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An Auditory-Architectural Design Methodology

Short Report

Thomas Kusitzky, Annette Matthias

Projektleiter	Thomas Kusitzky M.A.
Projektbearbeiter	Thomas Kusitzky M.A., Dipl.-Ing. Annette Matthias, Prof. Dr. Alex Arteaga, Prof. Dipl.-Ing. Uta Graff
Zuwendungsempfänger	Universität der Künste Berlin
Ausführende Stelle	Forschungsstelle Auditive Architektur am Zentralinstitut für Weiterbildung (ZIW)
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Goal of the research project

Observing the conceptual designing processes of current architectural and urban planning projects, it is evident that auditory experience is not systematically considered.

Although the requirements for acoustic functionality are determined through the building and room acoustics, there is normally no extra architectural or artistic concept for sound, that is, a process which considers the auditory aesthetics of the particular spaces. Yet, this auditory experience is a *constitutive* aspect of the spatial experience and the way in which a space is designed unavoidably conditions its sound.

To a great extent, the inattentiveness toward auditory factors in contemporary architectural planning can be ascribed to a lack of instruments and methodologies suited to auditory-architectural design processes. With this in mind, the goal of the research was to develop a methodology that would facilitate consciously taking into account auditory aspects during conceptual phases of architectural and urban planning projects, so that their sound, as a constitutive part of the experienced architecture, could be comprehensively designed. To achieve this goal the main focus was laid on the following points of inquiry:

- What material is being designed during auditory-architectural designing?
- How can auditory experience in architectural and urban conditions be recalled and surveyed?
- How might one imagine an auditory-architectural design proposal? How can one define the intended auditory qualities and how should the concept as a whole be put together?
- How can proper design measures for the realization of the auditory-architectural proposal be specified, and how can the necessary means of design be systematized?
- How can auditory-architectural design concepts be presented?
- How should the auditory-architectural conceptual design process be structured?

Realization of the Research Project

In order to have available the broad expertise necessary for the intended research, the project was conducted by an interdisciplinary team. Researchers and designers from the following disciplines were involved: architecture, landscape architecture, sound research, sound art, philosophy, and electroacoustics.

The concept of the *Klangumwelt* (plural *Klangumwelten*) served as the foundational principle for the development of an auditory-architectural design methodology. This concept was developed in the context of a previous project by the research unit for Auditory-Architecture at the University of the Arts in Berlin: „Die Klangumwelt wird als eine Situation in ihrer Ganzheit definiert, so wie sie sich durch das Wahrnehmen als Klang im Bewusstsein der Hörenden manifestiert.“¹ (The *Klangumwelt* is defined as a situation in its entirety, in terms of the way it manifests itself sonically in the listeners awareness by means of their perception.) *Klangumwelten* are relational in nature, being constituted both by the circumstances of the situation as well as through the conditions of intersubjective perception. In this context, an auditory-architectural design can be understood as a configuration of conditions through which the deliberate transformation of an existing *Klangumwelt* can be effected.

Since the intention of the project was to develop a design methodology to construct an auditoryly experienced space – and since such a space as an object of sense-experience does not lend itself to quantitative documentation and evaluation – the project relied heavily on a qualitative approach and the research was primarily accomplished with the aid of qualitative methods. Quantitative methods, e.g. sound pressure level measurements, were only used to identify possible conditions of the auditory experience.

Research Method

The auditory-architectural design methodology was developed on the basis of two sub-projects: „Klangumwelt of Ernst-Reuter-Platz“² and „Sound Concept for Schlieren City Park“³. The focus was on the *Klangumwelt* project of Ernst-Reuter-Platz. As part of the project Sound Concept for Schlieren city park, a basic auditory-architectural concept was developed in order to reverify the design methodology.

¹ Arteaga, Alex; Kusitzky, Thomas: Auditory Architektur. Stuttgart 2009. (Abschlussbericht F2723)

² Ernst-Reuter-Platz is one of the largest public spaces in Berlin. The entire construction of the site as well as the garden design is under protection as a historical site and example of West-Berlin post-war modernism.

³ The city of Schlieren, situated in the immediate vicinity of Zürich, is a typical example of a Swiss agglomeration community. The city park can be found in the center of Schlieren.

The intention in both projects was to systematically survey and understand the respective Klangumwelten in all their complexity and to interpret them in respect to their conditionalities. Then, on the basis of this, to prepare a conceptual design or design approach for auditory-architectural construction.

