ACOUSTIC DESIGN IN COMMERCIAL SPACE

Björn Hellström

Ingemansson Technology AB
and
University College of Arts Crafts and Design
Stockholm, Sweden
bjorn.hellstrom@ingemansson.se

Abstract

The starting point for this paper is to discuss and challenge the visual dominance in architectural thinking, and to raise competence among architects and planners on sound and sound environment issues. To promote a sustainable urban environment, sounds must be integrated in the complexity of urban design and development. Therefore, it is especially important to integrate acoustic and architectural analysis.

The paper focuses on urban public space as well as indoor public pathways, communication space and semi-public commercial space, e.g. shopping malls, where reliability on sonic orientation may be crucial. For these kinds of collective spaces, I argue, it is especially important to integrate acoustic and architectural analysis. Their sonic conditions are often loud, blurred, and confusing, with little correspondence between visual and aural perception, and with weak articulations of spatial dimension, distance, borders, and orientation. If not cared for, the result may be increasing sound disturbance, lack of people's moving through the areas, dangerous differences between day and night use, disorientation for several user groups, and segregation.

The paper is integrated in the ongoing research project, *Transmission*, executed by Urban Sound Institute (USIT), financed by Swedish Research Council. Results will hopefully deliver good examples and operative methods to be used by architects, planners and acousticians. The paper is also a result of ongoing projects and research at the acoustic consultancy company *Ingemansson Technology AB*, Sweden

INTRODUCTION

Towards Urban Acoustic Space and Architecture

A common view of architecture holds that it deals solely with static and material artefacts. However, architecture is as much a question of immateriality. In contemporary architectural discourse, there is some discussion of the idea of a transparent and fluid space, made up by information that is distributed by sounds, light and pictures, as well as of electronic media. We are therefore dealing with other categories of space, sometimes identified as a 'place-less space', 'phenomenological space', 'rhizomatic space', 'cyberspace', 'electronic space', etc. So architecture is redefining its boundaries, involving a type of ephemeral space-time-accelerating architecture that dissolves the traditional concept of place into a place of phenomena.

One dimension of this architectural discourse is the sound medium, by nature transient and immaterial. And this is what sound engineers, physical and psycho acousticians, audiologists, sound artists, sound designers etc. deal with. Today digital technology has made it possible to store, manipulate and distribute sounds in a way that until recently was impossible even to imagine. This has opened up many possibilities, and resulted in renewed interest in acoustic design, especially among design disciplines that cross different aesthetic fields, such as music, art and architecture. So, over recent decades, acoustic environmental research has slowly developed, and nowadays it is not only confined to established disciplines such as social medicine, psychoacoustics and acoustic audiology, but has expanded into other disciplines that, on the one hand, emanate from aesthetics, and, on the other, from social sciences e.g. sociology, anthropology and urban planning, which all circumscribe aspects regarding experience and receiver criteria. In short, one might say that a traditional quantitative viewpoint is now supplemented with qualitative aspects on sounds, which is important since sound production and sound perception are very complex phenomena.

It is important to have in mind how we as social beings participate in acoustic space. In this respect, I would emphasise the possibilities of architectural work i.e. using the listening apparatus as a complementary tool in the architectural design process, the architect may, indeed, use the given acoustic space in support when operating in situ (Amphoux, Hellström 5). Thus acoustic space becomes a deductive and productive synthesising determinant in architectural work. In brief, one could say that it deals with design (or composition) of an acoustic space, simply by managing the built environment that triggers the sounds.

In comparison with visual media, sound disciplines lead fairly obscure lives. Due to its immaterial nature, it is not easy to feature interesting acoustic spaces in glossy magazines – it is even difficult to make adequate representations via recordings. Yet, just as light and pictures do, so the sound medium embodies and unfolds today's world, it mediates the passage between the outer physical environment and the inner experience. So why has the medium of sound not been established

as a design discipline, unlike other disciplines connected to visual media (e.g. light design, industrial design and interior design)? One answer would be the lack of a holistic perspective in that our knowledge of sounds is fragmented in a variety of disciplines. Another answer would be that our greatest efforts, in regard to the development of knowledge and techniques, are concentrated on defensive strategies for protecting people from sounds. Without getting sidelined by these issues, it is now time for offensive strategies that aim at exposing the sonic world.

Within the architectural discipline, researchers have long been studying the interplay between perceived space and the built space, especially regarding the dimensions of light and colour. But today one may add the dimension of sound as an important building block for architectural research in its entirety. It is important, though, to stress that this is not a matter of audibility in concert halls, or of sound-absorbing measures, but rather about qualitative criteria on the whole, which is crucial concerning our experiences and understanding of the built space. Hence it deals with the design of sound qualities in regard to the actual situation, which is analogous to the design process when deciding the range of colours for a place or for a building. Like Luigi Russolo, (Russolo) I would stress the need for an acoustic city-planner, whose profession – besides overall planning and actions – could promote interest in and awareness of sounds in urban space, from pedagogic as well as aesthetic viewpoints. Yet I am not advocating the promotion of sounds from nature (bird song, waterfalls, the rustling of leaves etc.) at the expense of urban sound, but rather I am promoting greater understanding of what sounds are about and their usefulness in urban space. To be more precise, what I am arguing for does not originate from a phenomenological approach to the sound world, but rather from a structurally oriented approach to sounds and the transient character of the acoustic space.

