



The effects of urban retail greenery on consumer experience: Reviewing the evidence from a restorative perspective

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ABSTRACT

Over the last three decades solid empirical evidence for the positive influence of greenery on human psychological and cognitive functioning has been steadily accruing. Based on this evidence, researchers and practitioners increasingly realize the importance of urban greening as a strategic activity to promote human wellbeing. Although commercial and retail activities constitute a significant and influential component of urban contexts, a concern is that the stakeholders involved (e.g. merchants) can sometimes be reluctant to integrate vegetation in commercial districts. This can be an important stumbling block for the process of urban greening. In this paper we introduce the concept of Biophilic Store Design (BSD) as the retail design strategy to consciously tap the beneficial effects of vegetation. The central aim of this paper is to demonstrate that the reluctance of certain retail stakeholders to integrate greening practices like BSD is unjustified. Two lines of evidence in support of this claim will be discussed. On the one hand, we sketch a conceptual framework which supports the view that BSD can have restorative effects for those implied in store environments. On the other hand, we review Wolf's multi-study research program on the effects of urban greening on consumer behavior, attitudes, and perceptions. These two lines of evidence show that commercial activities and urban greening are not to be considered as antagonistic but as mutually reinforcing practices.

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The aesthetic and restorative effects of greenery

Since as early as the 1970s, researchers have been experimentally studying the influence of greenery on human attitudes and functioning. One of the main findings – for which a large body of empirical evidence has accumulated – is that natural (i.e. green) environments are consistently preferred over non-green urban settings, or environments dominated by artefacts (for a review see Ulrich, 1993). Another important observation is that nature can have 'healing' effects on human individuals. One illustrative inquiry in this respect is Ulrich's (1984) *Science* study, which reports that hospital patients that had undergone a gall-bladder operation recovered more rapidly and felt better when they had views on trees than when they viewed a brick wall from their hospital rooms (Ulrich, 1984). Since Ulrich's pioneering inquiry, many environmental psychology studies have investigated and corroborated the beneficial or 'restorative' effects of vegetative elements (flowers, trees, plants) on human functioning and health

(for reviews Ulrich, 1993; Van den Berg, 2005, 2009). Nowadays this field of inquiry is often referred to as 'Restorative Environments Research' (Van den Berg, 2009).

Over the past two decades, two major interpretations of what constitutes a 'restorative experience' have dominated the restorative research literature. One interpretation is termed 'Stress Recovery Theory' (SRT), which has been advanced and elaborated by Roger Ulrich (see Ulrich et al. 1991; for early foundations of SRT see Ulrich, 1983). According to SRT, exposure to unthreatening nature leads to more positively-toned emotional states and is better able to bring physiological arousal in stressed individuals back to more moderate levels than environments devoid of natural elements. SRT has been corroborated by different empirical studies (e.g. Ulrich et al., 1991, 2003; Parsons et al., 1998; Hartig et al., 2003; Custers, 2006; Dijkstra et al., 2008). Quite often, these stress-reducing effects are claimed to be rooted in our shared human evolutionary past, during which early humans were deeply dependent on nature for their subsistence and survival (see especially Ulrich, 1993; also Heerwagen and Orians, 1993; Lohr and Pearson-Mims, 2006). In particular, vegetative elements were a source of food and medicine, and offered early humans opportunities for prospect and refuge (e.g. from weather conditions or predators). Ulrich (1993) contends that individuals who genetically

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retained restorative responses (i.e. stress reduction) toward these natural elements had higher survival chances than those who had not evolved such a hardwired trait. This retention also explains why the stress-reducing effects of (unthreatening) nature are still widespread among modern-world individuals. (Note that greenery also positively impacts behavioral states that are closely related to stress, such as higher frustration tolerance (Cackowski and Nasar, 2003), prolonged pain tolerance (Lohr and Pearson-Mims, 2000), and alleviation of states of anger (Kweon et al., 2008).)

