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Abstract

Dramatically increasing urbanization is observable worldwide and brings pressure on space within urban areas as the built environment intensifies. Considerable evidence suggests that contact with nature is important for city dwellers, although it is not known whether residents' appreciation of the forms of urban green spaces is constant across different contexts. More specifically, it has not yet been shown whether our appreciation of nature is innate and inherently human, is cultural and something that we learn, or is a mixture of both. This article describes an exploratory study consisting of 17 interviews carried out in Zurich, Switzerland. Kelly's repertory grid technique is used to identify preferred urban landscapes, which were contrasted with identified rejected landscapes. Principle components analysis and multidimensional scaling reveal a clear separation of cultural and biological modes of landscape assessment in some respondents. The research contributes to an understanding of the meanings of urban green spaces, which would in turn provide planners with a tool to match urban natural resource management with the needs of residents.

Keywords

personal construct theory, urban nature, landscape preference, landscape aesthetics

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Introduction

A Problem of Green Space Management

We live in a rapidly urbanizing world. It is estimated that 47% of the world's population lived in urbanized areas in 2005 and this amount is expected to rise to 60% by the year 2030 (United Nations, 2005). In Switzerland, 75% of today's population live in conurbations with an expected increase to 83% in the year 2030 (United Nations, 2005). As the built environment intensifies, with the understandable aim of preventing the spread of the urban into the surrounding areas, the growing populations require housing and services. This in turn brings pressure on decision makers to release green spaces within urban areas for development. For the purposes of this article, the term *green space* describes spaces that feature predominantly unsealed, permeable, "soft" surfaces such as soil and grass (Swanwick et al., 2003). The higher density urban living that results from the loss of green spaces to development has potentially significant implications for citizens because of the importance of urban green spaces as nodes of contact with nature (Barthel et al., 2005). Coley et al. (1997) found that natural elements, such as trees, in semipublic spaces surrounding urban housing promote increased use by, and interaction between, residents. Urban green spaces that are well used have been shown to encourage bonding between neighbors (Kuo et al. 1998), provide a greater sense of safety (Kuo et al., 1998), and reduce urban ills such as crime and violence (Kuo & Sullivan, 2001).

The anthropocentric arguments of those seeking to preserve or otherwise enhance green spaces are based on the benefits, described by Costanza et al. (1997) as ecosystem services, which residents receive from the ecosystem, such as the restorative contrast to the built environment that urban nature provides. However, Kaltenborn and Bjerke (2002, p. 3) commented that "expanding the perspective from considerations of the functional capabilities of the landscape to values and sociocultural meanings is probably one of the paramount challenges of future land use planning." Bolund and Hunhammer (1999) concluded that locally generated ecosystem services have a substantial impact on people's quality of life and should be addressed in land-use planning. It follows that if city dwellers receive services from green spaces, then enhancement of urban green spaces would be a worthy goal for decision makers in cities. However, knowledge of what factors will in fact enhance a particular space must guide intervention strategies (Matthies & Kroemker, 2000). Gobster et al. (2007) pointed out that acceptance of interventions is dependent on landscapes meeting expectations of being aesthetically attractive, whereas Nasar (2002, p. 1822) puts it plainly that "community appearance matters to people."

Public acceptance of replication of successful interventions from other contexts requires knowledge of the way in which people perceive the environment (Priskin, 2003). Bourassa (1990) articulated a paradigm for environmental assessment and proposed that individual differences in landscape preference can have both cultural and biological determinants, moderated by the individual. When seeking suitable interventions in the context of urban green spaces, we require knowledge of whether people's preferences for such spaces are biologically determined and independent of context, culturally determined and context specific, or a mixture of both. This exploratory study addresses that challenge and, using in-depth interviews conducted in Zurich, Switzerland, aims to identify the determinants that cause landscapes to be either favored or rejected. In short, we seek to answer the research question of whether the determinants that cause a landscape to be either selected or rejected are cultural and refer implicitly to behavior that is learned (Bourassa, 1990), or biological, and refer to behavior that is innate (Bourassa, 1990).

Review of Relevant Literature

Cultural and Biological Determinants of Landscape Preference

Those who consider appreciation of nature to be culturally driven argue that the significant factors are those that imply a social, spiritual, or self-actualization dimension, or those that clearly relate themselves to the activities of mankind (Bourassa, 1990). Cosgrove (1998) has apparently little doubt that the idea of landscape, which is how Europeans have represented their world as a source of aesthetic enjoyment, is a cultural concept. Godfrey-Smith (1979, p. 310) described a service that nature provides, from an anthropocentric perspective, as that of a cathedral. The cathedral role appears to be clearly cultural and Godfrey-Smith argued that "wilderness areas provide a vital opportunity for spiritual renewal, moral regeneration, and aesthetic delight". Danto (2003) pointed out that aesthetic judgments within a culture may be conditioned over time. For example, in early 18th century England gardens were considered beautiful when they were ordered into symmetrical patterns and mathematical figures. By the end of that century the comparatively wild "expressive" gardens had become the definition of beauty (Egbert, 2000). Given that the aesthetic appreciation collectively changes over time, it would seem reasonable to assume that the clearly cultural concept of fashion has a role to play in its formation.

A biological determinant of landscape assessment is supported by Farina and Belgrano's (2006) premise that cognition is an essential component of the living strategies of organisms and that cognition is a step in assigning meaning

to a particular space. Among the dominant biologically based theories in understanding landscape assessment are Kaplan and Kaplan's (1989) information processing theory and Appleton's (1975) prospect refuge theory. Information processing theory suggests that preferred landscapes are similar to those that stimulated and facilitated primitive man's gathering of information and thus promoted the development and differentiation of his most distinguishing feature, his power of reasoning (Bourassa, 1990). Landscape perception is expressed in terms of complexity and mystery, which relate to the need to gather information, and coherence and legibility, which relate to the need to make sense of the information (Kaplan & Kaplan, 1989). Most studies into landscape aesthetics (e.g., Kaplan & Kaplan, 1989; Peron et al., 1998; Purcell et al., 2001) have presented respondents with a selection of visual depictions of environments, asked questions about preference, and then looked at common characteristics within the chosen environments (Hagerhall, 2000). Several studies have analyzed the influence of one or all of these four paired characteristics identified by Kaplan and Kaplan (1989) on those preferences capable of being empirically determined (Coeterier, 1996; Herzog, 1989; Strumse, 1994; Van den Berg et al., 1998). The relevant findings ranged from ambivalent (Strumse, 1994) to completely negative (Coeterier, 1996). Bourassa (1990) suggested that the problem lies in the absence of an encompassing theory and attempts to resolve the biological/cultural debate by combining biological, cultural, and personal bases for aesthetics in a comprehensive paradigm.

