Contemplative Greenway Design for the Health and Well-Being of City Inhabitants

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Introduction

This paper presents the findings of the PhD research titled *Contemplative Values of Urban Parks and Gardens*, which can be applied to urban greenway design. We consider the network of urban green spaces a multifunctional structure that can not only serve environmental and aesthetical values, but also directly influence people´s mental health and well-being. Urban green infrastructure has a significant potential to serve as a place for the passive recreation that involves re-connecting with nature through contemplation. We made the concept of contemplative landscapes operational by identifying physical attributes of such spaces.

The study revealed seven key-categories of landscape design that make the landscape "contemplative", namely: *Landscape Layers, Landform, Vegetation, Light and Color, Compatibility, Archetypal Elements and Character of Peace and Silence.* This paper focuses on particular components of these categories, which are understood as the most important design strategies to create contemplative character in the greenways.

Background

The most frequently described functions of greenways include improvement of biodiversity and water quality connected to land conservation. They also provide areas of recreation for local community and routes for non-motorized transportation. (e.g., Flink & Seams, 1993; Jongmann & Pungetti, 2004; Smith & Hellmund, 1993).

Nevertheless, we argue that greenways can also provide tremendous benefits for city inhabitants' mental health and well-being. The findings of environmental psychology suggest that contact with nature can stimulate the attention restoration mechanisms, reducing mental fatigue and levels of stress and anxiety (Kaplan & Kaplan, 1989). The newest study on contemplative landscapes seems to confirm this with neuroscientific methods, showing that the particular design strategies utilized in urban green spaces (contemplative landscape features) can have measurably significant effects on brain activity. More specifically, they can switch the mechanisms of attention and can induce

positive emotions (Olszewska, 2016). This study, conducted as a PhD research, revealed that landscapes with high contemplative scores induced the mentioned phenomena in a more pronounced way than landscapes with low contemplative scores. This study identified several contemplative features of the landscapes within seven key-categories and developed the evaluation tool – Contemplative Landscape Questionnaire (CLQ), thanks to which we are able to give any landscape scene a contemplativeness score.

Goals and objectives

The goal of this study was to present the results of the work on the CLQ, which pinpointed the design strategies that could contribute to the creation of contemplative green spaces with practical application concerning urban greenways.

Methods

In order to obtain the results that are presented in this paper, we analyzed the instrument for the identification and evaluation of the contemplativeness of the green urban spaces (CLQ). It was developed based on a separate complex methodology (evaluation of forty pre-selected landscape photographs from parks scattered across Europe and North America, evaluated by a panel of ten experts, with 6-31 years of experience in landscape architecture), and tested with statistical methods. After the collection of responses, each of the items of the questionnaire was tested in terms of how strongly it contributed to the overall contemplativeness score of the evaluated setting. Also, the agreement between the raters was tested in order to see if the CLQ items were well-formulated and addressing the common understanding of the spatial phenomena. Moreover, the concept of contemplative space was validated by measuring how it corresponds to the real world and to common understanding. Table 1 presents the summarized results of the statistical tests performed on the questionnaire. It shows that the CLQ is a reliable and valid tool that can be used in order to identify contemplative landscapes.

The detailed analysis of the statistical test results on the CLQ enabled us to highlight the set of design strategies that contributed most significantly to the contemplative character of the space, and reject those that do not contribute. The next sections shall present them in an organized way.

Table 1. Summary of statistical tests on the CLQ

Statistical index	Name of the test	Result	Meaning
Reliability	Cronbach´s Alpha (Internal consistency)	*Alpha*= .817	Good
	Inter-rater agreement	*ICC*(10 raters) = .810	Almost perfect
Validity	Pearson's correlation coefficient	*r* = .772 for the mean score	Strong positive corr.

Results

Presented below are the more detailed results for each of the seven categories with the item-total correlation scores.