A second interpretation of restoration builds on the finding that unthreatening nature – and especially vegetation – is able to restore and refresh the ability to focus or direct attention. Directed attention is a faculty that is deployed during tasks that require concentration, such as proofreading or studying. This second interpretation of restoration has been developed by Kaplan and Kaplan (1989) and Kaplan (1995) and is known as Attention Restoration Theory (ART). What is crucial about directed attention is that it can be subject to fatigue and depletion. A degraded capacity to direct attention can be associated with degraded cognitive capacities, difficulties in controlling (misplaced) behavior, negative personal and interpersonal reactions, and so on. Central to ART is the fact that environments which are characterized by *soft fascination* are uniquely capable of recovering Directed Attention Fatigue (DAF). Soft fascination implies that an individual's attention is captured in an undemanding and effortless manner, thereby allowing attentional resources to recuperate (Kaplan and Kaplan, 1989; Kaplan, 1995; Herzog et al., 1997). Although ART does not exclude that non-natural settings can rest directed attention (e.g. Kaplan et al., 1993; Ouellette et al., 2005), restorative research experiments have to this day mainly focused on the restorative qualities of *natural* settings, and elements (e.g. Hartig et al., 1991; Tennessen and Cimprich, 1995; Hartig et al., 2003).

The studies revealing the aesthetic and restorative effects of environments containing greenery are frequently considered as supporting evidence for the 'biophilia hypothesis' (Wilson, 1984; Kellert and Wilson, 1993). Biophilia is commonly defined as the inborn emotional affiliation with natural processes and elements (like greenery), which is claimed to be the result of human evolution in a natural environment. Although it still needs to be established to what extent biophilia is hardwired, the numerous environmental psychology studies on nature's beneficial effects leave little reason to doubt that humans emotionally relate to (certain) natural elements in positive ways. Nowadays, the upcoming field of 'biophilic architecture' has fuelled a renewed interest in biophilia. Central to biophilic architecture is that it attempts to tap the positive or 'biophilic' effects of nature in architecture, either by including actual nature (e.g. real plants) in architectural environments or by symbolically referring to nature in architectural design (e.g. nature ornament) (Kellert, 2005; Joye, 2007; Kellert et al., 2008). This new design trend draws its relevance and urgency from the fact that opportunities for contact with nature are often in decline in current modern living environments. With increasing population levels and urbanization, this alienation from nature could become further exacerbated, with the result that an increasing number of individuals will lose the opportunity to experience nature as a source of psychological and physiological health and enjoyment. Biophilic architecture does not imply a romantic return to nature but acknowledges urban living as a reality. It therefore reconciles both aspects (i.e. nature and architecture) by deliberately integrating natural forms, elements and conditions into the built environment (for specific design proposals, see Kellert, 2005; Joye, 2007; Kellert et al., 2008).

One straightforward biophilic design strategy consists of integrating *greenery* into the urban context; see Kellert et al.

(2008) for concrete design suggestions. However, since stores and commercial settings constitute a significant part of the urban fabric, it is not unimaginable that the associated stakeholders (i.e. shop-owners, tenants, employees, salesmen) will be reluctant to integrate plants or trees in the urban areas where their businesses are situated. For example, there may be concerns about whether the costs of maintaining urban vegetation will outweigh possible benefits or about the fact that trees may reduce the visibility of storefronts or obstruct access to products. The central aim of this paper is to shed further light on this issue and to inquire what the possible effects of biophilic design strategies could be in these contexts. Do such interventions indeed have adverse effects for retail businesses or do they rather provide them with a strategic advantage? We will denote the strategy to consciously bring nature into retail areas and stores by Biophilic Store Design (BSD). In the ensuing sections, we will explore the possible effects of BSD from two perspectives. First, we will examine from a conceptual perspective the question of whether greenery's possible restorative potential could be effective for retail settings, and what the specific effects of this could be for consumers, shop owners, and employees. We will then attempt to back up this conceptual discussion by reviewing existing empirical research, mainly done by Kathleen Wolf, into the possible positive influences of urban vegetation on commerce. These two lines of inquiry will be followed by a discussion and a presentation of ideas for future empirical research.

