LANDSCAPE EVALUATION: APPROACHES AND APPLICATIONS

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THE USE OF PERSONAL CONSTRUCT THEORY IN EVALUATING PERCEPTIONS OF LANDSCAPE AESTHETICS

J.W. Pomeroy, J.E. FitzGibbon and M.B. Green

INTRODUCTION

Landscape planning has been hampered by the lack of a suitable theory by which the aesthetics of a landscape can be assessed. Presently, the art of assessing landscapes is based on elusive qualities of the landscape, defined by the experience of practitioners and strongly ascribed to by those who have accepted the rules and procedures of the "profession". Landscape architects and planners have devised criteria for the "aesthetic" landscape without reference to scientific measurements of such.

It has recently become more generally accepted among landscape planners and scientists that landscape beauty should be defined by the opinions of the population that uses the landscape, rather than the opinions of an elite profession. Landscapes are "goods" of mass consumption for which the public has no choice but to consume. Their designs should reflect the ability of the public to discriminate among landscapes and the preferences of the public for landscape. Without such a basis, man's designed environments are in danger of being unappreciated and futile, with qualities that only a self-designated elite group can appreciate.

This study proposes personal construct theory, developed in environmental psychology, as the basis for new methodologies in interpreting the perceived similarities among and preferences for various landscapes. These qualities of a landscape can designate unique places, attractive landscapes, ugly landscapes, monotonous landscapes, and areas of great landscape variety. Precise determination of landscape similarity and preference can provide valuable input for planning decisions and the procedures of the professions involved in the difficult task of designing and managing landscapes.
USE OF PERSONAL CONSTRUCT THEORY IN LANDSCAPE ASSESSMENTS

Personal Construct Theory

Kelly\(^1\) developed personal construct theory for use in psychoanalysis of human responses to various stimuli. He proposed that a person's present perception of his or her environment is based upon the complex interaction of past experience in the memory. New experiences are evaluated or "construed" using the order made out of previous experience as a basis. Personal constructs are the criteria used by a person to describe the conceptual structure which is derived from past experience and to interpret new experiences in terms of the existing conceptual structures. Constructs are bipolar concepts which categorize the perceived similarities and differences among environmental stimuli.

The Repertory Grid

Personal constructs of environmental stimuli are most often elicited from individuals using the repertory grid technique.\(^2\) The repertory grid is a matrix showing the disparities among aspects of the environmental stimuli. In the repertory grid technique, each individual discriminates among environmental stimuli. This construing process is based upon the individual's personal constructs of his or her environment. The discrimination process can be achieved by the sorting, ranking or rating of environmental stimuli.\(^3\) Ratings of similarity or preference are compiled in the matrix. The repertory grid for an individual can be combined with the grids from other individuals to form an aggregated "supergrid".\(^4\) The supergrid represents the aggregated personal constructs of several subjects. Those constructs that are consistently important among the individuals will have the greatest influence on the composition of the supergrid.

The repertory grid technique has been successfully applied in measurement of the perception of similarities among, and preference for, landscape paintings,\(^5\) urban sketches,\(^6\) environmental cognition,\(^7\) recreation areas,\(^8\) and landscape photographs.\(^9\) The results of the various studies show that the perceived similarities of landscape representations are based on strong, common personal constructs in cases when the study participants are familiar with landscape. However, there tends to be more disagreement on constructs describing preference for landscape representations.\(^10\)

Cognitive Set

O'Hare\(^11\) found strong differences in preference for landscape paintings between persons trained and untrained in art appreciation. This suggests that "groups" of people with similar personal constructs of landscape preference may exist. Ward and Russell\(^12\) refer to the cognitive set as defining the mental universe of concepts which is represented by personal constructs. The cognitive set is the conceptual structure in a person's mind within which environmental stimuli are assessed. Ward and Russell state that a particular landscape can be assessed in terms of the regional landscape by aligning the cognitive set of the study subjects to the regional landscape. This imitates the mental processes of landscape assessment normally performed by a populace on their local landscape. For instance, a resident of the Prairie Provinces does not commonly assess the "aesthetics" of a wheat field by comparing it to the coast of Vancouver Island or Montreal's city centre; these views are not directly comparable. Landscape scenery tends to be assessed in terms of similar landscapes recently viewed.