(1) Layers of the Landscape. The first category, which also became very important to the overall contemplative score of any given image (*Item-Total correlation* = .710), addresses the level of depth of the scene. This category was directly connected to the visibility of three planes and the comfort of long distance views. Furthermore, the study showed that among all contemplative landscape images the majority was of the panoramic composition type (Figure 1). Figure 2 presents the landscape image that scored the highest in this category (Image *a*), the view through the void of the Parchi di Nervi (Italy), which, despite being enclosed with the screens of planting, reaches far over the hills. Not only is the view far, but it also greatly enhances the overall character of the image.

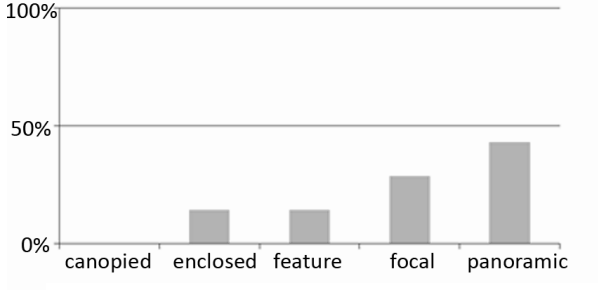

Figure 1. Distribution of the most contemplative landscape settings across five landscape composition types

(2) Landform. The landform category was another contributing factor to the total contemplative score of the given landscape (*Item-Total correlation* =.552) and was based on the smoothness of the ground and the manipulation

of the skyline, such as openings, closings to the view, and elements that attract attention to the sky. This suggests that subtle hills, mounds, and diversified skylines would be the most desired features for contemplative design, which in turn suggests that flat or rugged landforms would be weaker strategies for contemplativeness. Figure 2 presents two images with high scores for Landform; image (b) achieved the highest score (5.50 on a 1 to 6 point scale) out of the 40 images in the dataset.

(a) *(b)*

Figure 2. Highest scores in (a) *Landscape Layers* (5.81 points) and (b) *Landform* (5.50 points) according to experts

(3) Vegetation. The vegetation category revealed a less significant contribution to the contemplativeness score (*Item-Total Corr.* =.431). It included such characteristics as seasonal changes of vegetation form, the right degree of wilderness and the biodiversity of the vegetation. For example, species that turn orange in autumn or trees that drop their leaves have better contemplativeness score compared with trees that remain the same throughout all year. The degree of wilderness describes how natural/native the vegetation appears in the scenery and improves the contemplativeness score similarly. Finally, biodiversity in the scene is an important factor, while large mono-cultures score lowest. Experts were especially challenged in this part of the CLQ, because they needed to balance between the three characteristics of the vegetation and choose the most appropriate score (in their opinion). Despite the challenge, the inter-rater agreement for this item was very high (*ICC(10* raters) = .889—an almost perfect agreement). Figure 3 presents examples of images from the dataset that scored the highest in this category.

(a) (b)

Figure 3. Highest scores in *Vegetation* according to experts (a and b 5.10 points)

(4) Color and Light. This category contributed to the overall contemplative score on a level comparable to the *Vegetation* category (*Item-Total Corr*. =.447). It evaluated how the light and shade influenced the character of the scene. An important factor for this feature was the presence of broken natural colors for improving the contemplativeness of the scene, opposed to vivid contrasting colors. The visibility of sunlight vs shade contrast and shade movements was also significant. The point of view of the observer located in shade improves the score, while direct exposition to the sun makes it worse. Similar to the *Vegetation* category, raters had to balance between the three factors above, but the inter-rater agreement for this item was lower than the previous one (*ICC(10 raters)* =.423). The images presented in Figure 2 scored the highest in terms of color and light (image *a* - 5.2 and image *b* - 5.2 points).

(5) Compatibility. This category contributed most significantly to the overall contemplative score (*Item-Total Corr*. =.831). It is identical to the *Adjacent Scenery* feature of the VRM model [31]. It is about the quality of the design in terms of balance and harmony. It includes features such as: spatial order, absence of disturbing elements, working out the openings and closings of views, as well as the physical and visual relations between the elements, and the hierarchical relation between signage or communication system elements. In other words, experts are asked to evaluate if the design is clear, balanced, well composed and not overwhelming or confusing.