An exploratory study of the restorative potential of Biophilic Store Design

Introduction

A common finding in preference studies is that introducing greenery enhances the perceived aesthetic qualities of urban, man-made environments. Consistent with this, empirical research shows that green interventions also improve the visual outlook of commercial/retail environments (see the next section for an in-depth discussion of this issue). As empirical inquiries have suggested a close link between aesthetic judgments and restorative experiences (Van den Berg et al., 2003; Dijkstra et al., 2008), the question arises as to whether including foliage in such contexts may induce restorative responses as well. Note in connection with this that restorative experiences such as stress reduction and attention restoration induced by greenery have been found to occur in different contexts, such as hospitals (Dijkstra et al., 2008), office environments (Kweon et al., 2008), roadside views (Parsons et al., 1998; Cackowski and Nasar, 2003), school settings (Han, 2009), home environments (Kaplan, 2001; Hartig and Fransson, 2009), and laboratory settings (Berto, 2005). The upshot is that there does not seem to be an a priori reason to assume that restorative effects would not take place in shopping contexts as well. In the following sections our objective is to develop a framework that provides evidence for the claim that BSD can facilitate restorative experiences (i.e. stress reduction and attention restoration).

Conceptual framework

The elaboration of this framework will be essentially based on conceptual grounds. In particular, we will review research findings indicating that the act of visiting urban commercial areas is frequently experienced as stressful and attentionally taxing (Fram and Axelrod, 1990; Fram and Ajami, 1994). By coupling these findings to the empirical literature on the restorative effects of

nature contact reviewed in the first section, we will provide theoretical arguments supporting the expectation that green interventions are likely to have pronounced restorative effects in store settings.

Expected restorative benefits of Biophilic Store Design

Stress-reduction and retail contexts

SRT's central finding that greenery has mitigating effects on discomfort, negative mood and stress is relevant for shopping contexts because a review of the relevant business literature shows that such stressful states are commonplace in retail settings. On the one hand, the segment of shoppers entering the store in a negative mood state comprises no less than 10% of the total shopping population (Maxwell and Kover, 2003). On the other hand, once a customer enters the store, there are numerous factors, both within and beyond the control of retail management, which might render the act of shopping into a stressful and potentially irritating experience (Fram and Ajami, 1994; d'Astous, 2000). In particular, shopping is often a goal-directed activity (e.g. buying a certain good) that can be constrained by certain factors (e.g. limits on time or budget). When obstacles are encountered during this process, this might evoke stress (e.g. Machleit and Eroglu, 2000, p. 101), which in turn can lead to avoidance behavior toward the particular retail context (Donovan and Rossiter, 1982). An obvious example is crowding, which can be a significant source of stress and irritation (Eroglu and Machleit, 1990; see Geuens et al., 2003 for an overview of potential stressors).

Research shows that the spending behavior of consumers in a negative mood, as well as their satisfaction with retailers, is considerably lower than that of customers who are in a positive mood (Babin and Darden, 1996). This suggests that retailers can benefit from minimizing the episodes of negative stress in customers or from providing them with 'breathers' from such tense states (We are well aware that so-called 'positive' stress – for example excitement about a certain product – can have positive consequences on shopping behavior, but that is not the scope of the current paper.). Babin and Darden (1996) encourage retailers not only to try to create positive consumer emotions, but to avoid and take away negative in-store moods in the first place (see also d'Astous, 2000). Interestingly, research by Geuens et al. (2003) indicates that the design of the store environment could play a particular important role in this respect. When customers were asked to imagine their ideal food store, several groups appeared to spend more time explaining what the shopping 'atmosphere' should be like than describing other characteristics, such as the products carried. They reported wanting to shop in "a spacious, bright, green, and nice atmosphere, with appropriate music in the background. An environment that takes away the stress instead of imposing more stress..." (Geuens et al., p. 246).