Appleton's (1975) prospect refuge theory provides the basis for his claim that human attraction to particular landscapes is a biological condition. According to Appleton (1975), a landscape with a wide, open view that allows observation of approaching predators, and simultaneously provides protected settings that prevent the viewer from being seen, gives evolutionary advantages. Livingston (1981, p. 117) went as far as saying that appreciation of the beauty of nature is purely biological and concluded that appreciation of nature is found in the ". . . sub-rational sense, lodged within the very core of being of unalienated humans, of a deep complicity in the beauty, that is life, possesses." Empirical evidence in support of Appleton's (1975) theory has been reported by Clamp and Powell (1982), Woodcock (1982), Abello and Bernaldez (1986), Mealy and Theis (1995), and Hagerhall (2000), although Klopp and Mealey (1998) concluded that their results did not offer support for the theory. Variation in prospect–refuge affordances do not necessarily contradict the theory as differences may be due to what appears to be prospect or refuge rather than the theory itself being not a biological explanation (Hunziker et al., 2007). The savannah theory of Orians (1980, 1986) puts substantial weight on the fact that the first humans lived in the African savannah.

Chamberlain (2000), however, pointed out that the savannah dwelling scenario of human evolution is oversimplified, and the current state of knowledge among palaeoanthropologists is that earlier human species were not optimally adapted to any particular and singular environment.

There appears to be little argument that both Appleton's (1975) attraction criteria and Kaplan and Kaplan's (1989) factors of coherence and complexity, and mystery and legibility are biological drivers; however, both theories focus on only some of the many biological factors and give considerably less attention to cultural and experiential influences. Appleton (1975) explained non-biological manifestations of landscape preference as being no more than variations in ways of responding to biological needs and thereby reduces culture to the biological. Similarly, Wilson (1975) suggested that any attempt to explain behavioral patterns, which have a degree of genetic cause, should speak of a biological base for behavior, even if innate behaviors were always moderated by culture.

The alternative interpretation is that if culture mediates all biological needs, then the consideration of a biological determinant of aesthetic experience becomes irrelevant (Bunkse, 1977, Jeans 1977). Others acknowledge the influence of both biology and culture, such as Dewey (1934) who stated that ". . . aesthetics involves cultural and personal influences and is not simply a matter of biological drives." According to Midgely (1978, p. 286), "Culture is not an alternative or replacement for instinct, but its outgrowth and supplement." Midgely thereby recognizes that humans retain biological needs as they develop cultures and that culture provides an additional or supplementary influence on humans. Price (2004) proposed that people perceive landscapes with emphasis on principles he describes as either naturalness or artistic, with the dominant principle dependent on the landscape context, the individual's cultural or socio-economic background, and individual characteristics such as profession.

Preferences for Particular Landscapes

Research into people's landscape preferences has identified a remarkable consistency in human preference for natural landscapes (Hartig & Staats, 2005) and have been found to be those that

- are natural, as opposed to urban (Ulrich,1983; Kaplan & Kaplan, 1989; Lamb & Purcell, 1990; Hartig & Staats, 2005);
- contain a variety of landscape elements and a variety of plant species (Misgav, 2000);
- display a degree of management (Ulrich, 1986; Gobster, 1995);

- are open (although not exposed) while containing a high degree of depth and a moderate-to-high degree of complexity (Ulrich, 1983; Kaplan & Kaplan, 1989; Hunziker 1995; Hunziker & Kienast 1999).

However, the empirical study of landscape aesthetics has mostly been carried out in the absence of an encompassing and unifying theory that would help to explain which factors serve as the basis for preferences (Bourassa, 1990), and the work that has been done in theory has tended to be dominated by either a biological or cultural basis of aesthetic behavior.

Modes of Aesthetic Experience

Research into landscape aesthetics has understandably concentrated on the interactions between the physical and psychological aspects of landscape perception. Zube, Sell, and Taylor (1982) reviewed more than 160 articles published before 1980, with reference to 4 paradigms that had been followed in assessing perceived landscape values (expert, psychophysical, cognitive, and experiential) and noted the absence of an explicit theoretical foundation. Daniel and Vining (1983) reviewed the body of landscape-quality assessment methods and concluded that neither the ecological nor the formal aesthetic models can serve as a basis for an adequate landscape assessment system and suggested a careful merger of the psychophysical and psychological approaches to provide the basis of a useful system. Gobster and Chenoweth (1989) examined the empirical relationships between various paradigms for describing and evaluating landscape preferences and found that physical, psychological, and artistic dimensions can explain aesthetic preference. They concluded that artistic and psychological dimensions "... defined separate constructs relating to compositional and affective-informational meanings," which was not the case with physical descriptor dimensions (p. 68). Daniel (2001) advocated a psychophysical approach in the formulation of a landscape quality assessment system to provide a balance between biophysical and human judgment components.

Parsons and Daniel (2002) concentrated on the human dimension of how and why landscapes are preferred, and suggested examination of the emotional attachments elicited by the experience of preferred landscapes to contribute to an understanding of visual and nonvisual environmental aesthetics. Bourassa (1990) proposed a tripartite paradigm in which "both biological and cultural factors underlie the personal mode, and that the individual can transcend those constraints through intellectual activity."

