Cityscope – The Concept of an Urban Kaleidoscope

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Abstract

The paper discusses the relation of movement and space against the background of human perception. Next to a theoretical approach the experimental installation Cityscope tries to explore the phenomenon of spatial perception within an urban context. Methods of reflection, distortion and fragmentation alter the usual visual experience of the beholder and generate a reinforced perception of the spatial object and its surroundings. The effects of perception were tested in a digital mock-up first using 3D-Modeling and Visualisation-Software. The final shape of the installation was then generated from the point of view and movement of the beholder in relation to the specific context. Using CAD-CAM technology the digital model data was transmitted to the production process in order to ensure the congruency between the digital model and the final installation.

Introduction

Visual experiences are gained in the dimensions of our physical world. The abilities, that are acquired in that context form – beside the genetically determined visual experience – the phenomenon of spatial perception. Spatial perception as one of the basic achievements for orientation can be differentiated into two principles of perception:

- The perception of the position of objects in space (height, width, depth, distance of the object to the point of view)
- The perception of movement (change of the position of an object or the point of view in time)

The perception of movement and space is obviously linked to each other and implies the interaction of human being and space or spatial objects. The space changes in relation to the point of view and the position of the beholder and generates diverse perceptions. The relation of both - subject and object - as described in the following quotation formed the basis for the experimental installation Cityscope, that tries to explore the limits of perception by reinforcing the relation of beholder and space using illusionary elements of alienation:

"Perception will no longer reside in the relation between a subject and an object, but rather in the movement serving as the limit of that relation, in the period associated

with the subject and object. Perception will confront its own limit; it will be in the midst of things, throughout its own proximity, as the presence of one haecceity in another, the prehension of one by the other or the passage from one to the other." (Deleuze, Guattari, A Thousand Plateaus, p. 282)

Case study - Cityscope

Staring point for the concept of Cityscope was the kaleidoscope (from grecian.: kalo = beautiful, eidos = form, skopeo = I see). The instrument was already known to ancient Greek and reinvented by Sir David Brewster in 1816, while conducting experiments on light polarization. It's visual performance is based on a tube of symmetric organized mirrors, that reflect small coloured objects.

Next to the inspiration of the kaleidoscope as an instrument to extend perception, Bruno Tauts Glass Pavilion for the "Deutscher Werkbund" Exhibition in Cologne from 1914 served as an inspiration for Cityscope. The prismatic glass dome, which was commissioned from the association of the German glass industry, was a colourful landmark with reflective glass plates in between the concrete beams of the structure. Bruno Taut himself described the appearance of his Glass Pavilion as follows:

"...reflections of light whose colours began at the base with a dark blue and rose up through moss green and golden yellow to culminate at the top in a luminous pale yellow." (Richards, New Glass Architecture, p. 16)

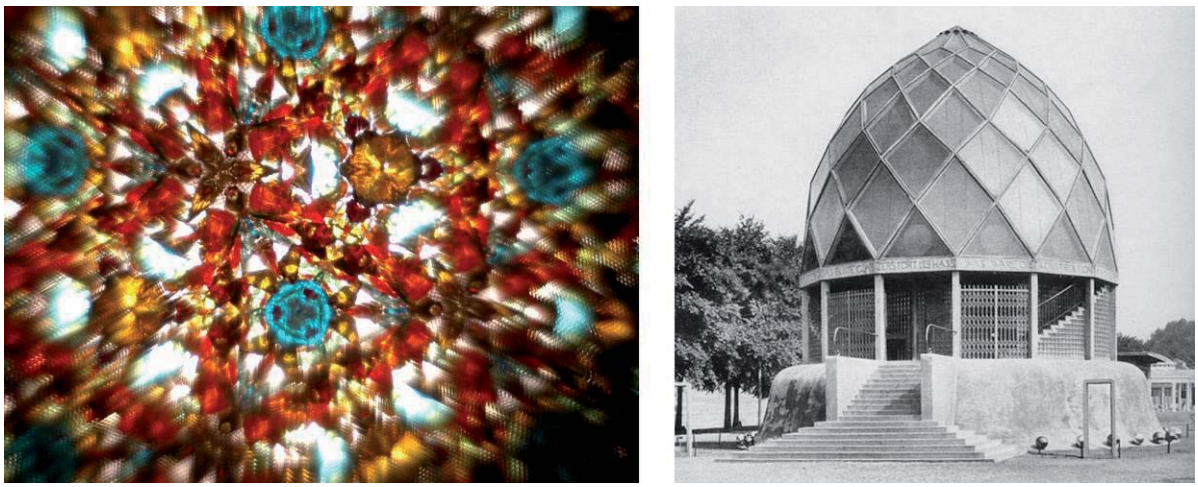

Figure 1: Interior View of a Kaleidoscope (left) and Glass Pavilion by Bruno Taut at the "Deutscher Werkbund" Exhibition in Cologne, 1914 (right).