The cognitive set can be an extremely useful concept in evaluating landscapes within a planning region because;

1) groups of persons with common cognitive sets in terms of similarity perception and perhaps preference can be found and constructs important in their landscape assessments determined;

2) assessment of a series of landscapes in a planning region familiar to the study participants can often be described by an aggregate cognitive set of the simple personal constructs common to most subjects.

The difference O'Hare\(^13\) has noted in the preferences of art students and others towards landscape paintings can be explained by the altered cognitive set of students studying art appreciation. Similar differences may exist between landscape architects and the populace they serve.

Multidimensional Scaling

Multidimensional scaling (MDS)\(^14\) of repertory supergrids has received increasing support as a suitable method of determining the aggregated personal constructs that compose the repertory supergrid and determine landscape perception.\(^15\) MDS takes the disparities among elements of the supergrid and uses them to create an n-dimensional space. The configuration of this space is such that distances among the elements are as recorded in the repertory supergrid. The dimensions of the n-dimensional space
correspond to the aggregate personal constructs used in the differentiation of environmental stimuli. The area of the space occupied by the landscape elements corresponds to the cognitive set common to the subjects.

Use of Surrogate Landscapes

The use of surrogates to represent landscapes has received some criticism but continues to be the most feasible method for eliciting a large number of responses to various landscapes. Photographs have been used and recommended by most researchers examining public response to the aesthetics of landscapes. Shuttleworth provided a comprehensive review and severe test of the use of photographs as surrogates in landscape perception studies. He concludes that there is a sound basis for using photographs in landscape studies provided two criteria are met by the photographs:

1) they must be colour photographs;
2) they must provide the lateral and foreground context in each of the views without distorting the view.

Dunn notes that strict controls on photographic quality and the representativeness of composition must be maintained as well.

METHODOLOGIES

The analysis of perception of similarities among, and preference for, landscapes in this study requires methodologies tailored to the information desired from the analysis and the resultant configurations of the MDS space. The methodologies used to elicit a response to landscape photographs interpret the results of the MDS differ somewhat between the similarity and preference analyses. The adaptability of personal construct theory, the repertory grid and MDS to the two methodologies while maintaining theoretical validity demonstrates a strength of this approach.

Perceived Similarity Data

The similarity analysis is designed to obtain judgments of the perceived similarity of landscapes in a planning region displaying both urban and rural scenes. Common personal constructs derived from the MDS are to be associated with permanent attributes of the landscape.

STUDY AREA AND PHOTOGRAPHIC REPRESENTATION

The “riverscape” of the South Saskatchewan River in, and adjacent to, Saskatoon, Saskatchewan was selected for this study of landscape perception. Saskatoon is the major centre of northern settled Saskatchewan and had a population of 165,000 in 1983. The riverscape bisects the city and includes commercial, industrial, residential, recreational and agricultural land uses. Local terrain is flat to moderately rolling except for the river valley, which is a broad floodplain in the south of the study area, narrowing to a sharp incised valley in the north. The river valley displays water, forest, topographically diverse terrain and the Saskatoon city centre in a region of sparsely populated, typically monotonous, semi-arid prairie.

Forty 35 millimetre colour photographs of the South Saskatchewan River Valley were taken during periods of high sun, on clear, cloudless days in late summer. These conditions characterize those from late May to mid-September when vegetation is flourishing and can be fully assessed as an attribute of the landscape. The photographs show foreground and lateral context as well as the unobstructed background landscape. The photographs were taken from accessible, well-travelled viewpoints along bridges, riverbank drives and trails. Composition includes both banks looking along the river, with the sky to land ratio constant at 1:5.