In this case, "mode" means the particular way of seeing, which is the manifestation of the underlying determinants of the way of thinking (Cosgrove, 1998). The theoretical basis of Bourassa's paradigm follows the Russian

psychologist Vygotsky's (1978) developmental approach to understanding the human mind and behavior. Vygotsky argued that in order to comprehend human behavior it is necessary to understand the processes by which individuals develop. Vygotsky's emphasis on a developmental approach to understanding human behavior resulted in a tripartite scheme combining phylogenesis (or biological evolution), sociogenesis (or cultural history), and ontogenesis (or individual development). Individual development serves to explain variation within cultures, as has been observed by Brady (1998, p. 142) who notes that ". . . mudflats and wastelands may also have aesthetic value, and perceiving that is dependent upon the effort of the percipient."

Such a tripartite organization appears compatible with Dewey's (1934) theory of aesthetics, but Dewey does not explain how biological and cultural factors interrelate in aesthetic experience of landscape. Remaining within the tripartite paradigm explains the lack of empirical confirmation of biology-based theory in that ignoring cultural and individual aesthetics can only give part of the picture.

Bourassa (1990) pointed out that humans may share some innate preferences for certain types of natural landscapes, evidenced by the consistency of preference noted by Kaplan and Kaplan (1982) and Hartig and Staats (2005). However, little evidence has been offered that landscapes used in preference studies have meaning or significance for groups represented in those studies. Studies seeking to discover deep-seated human instincts rarely consider the relationship between nature and the individual, and care is usually taken to ensure that respondents do not recognize particular scenes used in the studies. Van den Berg and Vlek (1998, p. 8) departed from this trend by asking respondents to assess landscapes from differing personal perspectives and concluded that "at least part of the beauty perceived in natural landscapes is derived from the knowledge that people bring into their aesthetic judgements." One can infer from this finding that people, when assessing a landscape, will have a preconceived idea of how it should be, or in other words, they have a set of criteria against which they judge the quality of the landscape.

Modes of Assessment of Urban Landscapes

It has not yet been determined whether findings of preference for natural landscapes would be applicable to urban landscapes and whether preferences are transferable between different urban contexts. Studies have consistently shown that natural environments are preferred over urban environments (Peron et al., 2002) although most have contrasted stark urban environments with natural scenes (e.g., Hartig & Staats, 2005; Hartig et al., 2003; Staats et al., 2003; Ulrich et al., 1991; Van den Berg et al., 2003). Considering the different modes of

aesthetic experience helps to explain such preferences and suggests caution in inferring preferences for urban landscapes. It can be argued that they are comparing two different things, namely, a biological aesthetic and a cultural aesthetic, meaning that preferences for natural landscapes are probably based on factors quite different from those that serve as the basis for preferences for urban landscapes. Bourassa (1990, p. 806) wrote that "it seems likely that natural landscapes are experienced largely in the biological mode, whereas urban landscapes are experienced primarily in the cultural mode." Price (2004) reached a similar conclusion although he described wildernesses to be perceived under the dominance of "naturalness" principles, while cultural landscapes are perceived under the dominance of "artistic" principles.

Hernandez and Hidalgo (2005), in one of the few studies examining the restorative effects of nature within cities, found that respondents viewing urban scenes with natural elements returned higher scores on a measure of restorativeness than those viewing the same scenes without the natural elements. Peron et al. (2002) found that mixed environments containing both built and natural elements are often perceived as being as restorative as purely natural environments. Sullivan et al. (2004) found that the presence of natural elements correlates with the use of outdoor spaces and the social activity that takes place within them, which allows the extrapolation that they are preferred. Ogunseitan (2005) in his study of topophilia in an urban environment identified factors that contribute to attachment to place, which he labeled "cognitive challenge," "familiarity," "ecodiversity," and "synesthetic tendency." It could be argued that this supports the tripartite paradigm with the first two factors corresponding closely to Kaplan and Kaplan's mystery and legibility categories, whereas ecodiversity refers to a learned attraction to natural elements such as flowers and animals. Synesthetic tendency describes preferences for particular colors and sounds and which suggests an individual difference. However, it appears that there is insufficient data to infer the mode of aesthetic experience when an individual evaluates an urban landscape.

Though it is possible to measure social activity and perceived restorativeness associated with a particular landscape, it is more difficult to measure which, if any, mode of assessment is used. Balling and Falk (1982) found that savannah landscapes were consistently preferred over forest and desert landscapes, although this preference diminished with age. They concluded that this result showed an inbuilt biological-instinctive reaction in younger people who had experienced a lower grade of socialization. The measurement difficulty is underlined by Lyons' (1983) suggestion that this result may have shown that savannah landscapes are similar to park landscapes where children usually play and that the preference is a product of cultural norms.

Research Gap

Foster (1998) pointed out that

> . . . if we want to argue for the importance of aesthetic values in relation to the natural environment, and wish to persuade others of those values, we must first have confidence that the premises for our argument grow out of, and are firmly rooted in what we can reasonably be said to know. (p. 127)

However, it is evident that no reasonable conclusions can be drawn from the results of previous study as to what modes of aesthetic experience people use when expressing preferences for urban green spaces. Furthermore, both Bourassa (1990) and Farina and Belgrano (2006, p. 6) have called for more research progressing toward the development of a "science of landscape" to understand how we perceive and appreciate landscapes. Van den Berg et al. (1998) commented that, in order to be of theoretical and practical relevance, empirical research in landscape assessment should provide information on the determinants of individual differences in terms of preferred landscape characteristics. Primary research was, therefore, undertaken in an attempt to address the aims of this study by identifying and classifying the determinants that cause landscapes to be either favored or rejected. Such knowledge of the way in which people perceive their environment is needed to answer whether urban nature is appreciated the same by all people or whether it is something that we learn, which will in turn influence whether successful interventions from elsewhere should be applied in different cultural contexts.