Given the importance of the shopping environment, it is noteworthy that much research has been conducted on how retailers try to influence consumers' mood – in order to increase purchase probability – by consciously managing the store's atmosphere (e.g. Kotler, 1973; Turley and Milliman, 2000; Maxwell and Kover, 2003). Despite this, the effects of integrating greenery in the shopping atmosphere to moderate stressful experiences while shopping remain empirically underexplored to this day. Based on the existent literature on greenery's 'biophilic' effects, there are clear reasons to assume that BSD (and greenery in particular) can mitigate negative states, like stress. As the store environment has been proven to impact not only on customers, but also on store employees (Bitner, 1992), we also expect pronounced (restorative) effects on sales personnel. Stress reduction among merchants and employees can, for

example, lead to more positively-toned moods. This, in turn, can translate into increased helpfulness and friendliness toward customers (Cohen and Spacapan, 1978) and into greater job satisfaction, both of which are obviously important factors for retail service quality (Vazquez et al., 2001). Other possible benefits are: reduced stress-related health problems in employees; reduced costs associated with health problems (e.g. absenteeism); and increased productivity (although this effect seems mainly observable in creative tasks, see Lohr et al., 1996).

Retail contexts and attentional fatigue

In affluent industrial societies, consumers are often overwhelmed by a wide variety and large amount of sensory information (Lipowski, 1970), which can cognitively overload their limited processing capacities. Retail environments contain all kinds of distracting stimuli that compete for an individual's attention. This, however, makes that being attentive to and searching for the objects one is looking for can become a highly effortful activity, prone to lead to Directed Attention Fatigue (S. Kaplan, 2001). Importantly, information overload (and DAF as its possible side-effect) can have negative consequences on consumer behavior. Malhotra (1984), for example, argues that trying to process too much information in a limited time, often results in confusion, cognitive strain, and other dysfunctional or unfavorable states, such as purchase postponement (e.g. Huffman and Kahn, 1998; Jacoby and Morrin, 1998), shopping fatigue (Mitchell and Papavassiliou, 1997), cognitive dissonance (Mitchell and Papavassiliou, 1999), reactance (Settle and Alreck, 1988), dissatisfaction (Foxman et al., 1990), negative word-of-mouth (Turnball et al., 2000), decreased store loyalty and decreased trust (Foxman et al., 1990, 1992), product misuse, and even reduced self-confidence, and hence, reduced consumer wellbeing (see Mitchell et al., 2005).

It will come as no surprise that the foregoing attitudes can negatively impact purchase behavior and intentions. When a consumer is faced with an overly complex environment that cannot be processed in the available time, he/she is unlikely to gain confidence in the purchase setting. Even if he/she is determined to pursue purchases, an insufficient understanding of the context could result in inferior decision-making performance. In particular, Jacoby et al. (1974) found that cases of information overload prevent the consumer from being able to effectively and efficiently choose the 'best' product brand. In such situations consumers frequently make recourse to some type of heuristic processing (Malhotra, 1984). Shoppers then also appear to stop far short of overloading themselves with information by, for example, interrupting the shopping process or by ignoring information. This, however, increases the likelihood of making unsatisfactory purchase choices (Malhotra, 1984), which could entail that customers will avoid the particular store altogether on future occasions.