(6) Archetypal Elements. This feature for the overall contemplativeness score was of medium importance, but still significant (*Item-Total Corr.* = .502). The presence of an archetypal element within a scene did not guarantee that it would noticed by the viewer, therefore the experts were asked not only to identify archetypal elements, but also to evaluate how strongly they influenced the overall visual quality. Archetypal elements, identified through the review of Jung's work on dream analysis, included: path, clearing, single old tree, forest, still water (water mirror), waterfall, circle, grave, and boulder. Figure 4

presents two images that, according to experts, were most influenced by the present archetypal elements.

(a) *(b)*

Figure 4. Highest scores in *Archetypal Elements* according to experts (a = 5.6 and b 5.2 points)

(7) Character of Peace and Silence. This category was the last contributing factor to the total contemplative score of the given landscape (*Item-Total correlation* =.545). The experts evaluating this category had to recognize design strategies that invite rest and relaxation, give a sense of solitude to the observer, or create a visual enclosure and an environment contrasting with the urban chaos. In short, this feature evaluates the tranquility and serenity of the presented setting composed of multiple design strategies that may be used. Figure 5 presents two landscape scenes with very high scores in this category.

(a) *(b)*

Figure 5. One of the highest scores in *Character of Peace and Silence* according to experts (a = 5.2 and b 5.1 points)

Discussion

All the design strategies mentioned above address the visual qualities of the designed landscapes that can be successfully introduced to greenway design. In terms of the landscape composition type, the most contemplative seem to be panoramic and focal. Greenways perceived as linear structures may provide the focal composition type and the panoramic type should be possible sometimes as well.

According to the analyses, *Compatibility* is the most important to create the character for contemplation. The classic values such as harmony, balance, spatial order, and lack of overload of stimuli correspond very well with the spatial conditions provided by greenways, therefore it should not be difficult to implement onsite.

Concerning the findings about the *Layers of the Landscape*, the linear structure of the greenways could serve well for introducing long distance views in our cities, especially very far views (visibility of fore-, middle- and back-ground, and of aerial perspective), which are so rare yet so desired in our cities.

The analysis of the *Landform* category performance in the CLQ and its feasibility to be introduced in greenway design shows that it is very important and relatively easy to introduce in urban green infrastructure (for instance, on the initial hard-landscaping stage).

Another important factor to consider in the contemplative design for greenways is *Character of Peace and Silence*. It seems obvious that greenways, as well as any outdoor green space, should provide tranquility and serenity at least in some of their zones. These places should not be completely isolated from people, but designed in a way so one can feel distance from other people and from the city. The greenway design could then contrast with the typical urban landscape in order to provide a sense of reorientation while inviting rest and relaxation.

The water present in the greenway can not only be a part of conservation policy, but also a powerful archetypal element, possibly evoking a strong, emotionally charged response in the visitor. Water, as well as other archetypal elements of the landscape, could be components of greenway design (by constituting landmarks on the map of the corridors, for example), which would significantly improve the contemplativeness of the site.

Last but not least, the analyses of the two remaining categories (*Color and Light* and *Vegetation*) confirmed that a natural, native character of materials and planting that corresponds to the environmental principles of the green infrastructure of the city is the best for contemplation.

Conclusions

The presented study showed seven categories contributing to the contemplativeness of urban green space, with the level of importance to the overall contemplative quality of the scene and guidelines for introducing them in practice.

The psychological aspect of green spaces is absolutely vital for improving the quality of life in urbanized areas by providing a space for contemplation (that can be associated with attention restoration and stress reduction). Greenways as extensive linear green structures can perfectly serve these purposes, so it is clear that designers as well as clients could be interested in introducing some of the presented evidence-based design principles in their projects.

As there still are many questions to answer in this area (for example, what is the long term health impact on the users of contemplative greenways?), the presented study invites more researchers to the multidisciplinary dialogue on how the designed environment can influence quality of life.

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