TESTING PROCEDURE

The participation of thirty University of Saskatchewan students was enlisted using a campus-wide advertisement. The students are from a broad range of disciplines and backgrounds, of ages 19-45 and proportionately representative of the sexes. This group of people may be representative of the young to middle-age population of Saskatoon with a Grade 12 or greater education. This population includes the most intensive users of the Saskatoon riverbanks.

The participants were given a randomly mixed stack of the 40 nine by thirteen centimetre colour prints of the river valley landscape and informed this was a “landscape study”. They were instructed to sort the photographs into as many piles as they wished based on any criteria. The piles produced are similarity groupings of the photographs; similarity derived from unbiased evaluation of the landscapes. The number of piles and the photographs placed in each pile were recorded by the experiment supervisor.

LANDSCAPE ATTRIBUTES

The photographs were visually inspected for selected attributes: colour, angle of view, vegetation, clarity, land use, valley slope, soil exposure,
urban blight and attempts at "enhanced" urban architecture. These attributes were selected from the range of "aesthetic factors" postulated by Leopold,^{28} Linton^{49} and Litton et al.,^{25} though selection was based on the prominence of the attributes in the set of landscapes studied.

The landscape attributes were determined qualitatively for each photograph. Ranges of the attributes within the set of landscapes were observed. Labels of positive and negative were assigned to the extreme ranges of the bipolar gradations. The non-determinant label was assigned to the centre of the gradations. Each photograph was assigned a "plus", "minus" or "zero" for each attribute. A photograph received a plus or minus if it strongly possessed a range of an attribute and zero if it did not or the attribute did not apply to the scene.

While this method may seem somewhat subjective, it is adaptable and easily performed. Since this portion of the study is examining perception of landscape similarity, it is of interest what attributes of a landscape, as defined by landscape designers, can be related to the personal constructs used by "landscape users" to perceive the landscapes.

Preference Data

The preference analysis is designed to determine which elements of the man-made environment are preferred. It presumes that preference is a complex process that can be represented as a multidimensional preference space. Since preference is often a subject of disagreement among persons with differing cognitive sets, the preference of residents for landscapes in their small town is studied. Residents of a small, somewhat isolated community are more likely than most populations to have similar cognitive sets in terms of preference for a "townscape".

STUDY AREA AND PHOTOGRAPHIC REPRESENTATION

The "townscape" of Wingham, Ontario was selected for this study of landscape preference. Wingham is a small town of 3,000 persons located in Huron County, 115 kilometres north of London, Ontario. It is an older agricultural centre surrounded by mixed farming and located on the Maitland River. The town is structurally typical of the small agricultural settlements founded in the 1800's in southern Ontario.

Forty 35 millimetre colour photographs comprising residential, commercial, recreational and mixed uses within Wingham were taken on a sunny day in late February. The town was snow-covered at the time, characterizing winter conditions in Ontario. Photographs were taken in winter to emphasize the structural attributes of the town, rather than gardens, flower beds, etc., in eliciting preference. The photographs show the maximum context available, in ordinary views from the sidewalks and streets of Wingham. The ratio of sky to land in each photograph is constant at 1:5.

TESTING PROCEDURE

Forty residents of Wingham were enlisted from church groups, the high school and users of the public library. Males and females are equally represented among the participants. Forty-eight percent have attended university and the work experience of the participants includes general labour, office or sales work and teaching. The majority were raised and have recently resided outside of cities, and report that they are familiar with the Wingham area. Their similar backgrounds and present choice of residence in Wingham may mean that the respondents have similar personal constructs of preference for the Wingham townscape. The participants were given a randomly mixed stack of the 40 ten by fifteen centimetre colour prints of Wingham and told that this is a study of preference for the landscapes of Wingham. They were told to rate each photograph on a preference scale of one to five, one being not preferred and five being highly preferred. The participants were then asked to list one word describing each photograph. The ranking procedure used here is faster to perform than the sorting procedure used in the perception analysis. Ranking of photographs based on preference is relatively easy, since determination of preference is an evaluation. This contrasts with determination of similarity which is based on a discrimination process and, therefore, more easily represented by a sorting procedure.