While the case of information overload shows that there are factors intrinsic to shopping contexts which can lead to attention depletion, it is apparent that there are also numerous factors *extrinsic* to shopping which makes it the case that customers do not enter stores and commercial districts fully attentionally rested (e.g. work, family life). Again, we are convinced that retailers can benefit from integrating atmospheric elements – and greenery in particular – that can provide customers with opportunities for resting directed attention. With more attentional resources available consumers are likely to arrive at better, and hence, at more satisfying purchase decisions. Probably they will also be less prone to abort shopping prematurely. Working in a 'cognitively refreshing' environment could also lead to more optimized store personnel performances (Cohen and Spacapan, 1978). Rather than

investing vast resources into all kinds of point-of-purchase communications, which – combined – are often beyond the customer's processing capabilities, retail managers could benefit from considering Biophilic Store Design. Finally, note that the restorative potential inherent in biophilic interventions is likely to ease down the negative emotional and behavioral states that can originate from attentional fatigue (e.g. irritation) and which undoubtedly influence shoppers' attitudes and behavior in a negative way.

A review study of the impact of urban greenery on commerce

Introduction

Although numerous environmental psychology studies have empirically investigated the psychological effects of retail settings and of green environments *separately*, the *interaction* between greenery and retail areas has barely been addressed. Although the framework sketched in the previous sections addressed this interaction, one of its obvious shortcomings is that it was a *conceptual* inquiry. The few experimental results that have been obtained on Biophilic Store Design are, however, promising and give us reasons for being optimistic about the expectations and hypotheses that we have expressed so far. Buber et al. (2007), for example, have tested the effects of (among others) plants on consumer behavior in a shopping mall. They found that consumers were more inclined to enter the mall when it contained vegetation and that the presence of greenery led to higher exploration rates (e.g. inquiring offerings more in-depth). The presence of plants was also associated with increases in interaction with other people in the shopping mall. Although preliminary, these results corroborate and extend environmental psychology results about greenery from residential settings to retail environments. The studies reported in the following sections aim to make the evidence base for BSD even firmer, by showing that it can have a definite and positive influence on customers' perceptions of, and attitudes towards retail environments.

Method

Up until now most research into the relation between the urban forest and commerce has been conducted by Kathleen Wolf, premised on a long standing theory of person–environment interactions. The central objective of Wolf's studies was to understand multiple dimensions of consumer responses to forested retail settings. Preferences, perceptions, and behaviors were assessed, associated with trees across retail districts and extended streetscapes. Given the importance of Wolf's contribution to this research domain, the following sections will be dedicated to an overview and summary of her study approach and results (this review is based on Wolf, 2003, 2004a, b, 2005a, 2006, 2008). Each of these studies was largely a replicate of the initial work that was done across larger cities of the United States (Wolf, 2003). We will briefly discuss which sampling procedure, stimuli, constructs, measures and methods of analysis were used across all the studies. Finally, the general results from this multi-study research program will be summarized. The cited articles in these sections all report peer-reviewed, primary research. With this review we ultimately aim to demonstrate the value and usefulness of BSD for retail contexts, while at the same time providing insight into how to study this topic. We hope that this will stimulate researchers to further inquire into this underexplored domain.

Wolf's research approach to urban greenery in business districts

Participants

Respondent sampling across the Wolf studies ranged from local to national audiences in U.S. cities, while retail environment sampling included 'main street' districts of small cities of 10–20,000 population (Wolf, 2005a), a mid-size city of approximately 100,000 (Wolf, 2004b), large cities of more than 250,000 inhabitants (Wolf, 2003, 2004a), as well as roadsides of urban high speed freeways (Wolf, 2006), and urban strip malls (Wolf, 2008). Surveys were randomly distributed among respondents by mail or during sidewalk intercepts.

Stimuli

Wolf's consumer surveys involved responses to retail streetscape scenarios (i.e., pictures) that varied with respect to the quantity, location, and complexity of vegetation. Other scene content (e.g., building age, utility lines, etc.) was controlled for in order to avoid distraction that could bias consumer responses (Wolf, 2005b). As a stimulus manipulation check, image preference ratings were conducted, resulting in three to five visual categories per study. That way, the comparability of streetscape scenarios "with trees" and those "without trees" was further ensured. Each survey was based on one of these retail streetscape scenarios ("with trees" or "without trees"), which were randomly presented. Questions were posed pertaining to the respondents' projected shopping behavior while viewing that particular visual setting.