The spatial installation Cityscope deals with the fragmented perception of urban spaces. The bevelling structure can be seen as an urban kaleidoscope, which reflects fragmented views on the city and composes at the same time a three-dimensional image of the surrounding facades. While moving around the sculpture the images, which reflect on the triangulated envelope, continuously change. In that way the beholder becomes an integral part of the installation and its complex reflections. Like in a kaleidoscope, the scattered fragments are guided to harmonious whole.

A sophisticated perception of urbanity is often limited to the ground floor level. Cityscope tries to open the perspective by concentrating different and unusual views of the urban surroundings. The crystal-like installation is positioned in front of the main station in Cologne, a highly frequented urban square, which allows different angles of vision and supports at the same time the interaction of the beholder with the installation.

The radiant foil, that is applied to the outer skin of the sculpture reflects, dependent on the daylight situation and the point of view of the beholder, the light in different colours. The colour-transformation generates an intentional alienation, which reinforces the idea of a fragmented perception. Through the movement around the installation the dichroitic colours of the foil change continuously.

Like the facades of a city, the specular envelope becomes transparent in the night, when the installation is illuminated from the inside. The appearance changes in another transformation-process into complementary colours and the inside of the installation can be experienced. The light installation was programmed with different sequences in order to support a dynamic perception of the sculpture by night.

Design Process

Cityscope was designed using parametric Software in order to create relational connections within the bevelling surfaces. While changing the position of the sculpture in relation to the surrounding facades the triangulated shape transforms continuously. Next to the parametric 3D-Model for the generation of the shape, visualization software was used to display the visual reflections in relation to the position of the beholder.

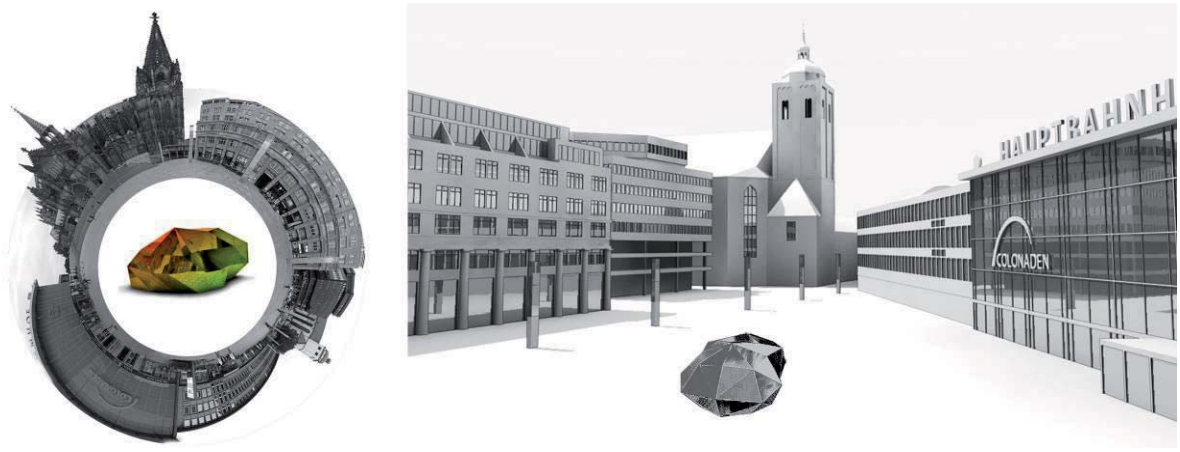

Figure 2: Concept image (left) and Digital Design Model within the urban context (right).

While moving around the sculpture - using a virtual camera - the dependency of the surroundings to the angle of inclination of the triangles became visible. Working with this technique the aim to capture different fragments of the city in to several adjacent

surfaces could finally be reached. As a consequence the final shape of the sculpture is very much related to the site and reacts to the heights and proportions of its surroundings (station, church, dome...).