LANDSCAPES ATTRIBUTES

The photographs were inspected for several visual attributes, age of residences, relative income of neighbourhoods, presence of coniferous trees, presence of deciduous trees, openness of view, ground cover, age of businesses, skycover, blight, presence of public buildings, presence of flags, brightness of the scene and the presence of water bodies. These attributes were selected on the basis of use in the landscape architecture profession,^{26} aesthetic factors proposed by previous researchers^{29} and prominence in the photographs. The gradation of an attribute over the landscapes was noted and each photograph assigned a "plus", "minus" or "zero" depending on the range of the attribute displayed by the photo-
graph. A plus or minus was assigned to extreme gradations of attributes while a zero was assigned when the attribute did not apply or was indeterminate.

**ANALYSIS**

The mechanics of analysis differ somewhat between the preference and perceived similarity data. This is because of inherent differences between the procedures used to generate the repertory grids for each individual and the nature of the multidimensional spaces.

**Repertory Grid Analysis**

To create a repertory grid of similarity data, a binary matrix was produced for each individual, with the rows and columns representing the photographs. Each cell of the matrix has a value of one if the photographs were sorted into the same pile and zero if they were not. These similarity matrices were added together to form a single aggregate similarity matrix whose cells' values represent the degree to which a pair of landscapes are perceived to be similar by the study participants. This matrix is the repertory supergrid of perceived similarity.

To create a repertory supergrid of preference data a matrix, with the rows and columns representing the photographs, was produced for each individual. The difference between the preference ratings for each pair of photographs was calculated. These differences between preference comprise the elements of the repertory grid. The preference matrices were added together, forming a single aggregate matrix describing the differences in preference for landscapes. This matrix is the repertory supergrid of preference.

The perceived similarity and preference supergrids were analysed by non-metric alternating least squares multidimensional scaling using the Statistical Analysis System computer analysis package.

A three-dimensional MDS solution is most suitable for the similarity space. For a three-dimensional space, Kruskal's Stress = 0.141 with a much higher stress for two dimensions and little improvement for four dimensions. The $r^2 = 0.849$ for the three-dimensional solution, indicating 84.9% of the disparities between the landscapes are explained by the location of the landscapes in the three-dimensional space. The three-dimensional configuration shows a fairly wide spread of landscape “points” with a tendency for landscape points to cluster in the periphery of the space.

For the preference space a two-dimensional MDS solution is most suitable. For two dimensions, Kruskal’s Stress = 0.199; there is little improvement for higher dimensional solutions. The $r^2 = 0.955$ for the two-dimensional solution indicating that 95.5% of the variance between the preferences for landscapes is explained by the location of the landscapes in the two-dimensional space. The landscape points in this space have a heavy concentration in the centre of the configuration with only a few points scattered in the periphery.

**Interpretation of the Landscape Similarity Space**

A major intention of this study is to identify the dimensions of perceived similarity in terms of permanent attributes of the landscape. Since this configuration of landscapes in the similarity space shows a tendency for clustering it was determined that the dimensions should be interpreted in terms of landscape attributes common to each cluster.