Methods

Methodological/Theoretical Framework

The predominant method of measurement of attitudes toward urban green spaces has been though the use of structured questionnaire surveys (Balram, 2005). However, there is no underlying theory, and consequently no comprehensive list of available constructs that are likely to be used when an individual considers urban green spaces. Use of surveys, therefore, brings a risk that some of the ways of seeing nature may be missed or that irrelevant alternative ways may be introduced. In addition, Thompson (1998) asserted the need for a move away from measures of landscape preference that test agreement with preconceived constructs and toward information-gathering methods. Cosgrove

(1998, p. 13) described landscape as ". . . the external world mediated through subjective human experience" so that it is "not merely the world we see, it is a construction, a composition of the world." Personal construct theory was, therefore, selected to provide the theoretical framework to learn which constructs the respondents themselves use, but have possibly not yet articulated, and which avoids introducing constructs that stem from the researcher (Home et al. 2007).

Personal construct theory is concerned with how people make sense of the world (Kelly 1955/1991). Kelly developed the theory in the field of psychology, and it has since been applied to a wide variety of fields ranging from market research (Jankowicz, 2004) to ascription of meanings to environments (Dinsdale & Fenton, 2006). The theory states that people have an individual view of the people and events that are part of their life (Kelly 1955/1991). The term *construct* reflects the dual role of the concept. People use their experiences and constant examination of the people and places around them to construct a personal explanation of how the world works. Meanwhile, constructs are an individual's predisposition to perceive and refers to how the world is construed. The individual continuously revises his or her constructs as further observations are collected. People predict what will happen in certain situations based on their past experiences and observations and, if the predicted outcome does not occur, the construct is revised (Fransella & Neimeyer, 2004).

Kelly (1955/1991) described a person's construct system as being composed of a finite number of dichotomous constructs. One of the central assumptions is that what an individual understands of reality is built up from contrasts rather than absolutes (Jankowicz, 2004; Fransella & Neimeyer, 2004). An element, in this case an urban green space, will receive meaning by it being seen as both that which it is and contrasted with that which it is not. So in expressing a meaning it is evaluated within a contrast rather than a negative. For example, the meaning intended by the descriptor "attractive" can best be understood when opposed to its contrast, which may be, say, "disinteresting," "ugly," or "repulsive," whereas its negative would be the less informative descriptor "not attractive." Accordingly, eliciting constructs allows the researcher to understand how a person views and values the environment.

Procedure

Constructs were elicited using the triadic method (Jankowicz, 2004) using researcher-supplied elements so that the focus would remain on a common set of variables. Nine photographs of urban green spaces, selected in consultation with an urban ecologist as being representative of the various green spaces

Figure 1. Photographs of Urban Green Spaces Used as Stimulus Materials

within Zurich, were used as stimulus materials. The photographs, with each landscape's assigned number, are shown in Figure 1, and these numbers will be used as the landscape reference in the following discussion. Respondents were asked to imagine their ideal urban green space and to imagine and remember what their ideal would look like when photographed and presented in a similar way to the stimulus photographs. This imaginary ideal landscape was used as a 10th stimulus. Respondents were presented with a random group of three elements, from the set of 10, and asked to nominate which 2 elements were somehow similar to each other and different from the third. The justification for differentiation of the elements was noted as a pole of a construct. The respondent was then asked to identify the contrast to the elicited pole, thus completing the construct. Each of the elements was then rated on a Likert

scale, with each pole representing the extremes of the scale. The process was repeated using further random combinations of elements until no new constructs were forthcoming.

The individual grids were analyzed using the statistical techniques of multidimensional scaling (MDS) and principal components analysis (Jankowicz, 2004). MDS is used to plot points in multidimensional space so that the physical distances between points on the plot(s) represent the subjective distances perceived by respondents. Points in the plot that are closer together are perceived as being more similar than those that are further apart (Garson, 2008). The Software package Repgrid IV was used to process the collected data and the results of an MDS analysis were superimposed onto the same axes as the two components explaining the most variation of a principal components analysis (PCA). PCA can be used to identify clusters of constructs by revealing the structure (dimensions) of the set of constructs and finding which of them respond similarly to the stimulus materials (Garson, 2008). Construct pairs for which the component lines intersect at an acute angle are considered to be more similar to each other than construct pairs for which the apex angle is less acute. The relative position of the element point to the component lines allowed inference into the determinants used by the individual to describe each element. The results were then immediately checked for validity with the respondent. All of the interactions between interviewer and respondent were recorded. An example of an interview output is shown in Figure 2.

This allowed an interpretation of which constructs were the determinants of preference for the favored landscape (Jankowicz, 2004). The determinant constructs were then assessed according to whether they conform to factors that Kaplan and Kaplan (1989) and Appleton (1975) would describe as biological or that Cosgrove (1998) would describe as cultural. For example constructs such as "liveliness," "intimacy," and "suitability for family" can be reasonably classified as culturally defined attributes. Meanwhile constructs such as "stimulation," corresponding with Kaplan and Kaplan's (1989) "stimulation" factor, and "space" corresponding with Appleton's (1975) prospect factor can be reasonably classified as biologically defined attributes. The same procedure of classifying the constructs explaining the most variance in a factor analysis was carried out for the rejected landscapes in each dimension. To minimize the subjective nature of such a classification, a peer control was carried out and the classification of constructs was negotiated until agreement was reached. This negotiation procedure was deemed sufficient given the exploratory nature of this study and is described as follows.