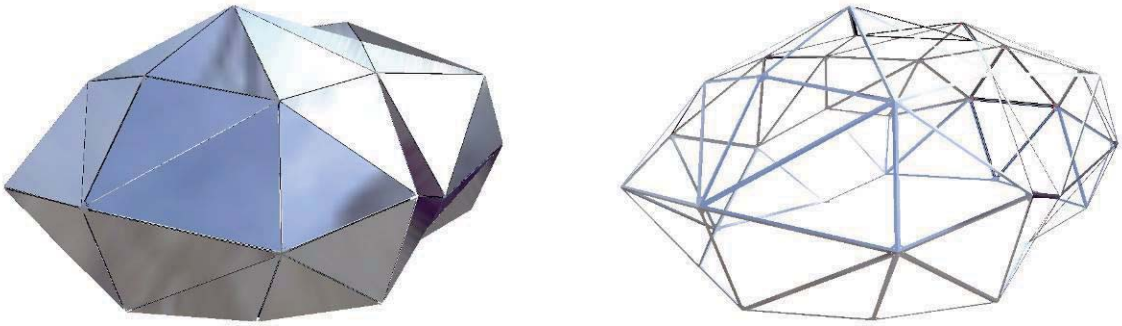

Figure 3: 3D-Model of the reflective skin (left) and framework of the installation (right).

Fabrication and Construction Process

After defining the shape of the outer skin the details for the construction and fixtures were developed. Based on an aluminium framework the acrylic glass panels were mounted with hidden fixtures on the knots where the bars meet. In that way every triangle was fixed in each the corner of the panel. Since all knots, bars and the synthetic panels where different in size and angle, CAD-CAM technology was the logic consequence for the production process of these elements. The material property and the thickness of all parts were transferred into the digital model resulting in a detailed construction model, which allowed it to minimize the joints between the different elements.

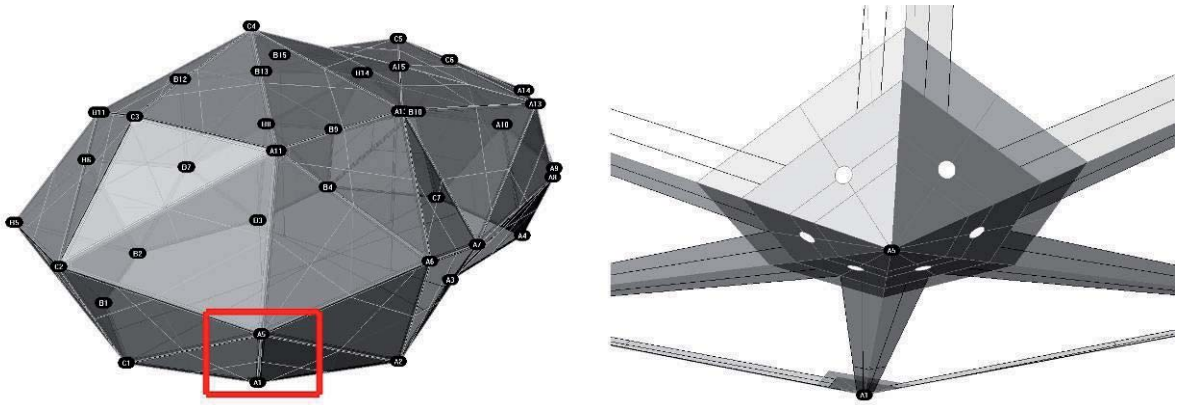

Figure 4: Digital model for CAD-CAM (left) and aluminium knot (right).

Another important aspect involved the assembly process. The structure had to be erected and dismounted in only a few hours, including the base-plate and the light installation. After testing various construction-principles for the knots the solution of a folded aluminium plate came up, that allows a fast and precise assembly and constitutes at the same time only a minimum of construction space. After including all the relevant information into the digital model the files were sent to the CNC-machines for the production of the different elements – both synthetic panels and aluminium parts (bars and knots).

Figure 5: Appearance of Cityscope by day (left) and reflection of the skin (right).

Conclusion

A digital design model, which relates to the perception of space through movement enables the designer to investigate the complexity of spatial perception in an extended way. In this respect the simulation of a time-based and beholder-related vision of space delivers a comprehensive design tool.

The approach to focus within the design process on the relation of space and movement involves two major aspects: The visual perception of space and the interaction between object (space) and subject (beholder). The installation Cityscope was meant to reinforce the visual perception of an urban space. Next to the amplification of perception by distorting and fragmenting the usual vision, the level of interaction between beholder and space increased significantly.

Outlook

Taking into account the visual perception of space in time results consequently into a more human-related design approach. Since human perception is based on manifold phenomenological experiences, the extension of the design approach to other levels of perception – like audition, olfaction or haptics – will be subject for future projects. The simulation of physical experiences with the help of virtual scenarios involves as well a critical attitude towards the significance and assignability of these methods.

Figure 6: Kaleidoscopic effect by night.

Acknowledgements

Cityscope was conducted with the support of Hans H. Löhr, Jens Böke and David Lemberski during the architectural festival plan08 in Cologne in September 2008. The installation could not have been realized without the support of Deutsche Bahn, Ebener Fassadentechnik, 3M, Bayer and Remagen Licht.

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