Johnson’s hierarchical clustering algorithm was applied to the perceived similarity supergrid; the derived clusters of photographs being plotted on the three dimensional similarity space. Six clearly defined clusters emerge, the centroids of which determine which particular clusters have diagnostic values for use in interpreting the identity of the dimensions. Values of the centroids range from $\pm 0.04$ to $\pm 1.66$ in the various dimensions (see Table 1.7). Values greater than 0.50 are diagnostic, those less than 0.50 are non-determinate (0) or given a positive or negative magnitude on each dimension. Magnitudes were assigned on the following basis: magnitude 1 equals $\pm 0.5$ to $\pm 1.0$; magnitude 2 equals $\pm 1.01$ to $\pm 1.5$; magnitude 3 is greater than 1.5 (see Table 2.7).
Table 2.7 INTEGRAL MAGNITUDES OF THE CLUSTER CENTROIDS FOR THE THREE DIMENSIONS
(0 = Nondeterminate Centroid)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Dimension 1</th>
<th>Dimension 2</th>
<th>Dimension 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>-3</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>-2</td>
<td>-2</td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>-2</td>
<td>+1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>+2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>+3</td>
<td>0</td>
<td>+2</td>
</tr>
</tbody>
</table>

Photographs with extreme values on a particular dimension are assembled into "extremes value groups." Such a group only characterizes a positive or negative range of a dimension. Extreme value groups were used only when there was no diagnostic cluster for that range of a dimension.

If the photographs in a cluster or extreme value group were consistent in their ranges of landscape attributes, then the cluster or group received that rating (e.g., positive, negative). If the landscape attributes were inconsistent the cluster or group received a non-determinate rating (0) for that landscape attribute (see Table 3.7).

Interpretation of the Landscape Preference Space

The preference space requires greater subtlety in interpretation than the perceived similarity space. The variations of preference among landscapes may be related to intangible concepts rather than easily identifiable attributes of the landscapes. The preference space may also be warped by inclusion of some aspects of similarity among landscapes. The lack of clusters in the preference space requires use of landscapes with extreme values in particular dimensions rather than clusters of landscapes to characterize attributes of the dimensions.

Table 3.7 CONSISTENT RIVERSCAPE ATTRIBUTES OF THE CLUSTERS
(0 = Nondeterminate Rating)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Angle of View</th>
<th>Vegetation</th>
<th>Clarity</th>
<th>Land Use</th>
<th>Valley Shape</th>
<th>Cultural Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
AVERAGE PREFERENCE MAPPING

To determine the variation of preference within the preference space the ratings of preference by the 40 study participants were averaged for each photograph. These mean preferences were mapped onto the two-dimensional preference space to confirm that the space adequately represents preference and to observe the variation of the mean preference within the space.

EXTREME VALUE GROUPING

Since clusters are non-existent in the periphery of the two-dimensional preference space, landscapes with extreme values in only one dimension were selected. A group of extreme value landscapes for each dimension was selected in this manner. These landscapes also possess the highest levels of mean preference. A group of landscapes clustered in the centre of the preference space with the lowest levels of mean preference was also assembled.

DESCRIPTION ASSOCIATION

To determine the possibly intangible concepts associated with landscape preference the one word descriptions given by each participant in the study were assembled for each landscape in the extreme value groupings. The words most often used to describe the landscape in each group are listed in Table 4.7.

ATTRIBUTE ASSOCIATION

To determine the landscape attributes associated with the dimensions of preference and with lack of preference, the attribute ratings given individual landscapes were compared within an extreme value group. If the range of an attribute was fairly consistent within the group, then that range of the attribute was assigned to the group. If the landscape attributes did not apply or were inconsistent, a non-determinate rating (0) was given (see Table 5.7).

RESULTS

Similarity Space

The various dimensions of the perceived similarity space were identified using the common attributes of the clusters located in the space.

<table>
<thead>
<tr>
<th>Group</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not preferred</td>
<td>messy, undesirable, run-down, dull</td>
</tr>
<tr>
<td>Dimension 1+</td>
<td>modern, functional, trees</td>
</tr>
<tr>
<td>Dimension 1−</td>
<td>historical architecture, pleasant</td>
</tr>
<tr>
<td>Dimension 2+</td>
<td>parklike, open space, play activities</td>
</tr>
<tr>
<td>Dimension 2−</td>
<td>trees, natural, historical, Victorian, elegant, variety</td>
</tr>
</tbody>
</table>

SIMILARITY DIMENSION ONE

In dimension one, clusters three and four have strong negative ratings while clusters five and six have strong positive ratings. Clusters in the negative range of dimension one have consistent man-made and urban attributes while clusters in the positive range of dimension one have natural riverscapes with very few human intrusions. It is suggested that this similarity construct of the South Saskatchewan River Valley at Saskatoon be labeled Degree of Development and its gradation labeled Natural vs. Man-Made (see Figure 1.7).