Holsti (1968) pointed out that content analysis requires the identification of the unit of analysis, for example, text, paragraph, or key word. In this case,

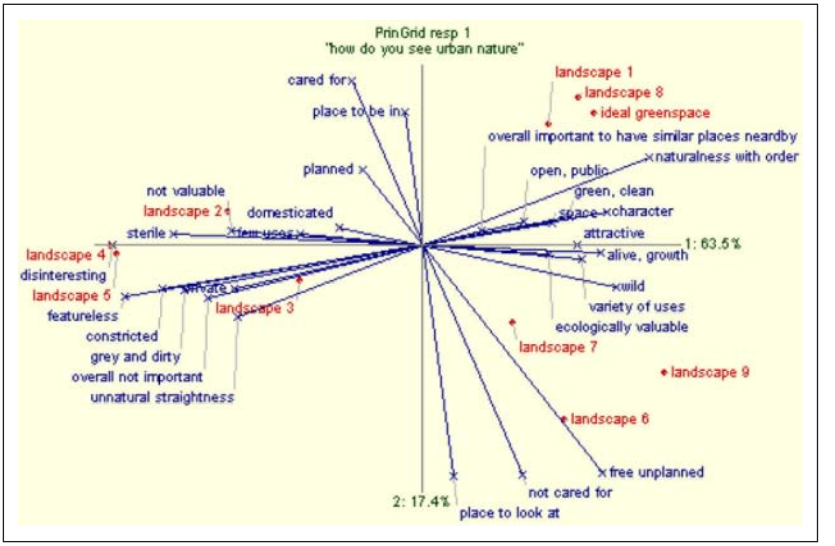

Figure 2. Example of Output of Repertory Grid With Points Representing Stimulus Landscapes in MDS and Lines Representing Constructs in PCA

the constructs are the base unit of analysis and provide both the content unit and the context unit. Jankowicz's (2004) core categorization procedure was used to classify constructs; however, particularly when considering nuances of language, there is a question of reliability. Hill (1995) identified three types of reliability in terms of content analysis.

Stability: That the same classifier would produce the same categories and allocate the same constructs to categories if the procedure were repeated.

Reproducibility: A second classifier would understand and reproduce both categories and classification

Accuracy: That constructs are allocated to categories according to consistent criteria.

Jankowicz's (2004) method addresses each of these concerns in its design, based on peer reproduction and comparison. The constructs were categorized, whereas a colleague from another scientific discipline (an ecologist) simultaneously and independently created a classification. A total of 53 out of 83 constructs (64%) were independently classified alike. The classification criteria were then

discussed on a construct-by-construct basis until agreement was reached. The next step was to independently reclassify each of the elicited constructs according to the agreed classification criteria. A total of 80 of the 83 constructs were identically classified, indicating an agreement of 96.5%. However, this result does not take random chance of agreement into account so a Cohen's Kappa was calculated with an acceptable result of 0.93.

Participants

The interviewees ($n = 17$) were selected according to the theoretical sampling strategy (Strauss & Corbin 1990; Patton, 1990). Winter (2005) highlighted the importance that the sample should include individuals who may hold values in different strengths. Statistical representativeness is not intended to be the principle of this strategy but rather one of "maximum variety" (Patton 1990). Thus, a theoretical sample, also called a purposeful sample (Patton 1990), consists of people with widely differing opinions about the topic under study and who represent the margin of the sampling universe. The strategy is portrayed graphically in Hunziker's (1995) diagram shown in Figure 3. The sampling universe in this study consisted of the residents of Zurich. A member of an environmental organization, a parent of a small child, and a person living in an apartment with neither balcony nor garden were selected as "seed" interview partners due to the supposition that they may have a relationship with local green spaces. At the conclusion of the interviews, they were asked whether they knew of somebody who they believed to be a source of differing opinions. This nonrepresentative snowball technique of identifying interview partners was deemed to be sufficient in this exploratory study.

Of the 17 respondents, 14 lived in apartments, with the remaining 3 living in freestanding houses with private gardens. Of the 14 apartment dwellers, 6 had access to a shared garden, 3 had access to a balcony, and 5 had only access to open spaces that were public. The respondents ranged in age between 23 and 71 years. Respondents will be identified in the following results and discussed according to their allocated respondent number to maintain anonymity.

Results

The application of the repertory grid method revealed 118 constructs from the 17 respondents, of which 83 were deemed to be determinants belonging to components used by the respondents to describe either the favored or rejected landscape. Displaying the outputs of each of the 17 principal components analyses is impractical due to the amount of space that would be required.

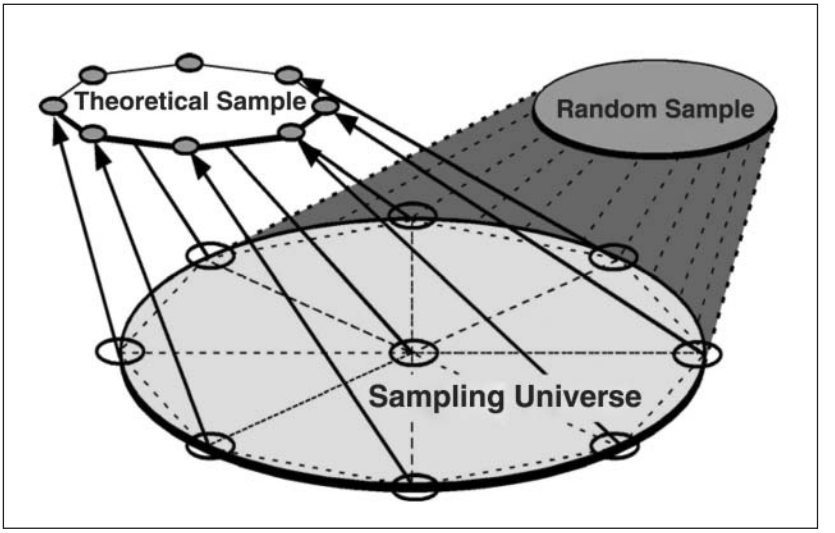

Figure 3. Sampling Strategy Used in the Project
Source: Hunziker, 1995
Note: Respondents were selected from opposite margins of the sampling universe. The random sample was not used but is shown here by way of illustration.

Furthermore, the components that do not determine selection or rejection are of little interest to this study, whereas the components in which the determinants are mixed are of interest but inconclusive. On the other hand, components in which the determinants are polarized into biological or cultural are of particular interest. Therefore, the responses from six of the respondents are presented because they are considered to be particularly illustrative.