The analysis of the Klangumwelt of Ernst-Reuter-Platz was carried out within a year during which about 300 listening protocols were made outdoor, as well as 18 listening protocols in the surrounding buildings. 150 sound recordings were completed with a dummy head microphone and six frequently used path crossings in the circle were studied. In addition, several listening descriptions were completed and further tests conducted, such as topological delimitations.

In the context of the subproject Sound Concept for Schlieren City Park, the acquired materials underlying the auditory-architectural design concept were a total of 8 listening protocols, 2 listening descriptions, and 4 sound recordings from different time periods.

Using these acquired materials the Klangumwelt of Ernst-Reuter-Platz and of the Schlieren city park could be characterized and broken down in terms of their salient qualities and conditioning factors.

In each case, the characterization was used as the basis for developing auditory-architectural design approaches. In both projects, the design intentions were determined on the basis of preexisting urban planning concepts: in the context of Klangumwelt Ernst-Reuter-Platz, the "Leitlinien für die City-West"⁴ of the Berlin Senate Department for Urban Development and Environment served as a reference whereas in developing design goals for the auditory-architectural design of Schlieren city park a starting point was central themes from the urban development concept⁵ for Schlieren by the Metron AG.

In accordance with design goals, and based upon the characterizations, suggestions for auditory-architectural transformational measures were finally developed.

⁴ Vgl. Senatsverwaltung für Stadtentwicklung und Umweltschutz: Leitlinien für die City West (o.J.), http://www.stadtentwicklung.berlin.de/planen/stadtplanerische_konzepte/leitbild_city_west/index.shtml (12.12.2011)

⁵ Vgl. Stadt Schlieren: Stadtentwicklungskonzept Schlieren (o.J.), <http://www.schlieren.ch/de/vorhabenmain/vorstadtentwicklung/> (12.12.2011)

Summary of Results

At the outset of the research period, the question of what the design materials of auditory-architectural designing are, as well as what means of design might be available for transforming a Klangumwelt, needed to be clarified in regard to the concept of Klangumwelt.

Design materials can be understood as those particular aspects of the Klangumwelt which can be transformed through auditory-architectural design.⁶ Since Klangumwelten are perceptual instances, this definition of design material does not follow in association with structural materials but rather in reference to those individually distinguishable qualities informing auditory perception.

The transformation of the design materials is accomplished through implementing the means of design. Means of design are all those configurable factors that constitute the conditions of the Klangumwelt's emergence and which are relevant for the transformation of the given Klangumwelt.

The relationship between the design material and the means of design is reflected in the determination of the concept of auditory-architectural designing: the auditory-architectural designing is the transformation of design material through the use of the means of design. Formulated differently: the auditory-architectural design is the transformation of existing qualities of a Klangumwelt by modifying the conditions of their emergence.

Structure and Components of a Design Methodology

On the basis of the auditory-architectural conceptual design work in the context of both sub-projects Klangumwelt Ernst-Reuter-Platz and Sound Concept Schlieren City Park a design methodology was developed which can be subdivided in two parts:

- The auditory-architectural survey
- The auditory-architectural designing

Preparatory to the actual auditory-architectural process of creating a design proposal, it is sensible to ascertain the initial situation of the relevant design project. The initial situation indicates the basic conditions of involved parties as well of the surroundings which are already known at the outset of the planned auditory-architectural design process. These can include design approaches, models, user requirements, safety regulations and material specifications,

⁶ The use of the term „material“ in this sense is justified through the definition of Klangumwelt: A Klangumwelt is the process of their coming into being.

but also information on the social and cultural environment. Other examples might be space allocation or zoning plans as well as planting concepts.

The auditory-architectural survey

The auditory-architectural survey aids in the recall and understanding of the Klangumwelt currently experienced in to-be-designed environment. The auditory-architectural survey can be subdivided in three sections: "Context Analysis", "Emergence of the Klangumwelt" and "Interpretation".

Context Analysis

The purpose of context analysis is to identify and organize the factors that potentially determine the emergence of the Klangumwelt, as well as to recognize their overall contextual relationships. For the context analysis, the material which was collected for the initial situation can be evaluated. This material is supplemented by on-site investigations specifically concerned with the factors potentially conditioning auditory experience.