Measures

The measures used in Wolf's studies include rating scales as well as categorical responses. The main constructs that were measured across the studies include:

- **Visual quality:** This is the degree to which people judge a setting as pleasing and desirable. Visual quality was rated on a scale ranging from 1 (low) to 5 (high).
- **Place perceptions:** These are the mental representations or assumptions that an individual infers from a place, such as perceptions of amenity and comfort, maintenance and upkeep, merchant interaction, and quality of products (Wolf, 2005b). Place perceptions were determined by asking respondents to rate their level of agreement with statements about the place using 5-point Likert scale variables while viewing one particular retail scenario.
- **Patronage behavior:** This refers to the frequency and duration of shopping actions, such as length of a visit. Study participants indicated their probable patronage behavior with respect to travel to the business district, visitation patterns, and willingness-to-pay for parking while considering the streetscape scenarios. Variables presented an ordered array of categorical response choices, in such a way that respondents could indicate what their patronage intentions towards the scenario presented would be. For example, the time they would be willing to spend in the district was measured by having them make a choice between the following options: (1) up to 30 min, (2) 30–59 min, (3) 1–2 h, (4) more than 2 h.
- **Price perceptions:** This is the consumer's willingness-to-pay for products and services. A pricing assessment was carried out using a contingent valuation method to understand the impact of streetscape trees on price perceptions. Respondents were presented with a list of goods and services and were asked to state prices for each. The list contained products within different product classes supposedly offered for sale in the presented setting.

Analyses and general results of the Wolf studies

Analysis methods were similar across all of the Wolf surveys. Preference means that were calculated for each of the presented images (up to 30 visual stimuli per study) resulted in image categories by applying factor analysis. Subsequently, for each of the individual scenarios used, responses to the array of variables were first tallied, and then combined using data reduction methods such as factor analysis. Finally, the responses to these underlying variable dimensions were compared for differences between commercial streetscape settings “with” versus “without” trees. When deemed necessary, comparisons were also made between respondent subgroups.

Findings for each of the measured constructs are summarized below (see also Wolf, 2005b). Details of findings pertaining to the respective urban retail settings can be found in the citations above. We emphasize that the text and figure do not provide detailed statistical outcomes for each of the studies referred to, but illustrate response trends and consistencies between the studies.

- Visual quality:** Image preference ratings sorted into three to five visual categories per study (each containing at least two images), with mean ratings ranging from 1.66 to 4.00. Fig. 1 shows sample category images and mean preference responses across the studies. Across all of Wolf’s studies, consumer ratings appear to increase steadily with the presence of trees (Wolf, 2003, 2004a, b, 2005a, 2006, 2008). Images depicting business district settings having tidy sidewalks and quality buildings, but no trees, were at the low end of the scores. Images having well-tended, large trees received the highest preference ratings, even though plants obscured other elements (such as historic buildings). Across preference studies of many landscape types, public judgments of visual quality of certain rural or wildland area views are usually higher than for urban scenes. Interestingly, the most highly preferred business streetscapes have ratings that compare to those of wildland and outdoor recreation settings (Wolf, 2005b), suggesting that well-planned and managed nature in cities can provide satisfying experiences.
- Place perceptions:** Means for place perceptions were calculated across all items for each of the statistically derived factors and then compared between the “forested” and the “no tree” conditions using MANOVA and Bonferroni alpha levels that were adjusted for multiple comparisons. Trees appeared to be associated with higher ratings of “amenity” and “visual quality” across the studies. Moving beyond the obvious visual content, the respondents seemed to make inferences about the settings. For instance, positive scores for “maintenance” were given to districts with trees, despite efforts to present the same level of building care and street tidiness. Respondents also attributed social traits and characteristics to in-store experiences. Judgments of “products” and “merchants” appeared to be more positive in forested places. This also seemed to be the case for

inferences about “product value”, “product quality”, and “merchant responsiveness”. It seems that favorable expectations of shopping experiences are initiated long before a consumer enters a shop.