SIMILARITY DIMENSION TWO

In dimension two, clusters two and three have strong negative ratings while the dimension two positive extreme value group displays strong positive ratings. All landscapes with high positive or negative values of dimension two possess man-made attributes. Cluster two and three consistently display trash, construction sites, vandalism and utilitarian styles of architecture. The positive extreme value group displays the city centre riverscape with arching bridges, urban parks and old world styles of architecture. There is no trash or vandalism evident in the dimension two positive extreme value group. It is suggested that this similarity construct of the South Saskatchewan River Valley at Saskatoon be labeled Structural Development Variation and its gradation labeled Blight vs. Enhancement (see Figure 1.7).

SIMILARITY DIMENSION THREE

In dimension three, cluster one has strong negative ratings, while cluster six has strong positive ratings. Cluster one displays consistently brown
coloured land, barren vegetation and often disturbed soils. Cluster six displays a lush, green landscape of thick vegetation and no bare soil. Landscapes with extreme values of dimension three have little in the way of man-made attributes or interference. It is suggested that this similarity construct be labeled Natural Variation and its gradation be labeled Barren and Brown vs. Lush and Green (see Figure 2,7).

Preference Space

The two dimensions of the preference space were identified in terms of the words used to describe, and common attributes of, the landscapes.
FIGURE 2.7 Saskatoon Riverscape Similarity Space

possessing extreme values in one of the dimensions. The word descriptions and landscape attributes tend to concur, though the information carried about the landscapes is often complimentary.

PREFERENCE DIMENSION ONE

Landscapes with strong values in dimension one display upper income residences and well-kept business districts; natural vegetation is of little importance to this dimension. The positive range of dimension one displays new residential and business districts with no blight evident. These landscapes are described as "modern" and "functional". The negative range of dimension one displays older Victorian residences, churches and war monuments; there is no blight evident. These landscapes are described as "historic architecture" and "pleasant". It is, therefore, suggested that this preference construct be labeled Businesses,

FIGURE 3.7 Wingham Landscape Preference Space

Public Structures and Residences with the gradation labeled Modern vs. Historical (see Figure 3.7).

PREFERENCE DIMENSION TWO

Landscapes with strong values in dimension two exhibit medium to upper income residences, deciduous trees, open views, no business district, occasional views of the river and frequent views of parks. There is no blight evident. The positive range of this dimension shows newer residences, no pine trees, deciduous trees, open snowfields and developed parks. These landscapes are described as "parklike", "open space" and "play activities" areas. The negative range shows older residences, pine trees, deciduous trees, more vegetated ground cover and relatively undeveloped parks, described as "natural", "treed", "historical", "elegant" and "Victorian". It is suggested that this preference construct be labeled Parks and Residences with the gradation labeled Open and Functional vs. Natural and Historical (see Figure 3.7).
MEAN PREFERENCE WITHIN THE PREFERENCE SPACE

The variation of mean preference within the two dimensional preference space is demonstrated by a mapping of isolines of preference (isoprefs) onto the preference space (Figure 3,7). Note that the space is not Euclidean in terms of mean absolute preference. This is to be expected, as the preference space provides a deeper insight into the complex nature of preference than a simple bipolar scale. The isoprefs increase in an approximately concentric pattern from the centre of the space. In other words, as the magnitude of a dimension increases in either the positive or negative range, the mean preference increases as some function of the dimensional magnitude. The functions of the increase of mean preference with the dimensional magnitudes are plotted for each range of both dimensions in Figure 4,7. Note that the rate of increase of mean preference with the dimensions varies among the dimensions.