The favored landscape was considered to be the landscape closest in the multidimensional scaling to the ideal landscape nominated by the respondent. The components containing the determinant constructs for the selection of the favored landscapes were found to be a mixture of culturally and biologically driven determinants in many of the cases. However, for some of the respondents, it appears that the determinants were dominated by either the biological or cultural mode. The determinant constructs for the selection of the favored landscapes in the six selected cases, and their categorization according to criteria of cultural or biological are shown in Table 1.

Biologically driven selections: Respondent 3 favored landscape number 9 and offered the constructs labeled "wild," "freedom to move," "place for different things," and "things to discover" as justification. Respondent 17 favored landscape

Table 1. Constructs Used in Selecting Favored Landscapes

Respondent	Determinant Constructs	Justification	Mode
3	Wild	"Wild" has the connotation of a place in which game might be found. The German word "Wild" translates to both wild and game.	Biological
	Freedom to move	Consistant with Orians' savannah theory and consequently with Appleton's prospect/refuge theory.	Biological
	Place for different things	Consistent with Kaplan and Kaplan's "Complexity".	Biological
	Things to discover	Consistent with Kaplan and Kaplan's "Mystery".	Biological
17	Healthy nature	"Healthy nature" indirectly indicates the presence of water and is consistent with the evolutionary explanation (see Parsons and Daniel, 2002, p. 47).	Biological
	Interesting	Consistent with Kaplan and Kaplan's "Mystery".	Biological
	Complexity	Consistent with Kaplan and Kaplan's "Complexity".	Biological
2	Fine	The word "fine" is translated from the German word "fein" which has connotations of human intervention. While it is synonymous with "subtle" and "precise," it primarily means "agreeable"	Cultural
	Clean	Clean is translated from the German word "sauber" which has the connotation of having been cleaned, or of something that has been done well.	Cultural
	Character	"Character" is translated from the German "Charakter" and, in this context, has implications of the personality or flavor of the landscape.	Cultural
	Established	"Established" has the clear connotation of something that has been installed. It was translated from the German word "Etabliert" which means established or arranged.	Cultural

(continued)

Table 1. (continued)

Respondent	Determinant Constructs	Justification	Mode
5	Lively and Noisy	"Lively" was translated from the German word "lebendig" which has implications of vitality. When connected with "noisy," it can be interpreted to refer to a social dimension.	Cultural
	Public	"Public" was translated from the German word "öffentlich," which in this context refers to the right of access.	Cultural
	Family activity	This was interpreted as reference to the social dimension of family activity.	Cultural
8	Recreation	"Recreation" has the implication to be an activity carried out to recover from survival-oriented activities.	Cultural
	Nature	Although "nature" could be argued to be a biological driver, the respondent related nature to recovery and opportunities for recreation.	Biological / Cultural
	Space for activities	While "space" has the implication of openness, and therefore prospect, it's connection with activities suggests a cultural dimension.	Cultural
	Interesting	Consistent with Kaplan and Kaplan's "Mystery".	Biological
13	Inviting	Argument can be made that "inviting," translated from the German "einladend," could be either biological or cultural.	Biological/ Cultural
	Different elements	Consistent with Kaplan and Kaplan's "Complexity".	Biological
	Attractive to many people	While "attractive" could be interpreted as being either a biological or cultural driver, the connection with to whom it would be attractive suggests a social dimension.	Cultural

number 1 and offered the constructs labeled "healthy nature," "interesting," and "complexity" as justification. Respondent 17 found landscape 1 to be ". . . stimulating, it's simply wild. It's nice to have wild space that's allowed to be wild."

Culturally driven selections: Respondent 2 favored landscape number 1 and offered the constructs labeled "fine," "clean," "character," and "established" as justification. Respondent 2 reported ". . . often go[ing] to the forest for philosophical reasons. Greenness makes me happy; flowers, birds, trees." Respondent 5 favored landscape number 8 and offered the constructs labeled "lively and noisy," "public," and "family activity" as justification. Respondent 5 is the parent of a small child. The role of nature in this respondent's life is central and illustrated by the observation that ". . . we often go for walks, sometimes with friends, sometimes just the two of us, my daughter's 2 years old now and she really needs fresh air and I do as well."

Mix of culturally and biologically driven selections: Respondent 8 favored landscape number 8 and offered the constructs labeled "recreation," "Nature," "space for activities," and "interesting" as justification. Respondent 8 found landscape 8 to be ". . . very nice, it is a park where you could recover, it's a bit of a larger space and has a bit more nature in it, and some paths I assume, it looks like, and some place where you could sit, at the back there is some sport possibilities, I like it." Respondent 13 favored landscape number 8 and offered the constructs labeled "inviting," "different elements," and "attractive to many people" as justification. Respondent 13 commented that ". . . it looks like a lot of people would come here, it is inviting and formed with different elements."

Similarly, the rejected landscapes were considered to be the landscape furthest in the multidimensional scaling from the ideal landscape nominated by the respondent along the axis explaining most of the variance. The determinant constructs for the selection of the rejected landscapes were found to be a mixture of culturally and biologically driven determinants in many of the cases, whereas in others the rejections were made in either the biological or cultural mode. The determinant constructs for the rejection of the unfavored landscapes and their categorization according to criteria of cultural or biological are shown in Table 2.

The rejection responses from the six respondents selected as being particularly illustrative are presented here.

Culturally driven rejections: Respondent 2 rejected environment number 4 and offered the constructs labeled "small," "closed," "new installed," and "characterless" as justification. Respondent 17 rejected landscape number 5 and offered the constructs labeled "lifeless," "inaccessible," and "human formed" as justification. Respondent 17 found this landscape to be ". . . uninviting, and underutilized, some thinking could add a lot to it, some plants and some bushes. It's a shame because it has potential." Respondent 8 rejected landscape number 1 and offered the constructs labeled "design" and "usefulness" as justification. Respondent 8 commented, "I find it a bit loveless, the whole, it is a bit natural but not really natural, it is a mix between artificially installed and natural but I find it an unhappy mix, it is neither natural nor artificial. Just a bit loveless for me."