- Patronage behavior:** Tables of response frequencies were analyzed to evaluate the relationship between streetscape character and reported behavioral intentions. Across each of the main street studies, responses regarding most patronage variables were found to be significantly more positive in the “with trees” conditions as compared to the “without trees” ones. A distinct response pattern could clearly be discerned: responses to settings “without trees” appeared concentrated at the lower end of each of the patronage variable’s values, while streetscapes “with trees” seemed to generate higher value responses. For example, respondents claimed they would travel further to visit a business district having trees in both large and small cities. This could translate to an expanded trade area radius that would add thousands of people within urban population centres. Respondents reported that they would stay longer once there and they indicated that they would visit a vegetated business district more frequently, which could lead to greater sales revenues (Underhill, 1999).
- Price perceptions:** Trees also affect respondents’ valuations of products. Overall, the Wolf studies demonstrate a positive price increment, i.e., a relatively higher mean price acceptance, associated with districts in which trees are present. This was found to be consistently the case for convenience, shopping- and specialty products. While there was some variability of price response between different sized cities, trees still appeared to be consistently associated with higher price points. When standardized across all product categories and scenarios, the amenity margin for the presence of trees was 12% for large cities and 9% for small cities. The variation related to city size may have been due to the higher appreciation of trees in big cities, but may also point to differences in the local economies of big versus small cities. It might even be caused by an economic downturn in the US that occurred in the period between the studies.

Discussion and ideas for future research

The foregoing sections conferred empirical and conceptual evidence that BSD can be of particular value and relevance for the different parties involved in commercial settings and shopping activities. We have first presented a number of conceptual arguments in support of the claim that BSD can have distinct restorative effects (section “An exploratory study of the restorative potential of Biophilic Store Design”). This discussion was then backed up, and further extended by a study that reviewed Wolf’s multi-study program on the beneficial effects of BSD on consumer attitudes and behavior (section “A review study of the impact of urban greenery on commerce”). We are convinced that these two



Fig. 1. Mean image preference ratings for three sample images of the visual categories used across multiple business district studies.

studies can be mutually reinforcing. On the one hand, as there is often an overlap between preferred and restorative environments, Wolf's positive results can strengthen our expectation that restorative experiences will also occur in green shopping contexts. On the other hand, our conceptual framework can perhaps also shed light on some of Wolf's results from the perspective of SRT and ART. For example, one possible reason for why people are willing to stay longer in green retail environments could be that they implicitly recognize the presence of opportunities for restoration. Future research should inquire as to whether this is indeed a viable mediating mechanism.

It would, however, be short-sighted to think that integrating greenery will necessarily lead to more positive shopping experiences in individuals. In all likelihood, different variables could attenuate or moderate the intended effects. For example, environmental psychology research shows that different species of trees are appreciated differently (Lohr and Pearson-Mims, 2006) and that the degree of complexity of settings influences preference ratings and perceived restorative potential (Han, 2007). Furthermore, greenery can block views on marketing-relevant information; it can reduce circulation opportunities and thereby exacerbate crowding; it can hinder easy access to certain products; it can be valued negatively when not well tended or when not fitting the specific context; and so on. The consequence is that these factors can moderate the effects that are contemplated by BSD. In such situations one might be better off using suitable pictures or representations of nature-content than using actual greenery. Future research should determine the scope and specific nature of how these variables interact with green interventions in store environments, and how they subsequently influence consumer behavior.