NON-PREFERRED LANDSCAPES

Landscapes with mean preferences below two (on a scale of one equals not preferred, five equals highly preferred) are plotted in Figure 3,7 on the two dimensional preference space. Landscape attributes and one word descriptions have been assembled for this group of landscapes in the same manner as the other preference groups. These landscapes are described as “messy”, “undesirable”, “rundown” and “dull”. Their consistent landscape attribute is the presence of blight in some form. The blight consists of open junk yards, abandoned buildings and utility stations within the town. None of the blighted landscapes are in upper income residential areas, most being in commercial areas or back alleys. These landscapes are located in the approximate centre of the preference space, having low values in all the dimensions.

DISCUSSION

In the case of the perception of similarity of the South Saskatchewan River Valley at Saskatoon, the participants were evaluating the differences between riverscapes in and near Saskatoon. The cognitive set within which these landscapes are evaluated is determined by the variation of landscape attributes in the area studied. The important landscape attributes have been defined in terms of the common constructs of the similarity space. While the importance of the attributes and constructs is specific to the “landscape region” of the Saskatoon rivercape, they are potentially very useful tools in regional planning of landscapes.

FIGURE 4,7 Preference for Dimensional Ranges

The Degree of Development similarity construct can be used to determine the apparent “naturalness” of an environment and to indicate what landscape attributes result in that perception. Landscapes perceived as natural may differ greatly from ecologically undisturbed environments. This distinction is important in land management, particularly where there are pressures for natural landscapes in areas where establishment of such reserves is impossible due to land use conflicts. The impact of new developments in “natural areas” may be assessed using this construct as well.

The Structural Development Variation similarity construct evaluates riverbank development in the context of the structures along the South Saskatchewan River. This similarity construct seems to be strongly influenced by preference for specific types of structural development. However, the sample of built environments along the Saskatoon riverbanks is somewhat limited in terms of the types of structures found in the city. The direct views of the Saskatoon city centre include arcing bridges and the Hotel Bessborough, acknowledged city landmarks. These views have the
highest positive values on Dimension 2. Views showing the steel traffic bridge and the skyline of modern apartment buildings rate somewhat lower on the Enhancement range of the Structural Development Variation dimension. Views showing construction areas and trash with the steel railway bridges rate high on the Blight range of the Structural Development Variation dimension. This dimension seems to be based on preference; however, preference was not specifically elicited in the similarity study. It is therefore suggested that only the elements of preference important to judgements of the similarities among the landscapes compose this dimension. The dimension displays the differences perceived to be important among the structures on the Saskatoon riverbanks; preference for the structures is an element of these differences.

The Natural Variation construct evaluates the land use, park development, moisture regime, soil erosion and dominant vegetation attributes of riparian lands. It does not evaluate man-made structures but does respond to unnatural disturbances of vegetation and soil. “Natural” components of the landscape are qualified on a perceived vegetation-colour scale. If it can be assumed that lush and green landscapes are preferred to barren and brown ones, then an element of preference for natural vegetation may influence this dimension. This construct has potential for evaluating the perceived aesthetic impact of riverbank erosion, park designs, trail locations, landscaping of buildings, agricultural land use and soil moisture. Specific patterns and types of vegetation can be evaluated and suggestions for effective manipulation of vegetated landscapes can be made on this basis.

The two preference constructs found for the townscapes of Wingham, Ontario define a space with the lowest preference in the centre and increasing preference away from the centre. This contrasts with the Structural Development Variation and Natural Variation constructs of Saskatoon’s similarity space where low preference is confined to one range and high preference to the opposite range of the dimensions. The vast majority of landscapes from Wingham are concentrated in the low preference centre of the space, with a few outstanding landscapes around the periphery of the space. The preference dimensions define the attributes and values of landscapes that cause them to be highly preferred.