Table 2. Constructs Used in Rejecting Unfavored Landscapes

Respondent	Determinant Constructs	Justification	Mode
3	Boring	"Boring" has the implication of lack of mystery, and would not stimulate and facilitate gathering of information.	Biological
	Uninspirational	"Uninspirational" can be seen as consistent with a lack of Kaplan's and Kaplan's "mystery" factor.	Biological
	Private access	The right of access is a clearly cultural construct.	Cultural
17	Lifeless	"lifeless" is a translation of the German word "flau," which also means dull, spiritless, or stagnant. The respondent was referring to its not having been formed to its full potential.	Cultural
	Inaccessible	The respondent was referring to right of access rather than physical accessibility.	Cultural
	Human formed	"Human formed" can be interpreted as a comment on the design. Urban landscapes can be reasonably expected to be human formed but in this case the form inspired rejection.	Cultural
2	Small, Closed	"Small, Closed" carries an implication of the personality of the space rather than it being physically closed. "Closed" is translated from "geschlossen" in German and is not synonymous with "beschränkt" meaning restricted.	Cultural
	New installed	"New installed" refers to the human dimension and is the antonym of established	Cultural
	Characterless	Characterless is the condition of an absence of personality.	Cultural
5	Private	In this case, "private" refers to right of access.	Cultural
	Lonely and quiet	"Lonely and quiet" is the contrast of "lively and noisy" in this case.	Cultural
	Not for families	This was interpreted as reference to the social dimension of family activity.	Cultural

(continued)

Table 2. (continued)

Respondent	Determinant Constructs	Justification	Mode
	Unstimulating	"Unstimulating" can be seen as consistent with a lack of Kaplan's and Kaplan's "mystery" factor.	Biological
	Restrictive	"Restrictive" is translated from the German word "beschränkend" which can be interpreted as the contrast to the open areas providing prospect.	Biological
8	Design	Rejection on the basis of an unpleasing design, or that it has been manifestly designed, can reasonably be interpreted as a cultural construct	Cultural
	Usefulness	Usefulness has a clear implication of a cultural dimension	Cultural
13	Restrictions	See "restrictive"	Biological
	Unstimulating	"Unstimulating" can be seen as consistent with a lack of Kaplan's and Kaplan's "mystery" factor.	Biological

Biologically driven rejections: Respondent 13 rejected landscape number 4 and offered the constructs labeled "restrictions" and "unstimulating" as justification. Respondent 13 commented that ". . . it looks to have been recently installed, but it is still quite boring." Although the recognition of installation suggests a cultural component, it was classified as being a biologically driven rejection because "unstimulating" was offered as the construct and this was reinforced with the comment that the attribute of being "boring" was the reason for rejection.

Mix of culturally and biologically driven rejections: Respondent 3 rejected landscape number 4 and offered the constructs labeled "boring," "uninspirational," and "private access" as justification. Respondent 5 rejected landscape number 5 and offered the constructs labeled "private," "lonely and quiet," "not for families," "unstimulating," and "restrictive" as justification.

Discussion

Because the stimulus landscapes used in this study are green spaces within a city, and the respondents are urban residents, it could be expected that the boundaries of cultural and biological determinism would be blurred. The

expected mix of biological and cultural determinants proved to be the case for some of the respondents, but for the remainder, either a biological or cultural dominance was able to be determined in the constructs that characterized their preferred landscape. Although constructs were repeated among respondents and grouped into components in the principal components analysis, there was no evident consistency in the grouping of components between respondents; for example, nature loaded with unstructured growth for one respondent, whereas it loaded with recreation, interest, and size for another. This finding adds support to Bourassa's (1990) paradigm that the individual moderates cultural and biological determinants.

However, in the constructionist perspective, we remember that constructs are also defined by their contrasts. If we look to the rejected landscapes and look at why they were rejected, then we may expect to see some differentiation across principal components. Interpreting these components could provide evidence whether influences are cultural or biological. The rejected landscapes were considered to be those furthest from the ideal landscape along the axis explaining most of the variance. The most strongly rejected landscapes tended to be the least natural and those with the least structural and vegetational complexity or those with the most exposure. Landscape 4 was consistently rejected and, although structurally complex with varied vegetation, was differentiated by a deliberate use of straight lines and hard angles. This lack of preference is consistent with the previously established preference for natural landscapes, in which straight lines and hard angles would not normally be expected, as opposed to urban landscapes (Kaplan & Kaplan, 1989; Lamb & Purcell, 1990; Ulrich, 1983). However, all of the stimulus landscapes were located within an urban environment in which it might have been expected that assessment would have been made in a cultural mode and straight lines would not be objectionable. It appears, therefore, that assessment of green spaces within urban environments maintains at least some biological element.

In some cases, a landscape was selected in one mode, whereas another mode was used to reject an unfavored landscape. Respondent 3 selected an open rural landscape (Landscape 9) as being closest to the ideal and constructs that could be classified, using Kaplan and Kaplan's (1989) criteria, as biological drivers were offered as justification for the preference. The landscape furthest from this respondent's ideal was the intensively managed landscape with geometrical forms (Landscape 4). Constructs offered as reasons for the rejection were also biological; however, the clearly cultural construct of ownership was offered as an additional reason. This respondent selected a favored landscape according to biological criteria and rejected an unfavored landscape according to a mixture of biological and cultural criteria.

Another apparent contradiction is that the lightly managed landscape that had been installed to appear natural and wild (Landscape 1) was selected by two respondents (Respondents 2 and 17) as being closest to their ideal and was rejected by Respondent 8 as being furthest from his ideal. The justification constructs offered by Respondent 17 for selection were biological in that the wildness was found to agree with Kaplan and Kaplan's (1989) factor of stimulation, whereas the justification constructs offered by Respondent 2, who nominated philosophical reasons as the basis of his relationship with nature, were cultural in that the character and established structure of the landscape were appealing. Respondent 8 also used cultural constructs but rejected this landscape based on a criticism of the design. This result underlines the challenge faced by researchers attempting to deduce the determinants of preference, based on the attributes of the environment in question.