What could be especially interesting from a marketer's perspective is to learn how 'shopping motivation' or *type* of shopping influences the above-described effects (i.e. aesthetic and restorative responses). In particular, in the literature on consumer behavior two important kinds of shopping are differentiated: *utilitarian* shopping and *hedonistic* shopping (see Babin et al., 1994; Geuens et al., 2002 for extensive reviews). Because utilitarian shopping is essentially functional, often experienced as 'a chore', and not pursued for relaxation, it seems probable that restoration will have more pronounced effects and relevance during this type of shopping. In contrast, there is hedonistic shopping that is pursued *just because* of its enjoyable and relaxing qualities, making restorative experiences less needed and relevant. Still, it probably goes too far to consider green interventions as wholly irrelevant in such contexts. First, 'hedonic' shoppers may often show more appreciation for aesthetic attributes or conditions in shops, such as BSD. Second, different individuals might be involved in either hedonistic or utilitarian shopping in one and the same shop. Third, while enduring shopping motivations are related to a person's personality and are relatively stable over time (Mooradian and Olver, 1996), situational shopping motivations are temporary and depend on a consumer's situation, such as time pressure, social surroundings or task definition (e.g. urgent versus regular purchase) (Van Kenhove et al., 1999). Fourth, hedonistic shopping can unexpectedly become stressful or attentionally fatiguing (e.g. during sales periods), which underscores the value of biophilic interventions during such shopping episodes.

While our discussion shows that greenery can be 'good' for business, the authors do not condone excessive consumption behavior. Places of commerce fulfill basic needs and desires, and they are therefore necessary in every community. Moreover, commercial settings often serve as the social hub of a community, as people may interact with friends and neighbors in the process of acquiring goods and services. Given the need for both retail environments and nearby nature in daily life, we propose a

number of research questions that might contribute to a better understanding of biophilic shopping places. For instance:

- Does the presence of greenery have equal or lesser restorative effects in hedonistic as compared to utilitarian shopping contexts?
- As positive nature experiences are associated with increases in sustainable behavior (e.g. Kals et al., 1999; Hartig et al., 2001), does BSD lead to more sustainable consumption patterns?
- Creating successful green retail areas requires significant investments of creativity and materials. How could this development process generate and demonstrate sustainability practices that could be observed, understood, and perhaps replicated at home by shoppers?
- Merchant or business associations are instrumental in creating green shopping areas, as improvements must be implemented across a district or mall, rather than on a spotty basis. Once active in landscape improvements (and observing likely positive returns on investments), how could merchant associations be urged to commit to other district-wide sustainability practices?
- Retail and commercial merchants are typically fairly influential in local politics, as business people often serve directly in elected positions or convey opinions on economic affairs to policy makers. How might merchant commitment to a retail greening program translate into support and endorsement of other community sustainability programs?
- To which extent do characteristics of greenery – such as complexity, maintenance, species type, and so on – moderate the occurrence and scope of restorative responses?
- Do imitations of nature (e.g. nature posters, nature like forms) give rise to the same beneficial effects in consumers and sales personnel as actual natural elements do? What are the possible implications for sustainability if imitations of nature are also effective in this respect?

Conclusion

Aligning the key-stakeholders in the process of urban greening can sometimes be a difficult and delicate undertaking, especially when commercial interests are involved. The central aim of this paper was to demonstrate that there is a growing and sound evidence base, which shows that in-store and out-of-store greenery can be 'good' for retail businesses and can provide them with a strategic business advantage. It seems that a plea for urban greening should not necessarily be antagonistic to the economic and financial objectives aimed for by the retail sector. We are therefore hopeful that our discussion will lead to an increased willingness to integrate greenery in retail environments (both in-store as out-store) and hence, that it will further contribute to the process of urban greening. We furthermore believe that the effects of green interventions like BSD can transcend the strict level of consumer behavior and psychology. Research indicates that experiencing nature's restorative and emotional effects can stimulate conservationist attitudes towards the natural world (e.g. Kals et al., 1999; Hartig et al., 2001). Perhaps quite similarly, the experience of BSD's beneficial emotional and cognitive effects can provide individuals with an experiential platform that will make them more willing to adopt and implement sustainable practices.

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