reach a more diverse population, this study was conducted at the museum as well as two free public gatherings in the City of Worcester. In total 130 people from urban (42%), suburban (44%) and rural settings (14%) participated in the study. Participants ranged in ages, with the age group of (26-65) most highly represented (55%) followed by children and teenagers (29%). The downtown Worcester participants differed from those surveyed at the EcoTarium museum by mostly residing in a city (98%), versus the majority of suburban participants at the EcoTarium (59%).

The participants were self selected – they chose to complete the photo survey and to attend a family science museum or civic festival. Therefore, the survey population may not be representative of Worcester’s overall population. However, the goal of the study was not generalizability to Worcester, but rather to explore the kinds of associations between landscape elements, architecture form, urban greening and residential density which could lead to greater or lesser preference.

There were certain characteristics of the photo survey that were associated with its setting in the larger City Science project and museum location. The survey needed to work within the museum setting, timetables and populations and be accessible but engaging to participants of all ages. When the participants in this survey were younger, they usually completed their surveys with an accompanying adult. This resulted in interesting cross-generational conversations about image characteristics (“Where would you put your bike?”) and social science survey research (“Why do you think they care about what we think?”).

Results

The study results point to preference for more urban tree canopy to ameliorate the impacts of higher density residential settings. The participants’ responses appeared to be influenced primarily by concerns about privacy, safety and visibility; and environmental benefits (e.g. clean air and shade). In general, urban residents rated all the images higher than the participants who reside in suburban and rural settings, perhaps speaking to their familiarity with higher density residential neighbourhoods.

The four photos with the highest overall means (Figure 2) share characteristics of visible nature and setback from the street. The photos with the two highest means are two versions of the sole single family house in the survey, with and without additional greening. This suggests participants’ desire for privacy from neighbors and the street. The visible smooth ground plane in the form of lawn is also an element that has been shown in previous studies to be highly preferred (Kaplan and Kaplan, 1989). The photos that received the third and fourth highest means are from projects built in the new urbanist style, incorporating a small setback from the street, greening and a semi-public personal space of a front porch and in one case, fencing.



Figure 2. Most preferred scenes share characteristics of more greenspace and setback from the street.

The four photos with the lowest overall means (Figure 3) include three images of multi-story buildings that have little or no setback from the street and one heavily greened image. The latter image may reflect that tipping point, elucidated by Stephen and Rachel Kaplan (1989), in which mystery gives way to the requirement for clarity. Several respondents said they would like that scene except they were worried that potential danger could be obscured by the heavy greening. Mean preference scores for the photos that were manipulated by adding urban greening were always higher than the same photos showing the existing setting.

After completing the survey, participants completed short answers to two prompts asking them why they rated some photos highest and other lowest. The responses were grouped around the themes of density, safety, greening, family concerns, aesthetics, automotive, evidence of care and intangible. The theme *density* was expressed by participants as concern about space between dwellings and neighbours; privacy; and proximity of the housing to the street. Concerns for walkable and safe streets; and proximity to unsafe neighbours were grouped under the theme of *safety*. The *greening* theme stems from comments about trees, yards, grass, open space, environmental benefits, and the balance of pavement to nature. Some participants' preferences were

influenced by considerations of being family-friendly and whether there was space for kids to play, grouped under the theme of *family concerns*. *Aesthetics* was a theme that influenced people's preferences, based on comments about the building style, natural light, fresh air and setting (e.g. "bleak", "isolated"). Automotive issues included concerns about the width of the roads, the amount of traffic, and parking challenges. Concerns about *evidence of care* included cleanliness and maintenance of streets, sidewalks, homes and porches; while the *intangible* theme included concerns regarding quality of life, sense of community and peacefulness.



Figure 3. Least preferred scenes include three images of multi-story buildings that have little or no setback from the street and one heavily greened image.

Discussion

The study results suggest a tension between high density and preference. Density matters a lot in a neighbourhood. The results indicate that trees are able to ameliorate that tension up to a point, shown with the manipulated photos. We can increase people's acceptance of density by neighbourhood greening.

Another point of tension was seen between the preferences of neighbourhood greening and fear of hidden danger or concealment. While research indicates that communities report a positive relationship between greener settings including feelings of safety and more civil community relations (Kuo and

Sullivan, 2001); studies also indicate that there is a middle ground between enough greening and too much, especially in urban settings (Herzog & Flynn-Smith, 2001). When greening impacts the ability to foresee potential danger it is a detriment.

Conclusion

Increasing urban canopy addresses green infrastructure needs while sustainable development points to higher density neighbourhood. If residential neighbourhoods can be made more appealing by planting trees, it will help. But if planning for higher densities is going to work, people will need to choose it – even if they have the means to choose lower densities.

The results suggest several strategies for potentially making higher density residential neighbourhoods more preferred: 1) A green canopy that preserves views beneath the canopy is highly preferred. It is seen as providing cooling shade, beauty and nearby nature. 2) Privacy is important to people. While many appreciate the amenities of urban life, there is a strong preference for settings that afford a sense of having a safe and protected haven. A vegetated setback from the street can help provide a buffer between public and residential spaces. Housing that abuts the street consistently received lower preference ratings from all respondents. 3) Scale also seems to matter. Larger, multi-storied buildings were consistently less preferred.

This exploratory study can contribute to understanding how to create residential settings that address user needs and preference as well as incorporating planning suggestions for compact form. In addition, some of the benefits and challenges of conducting research within a museum setting were discussed. A potential avenue for future study is how urban greening can help balance cultural norms for personal space within urban neighbourhoods.

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