Emergence of the Klangumwelt

In the context of the research project four methods were developed, or further developed, with allowing Klangumwelten to be sophisticatedly and systematically surveyed in the process of emergence and in their complexities:

- Listening Protocol – this is a structured list of parameters or qualities, which serve as a template for reflective listening.
- Topological Delimitation – a systematic inspection of an urban or architectural surrounding by which the extension of an auditory area is determined.
- Listening Description – a method in which auditory experience is related as a freeform description either in writing or by dictation.
- Klangumwelt Dialogue – a method which allows reflection on and interpretation of an experience of a Klangumwelt in exchange with an interlocutor.

These four methods are mutually complementary. They are conceived in such a way that, through their combination, a multilayered experience of the auditory space is possible.

Interpretation

The interpretation part is meant for retrospective reflection on the experienced and the recalled Klangumwelt, as well as for understanding the relationships of individual qualities to each other and interpreting the Klangumwelt in terms of its conditionalities, which were identified both within its emergence as well through the context analysis. Through this, potential design materials can be identified and potential means of design determined.

In this way, a characterization of the Klangumwelt in terms of its qualities and limitations can be created. Such a characterization can be displayed in different ways depending on the requirements. The following formats have proven practical:

- A Tabular Form – a clear and compact format
- Body Text – a detailed and easily read format
- A Perceptual Map – a clear format through which complex interrelationships can be presented

The retrospective interpretation of the Klangumwelt allows a decoupling from both the original chronology as well as the immediate affectivity.

The auditory-architectural designing

In the phase „the auditory-architectural designing“ the Klangumwelt which will be aimed for in design draft is conceived and imagined. The auditory-architectural designing takes place in an area spanning three poles:

Pole 1: The conceptual base

In relation to this pole, drafting work can begin by the formulation of an objective for the sound design. Further along, this objective should be more fully expounded on as a conceptual foundation. Once the characteristics of the planned architectural or urban situation have been thusly determined, these characteristics can be juxtaposed to the qualities of the surveyed Klangumwelt, allowing a development of potentialities for transformation into the sought after Klangumwelt.

Pole 2: Imagining the Klangumwelt

In the drafting process it is necessary to develop a conception of the Klangumwelt that might emerge through the auditory-architectural designing. This is necessary in order to evaluate

whether, on the one side this Klangumwelt corresponds with the conceptual base and on the other side, whether the selected means of design would be effective in this context.

Rather than forming a commitment to a Klangumwelt necessarily created through the targeted design, this conceptual process allows an idea to form of the potential, or probable, auditory experience on site.

Based on the survey methods in the subsection Emergence of the Klangumwelt, three methods were prepared as tools to aid in developing an idea of the potential Klangumwelt: The "Listening Protocol of the imaginary Klangumwelt", "Listening Description of the imaginary Klangumwelt" and the "Perceptual Map of the imaginary Klangumwelt".

Pole 3: Concrete means of design

The third pole of auditory-architectural designing is the "concrete means of design." Auditory-architectural means of design are definite and specifically-altered conditions for auditory experience which should allow the materialization of the desired Klangumwelt. Determining the specific means of design can be based on results of the auditory-architectural survey and in relation to transformation potentials ascertained in the framework of the conceptual base. A system for creating an auditory-architectural model is instrumental for both representing the effects of the planned interventions (which are determined through the means of design) as well as evaluating their effectiveness. Within the research project, a prototype of a modeling method was developed – based on common electroacoustic technologies – with which models can be created that allow an auditory review of volume ratios and localizations of individual sound events. Depending on the particular design project, additional and different kinds of requirements may exist for an auditory-architectural modeling method, so it may become necessary to develop diversified modeling methods in the future. During the auditory-architectural design process, modeling methods have the fundamental task of creating an artificial environment in which individual aspects of the Klangumwelt that are of particular interest can be emphasized and reviewed.

Final Comments

Auditory-architectural designing is a process of specifying, differentiating and thoroughly developing initial ideas all the way through to a detailed auditory-architectural design concept. The design process proposed here is fueled by an auditory-architectural survey and is carried out in an area spanned between three main poles. Although a particular approach is suggested by this design methodology, auditory-architectural designing is not a fixed process but rather a free artistic procedure. For this reason, the design methodology cannot and should not represent a standardized approach. It is meant rather to be taken as an orientational aid which can point at the relevant thematic areas and which can suggest strategies and methods for their treatment.