Respondent 2 also based his rejection of the unfavored landscape (Landscape 2) on grounds that could be classified, according to Cosgrove (1998), as being cultural in that it was "newly installed" and "characterless," and was thereby consistent in using cultural grounds for both selection and rejection. Respondent 17, however, after basing the selection of a preferred landscape on biological determinants, then rejected his unfavored landscape (Landscape 5) on the basis of what can be interpreted as cultural determinants in that he found it to be "lifeless," "artificial," and "inaccessible." Respondent 17's inconsistency in selecting his preferred landscape in the biological mode while rejecting his unfavored landscape in the cultural mode can be interpreted as suggesting that selection and rejection can be made using not just different criteria, but wholly different categories of criteria.

The risk involved in inferring determinants of preference based on environmental attributes is again highlighted with Respondents 5, 8, and 13 selecting the lightly managed open park–type environment in Landscape 8 as the landscape closest to their ideal. Although preference for this type of landscape might suggest a biological determinant, in which it corresponds with the factors suggested by Kaplan and Kaplan (1989) and Appleton (1975) as being innately attractive, Respondent 5 justified the selection based on cultural constructs in that it appears suitable for family and social activities, and Respondents 8 and 13 justified their preference with a mixture of biological and cultural constructs. Further evidence of the modal change when selecting and rejecting landscapes is found in that Respondent 5 rejected Landscape 5 on a mixture of cultural and biological constructs, whereas Respondent 13 rejected Landscape 4 on the biological grounds that it was restrictive and unstimulating.

Common to each respondent was a preference for landscapes (Landscapes 1, 8, and 9) that are consistent with preferences found in other studies, namely,

those that are open (but not exposed) in which there is a high degree of depth and a moderate-to-high degree of complexity (Kaplan & Kaplan, 1989; Ulrich, 1983). A notable feature of these results, however, is that some respondents, despite the focus on urban environments, selected their favored landscape on the grounds of biological determinants, whereas others selected their favored landscape on the expected grounds of cultural determinants. Similarly, it appears that biological determinants are evident in the rejection of urban landscapes, which could otherwise have been predicted to be culturally determined. This result provides some evidence to support Bourassa's (1990) paradigm that individual differences can have either a cultural or a biological determinant. It cannot be concluded that the consistency in preference is an evidence of either a cultural or a biological preference mode but rather that, in the cases of the consistently preferred landscapes, the cultural and biological are aligned.

Community appearance, as Nasar (2002) pointed out, matters to people and, because nature is important for city dwellers, it follows that cities will be improved if urban nature is made more attractive to residents. So if a city is to be improved with respect to nature, some interventions are required. Matthies and Kroemker (2000, p. 65) pointed out that interventions should "optimally be tailored to the specific situation by involving the target group right from the planning stage of the intervention." Priskin (2003) pointed out that public acceptance of management strategies, or interventions, is affected by the way people perceive the environment. However, determining how individuals perceive the urban environment is a necessary, although problematic, step in identifying meanings that may become commonly shared. To answer whether there could be a universal recipe for what constitutes "better" urban nature or whether the quality of urban nature will be culturally interpreted, we have attempted to determine whether urban nature is appreciated the same by all people (biological) or whether it is something that we learn (cultural).

It has been proposed that people assess their environment in urban areas in the cultural mode and that people assess natural areas in biological mode (Bourassa, 1990). The tripartite paradigm suggests that we could expect the boundary to become blurred when considering a spatial overlap of both landscape types, as is found in urban green spaces. This appeared to be the case in some respondents; however, in others, evidence was found that the urban green stimulus landscapes were either selected or rejected based primarily on apparently separated biologically or culturally relevant constructs. This is not to say that those who assess a landscape in cultural mode are more culturally developed than those who assess in biological mode but rather that some landscapes appealed to some individual's precognitive aesthetics whereas

other landscapes appealed to some individuals' cognitive and chosen aesthetics.

This research provides evidence to support the paradigm put forward by Bourassa (1990) that it might indeed be the case that there are both cultural and biological ways of reacting to nature, which dictate our preference. This was revealed by looking at this paradigm from the constructionist perspective in which things are defined by the contrast between what they are not and what they are and by examining both preferred and rejected landscapes. However, preference for a particular landscape based on either a biologically or culturally relevant concept suggests, but doesn't prove, such preference exists within the brain at the precognitive or cognitive level. This conclusion supports the choice of Kelly's repertory grid method in this exploratory study but simultaneously suggests that the method may not be appropriate for the next steps in establishing differences in how preferences for urban and natural landscapes are determined. In other words, further research using alternative methods is required to examine the generalizability of these results and, on a larger scale, to contribute to the establishment of an empirical basis for a theory of landscape preferences.

In searching for such methods, Balling and Falk's (1982) approach of examining respondents who have had varying degrees of exposure to, and, therefore, varying degrees of familiarity with, a particular landscape type appears promising. Van den Berg et al. (1998) adopted a similar approach but warned that applying their findings to the theoretical debate on the biological or cultural origins of landscape evaluations should be undertaken with caution. They wrote that between-group differences in perceived landscape quality might not be the result of specific cultural experiences when groups are self-selected because inherited traits may have motivated members to join the group in the first place (Van den Berg et al., 1998). A possible solution would be to identify groups for which membership is not self-selected, such as immigrant groups sharing a particular ethnic origin, and compare their preferences for urban and natural landscapes with those of the long-term local population. If natural landscapes are indeed more biologically determined and urban landscapes more culturally determined, greater between-group differences could be then expected in preferences for urban landscapes than for natural landscapes.

The tendency to select using one mode and to reject using another suggests that management of urban green spaces cannot rely on a blueprint of what has been successful elsewhere but that any intervention should be carefully tailored to the needs of stakeholders on a case-to-case basis. It will be the challenge for future research to find ways to translate such needs into strategies that match urban natural-resource management with the needs of residents. The results of

this study suggest that seeking to align both the cultural *and* the biological determinants of landscape preference will contribute to achieving this goal. The first step is acknowledging that such a distinction exists.

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