The Businesses, Public Structures and Residences construct of the preference space identifies landscapes containing those features that are preferred because they are modern and functional and those preferred because they are historical and pleasant. The Parks and Residences preference construct identifies landscapes preferred because they are considered open space and good recreational areas and those preferred because they are considered natural, elegant and historical. Thus the features of a landscape that cause it to be preferred can be identified and compared to features in other landscapes. The landscape with the highest preference in Wingham is on the Historical range of the Businesses, Public Structures and Residences construct and displays a stone war monument, an old church and a residence from the 1800’s. The scene represents the best features of 19th century architecture in Wingham and is therefore outstanding in the context of the Wingham landscape.

Figure 4.7 indicates that the greatest response of preference is to the Open and Functional range of the Parks and Residences construct. A small increase in this attribute of a landscape will cause the greatest increase in preference among the various ranges of the dimensions. Preference has its second greatest response to the Modern range of the Businesses, Public Structures and Residences construct. The Historical range of this construct elicits the third greatest response. The Natural and Historical range of the Parks and Residences construct generates the lowest response of preference increase to an increase in dimensional attributes.

This indicates that preference is most sensitive to development of open, functional and modern townscapes. However, the least preferred landscapes also have these attributes to some degree. Inclusion of trash or rundown buildings in these types of landscapes causes a dramatic drop in preference. Thus, in Wingham, an “average” landscape can have its level of preference increased most easily by adding attributes of open space, functional activities and modern housing. However, this is the most unstable landscape in terms of preference and the easiest landscape to blight. Within Wingham these landscapes have not elicited the highest preference, being only moderately to well preferred.

Preference is least sensitive to changes in the historical and natural landscapes. These townscapes are not being produced anymore in Wingham, as are the open, modern and functional townscapes. However, the historical and natural areas are difficult to degrade. Major variance in their attributes cause little change in preference. These landscapes are capable of sustaining the highest preference in Wingham. Historical and natural landscapes in this small town should therefore be of great interest to local planners, as they are capable of developing the highest degree of preference but when blighted, require large changes in their attributes to restore. Old and natural landscapes already possessing high degrees of preference are therefore rare and to be valued.

CONCLUSION

The stress and \( r^2 \) values of the multidimensional spaces indicate that the application of personal construct theory using the repertory grid and MDS can be successful in both similarity and preference studies of landscape perception. The dimensions or “constructs” of similarity and preference found in this study are found to function within the experimentally specified cognitive set of the study participants. This allows evaluation of landscapes
in a regional context. Thus, each evaluation of landscapes can be tailored by the experimenter to a region or aspects of a region which are of interest.

The similarity space can be useful in designing landscape changes which do not significantly alter perceptions of the landscapes reserved for preservation. Preference is found to be a component of some dimensions of the similarity space, particularly those evaluating landscapes which have been altered by man. The similarity space defines the attributes of an area that are important to some local residents. Wider testing of the perceptions of various socio-economic and cultural groups may show that not all attributes of a landscape are perceived equally by various groups.

The preference space configuration confirms that residents from both sexes, various age groups and income levels can have similar preferences for their hometown landscapes. The preference space easily isolates outstanding landscapes and determines the qualities of these landscapes that make them outstanding. The sensitivity of preference to changes in various landscape qualities is determined as well.

Similarity and preference spaces open up many new possibilities in assessing the aesthetics of landscapes. Quantification of generally perceived similarity and preference allows aesthetic impact assessments to be performed as well as monitoring the aesthetic qualities of an area or site. Such relatively exact measurements of aesthetics may allow “tailoring” of landscapes to specific user groups. The principles which have guided structural architecture, landscape architecture and regional planning may be rigorously tested. The scientific and theoretical soundness as well as the empirical viability of the methodologies espoused by this paper will allow the aesthetics of landscape to have a greater input in land planning and management decisions.

REFERENCES


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PLATE 16 Heather Mountain, British Columbia. Land use activities influence not only scenic quality but also landscape processes: logging often results in landslips, particularly below road-cuttings.