ACOUSTIC DESIGN

Towards Acoustic Environmental Theories and Methods

There is, thus, important to develop acoustic environmental theories and methods that are adaptable to the built environment and architectural design. The acoustic discipline can not embrace the whole subject area so research must be conducted on an interdisciplinary level. The French-Swiss researcher Pascal Amphoux states that the acoustic space works as an instrumentarium, a store of sounds, which brings form to social, perceptual, cultural and spatial configurations, and the key to this instrumentarium is to be found in knowledge of sonic grammar (Amphoux). This means that knowledge of the sonic world cannot be reduced either to exclusively objective data, or to exclusively subjective data, but the sounds cover all kinds of objective, subjective and inter-subjective interrelationships and complex configurations in the built space. What is needed for is the emphasis on the creation of interdisciplinary qualitative tools, which can be adapted to various forms of the architectural space.

So, acoustic design deals with development of concepts and methods applicable to analysis and modelling of the acoustic environment. The ‘acoustic environment’ embraces the whole sound spectrum, from discrete signals to the sound environment in the built space. Acoustic design is – like all design processes – an uncertain process in that there exists no definite manual; the work differs from case to case.

One common problem is that the acoustician very seldom is involved in the initial design phase – the architect or building contractor usually engages the acoustician in the concluding phase, in most cases regarding sound-absorbing installations. This situation is to some extent self-caused since acoustic research and acousticians focus on the measurability of sounds but tend to ignore the descriptive dimensions. This means that acousticians lack a qualitative vocabulary that would be beneficial when communicating with architects and others in the design process. A typical example is the concept of space, which for the acoustician implies volume, resonance, absorption and to some extent geometry. But from the architect’s point of view, the concept of space contains a series of nuances that also encompass spatial, aesthetic, perceptual, social and cultural significations (Hellström 6).

One basic qualitative tool concerns language issues, and especially the development and specification of conceptual tools. Such a tool can be used in the architectural process; it permits a synthesis of the sonic characteristics of a place, as well as the qualification and planning of sound maps. It is also a predictive tool in that it may serve as an instrument when creating the sounds of a planned place. Moreover, this conceptual tool should not solely be dedicated to the technical acoustic discipline, but may be used by the architect and the sociologist (and others) in their practices; it should serve as an interdisciplinary tool with which one may conceptualise and create sonic criteria with regard to the built environment and perceiver space (Hellström 6).

The design concept implies the modelling and quality assessment of an abstract or concrete product’s characteristics, which is made in order to help a future user to manage certain problems. According to this, one major task regarding design research is to define concepts that can be applied by the designer, i.e., to define an ordered set of concepts that function as a tool when dealing with such products in practice. Moreover, the development of concepts must also be made in regard to a context. The concepts are therefore seldom general in that they are suitable within different disciplines, but instead the concepts demarcate a specific disciplinary knowledge field. This means that design does not mainly deal with solving problems, but managing problems, i.e., on the one hand, regarding the identification and the active creation of a certain problem, based on an understanding of its different factors, and, on the other hand, the handling of the problem into manageable questions (Lundequist).

The Cresson institute – located in the School of Architecture in Grenoble – has strong links to the architectural discipline. Over the years sonic environmental theories and methods have been developed that are adaptable to the built environment and architectural design. The researchers – led by Jean-François Augoyard – realised at an early stage that the acoustic discipline could not embrace the whole subject area so research must be conducted on an interdisciplinary level. Besides architects and acousticians, a range of professionals including composers, sociologists, philosophers

and ethno-geographers have been drawn to the institute. What is unique with Cresson is the emphasis on the creation of interdisciplinary qualitative tools, which can be adapted to various forms of the architectural space. Ever since the late 1970s when Cresson was established, the institute's main research has focused on language issues, and especially on the development and specification of conceptual tools. Their scientific flagship is indeed the specification of sound effect that is presented in the extensive work *A l'écoute de l'environnement – répertoire des effets sonores* (Listening to the Environment – Repertoire of Sound Effects), from 1995 (Augoyard 2, Hellström 6). In short, the sound effect is a conceptual tool to depict the context of sound in the sense that it embraces the interaction between human, spatial and physical dimensions.

In order to be successful it is of great importance to implement sonic environmental theories and methods in practice; to shape 'recipes', which the architect and acoustician can apply when designing a building or a place. To bridge this gap between theory and practice, I would argue for two forms of action:

Firstly, it is a question of education. In order to spread knowledge on sonic environmental theories and methods one needs to formulate an educational objective, to be implemented at, for instance, schools of architecture and also at technical schools that focus on acoustics. Such education is in fact already underway. Researchers at Cresson arrange courses for the students at the School of Architecture in Grenoble and also for students within the technical study programmes. The Swedish University of Arts, Crafts and Design (Konstfack), in Stockholm, is also arranging courses for the students. Right now, an Audio Design Studio is under construction at Konstfack. The Audio Design Studio would function as a platform for research and training, for instance room acoustics, sonic environmental design, sound design of products, sound art installations and sound as a pedagogic tool. It would also be a meeting place for people from the university field and the business sector.

Secondly (which might arise from the first point), one needs built examples as references. These would benefit the dialogue between architects and acousticians. This question is crucial since the architectural tradition to a great extent is based upon imitation and reproduction in that a certain architectural expression creates a school for future architects. Therefore the more examples of buildings and places in urban space, the easier it would be to further implementing new projects in the future (Hellström 6).

CONCEPTUAL TOOLS

The Concept and Paradigm of Acousmatics

The concept and paradigm of acousmatics is defined by Pierre Schaeffer. The major reason why discussing the paradigm, consisting of the patterning of auditory processes and concepts, is that it circumscribes sounds connection to perceptual criteria, not only from a theoretical point of view, but also from pedagogic and pragmatic perspectives in that the understanding of the concept enriches our listening

sensitivity. It is also an applicable tool when exploring the relation between musical aesthetics, urban sounds and the user's space, which adds valuable knowledge to the sonic world.

In brief, the concept of acousmatics deals with the process of apprehending any sound, the source of which is invisible; or, in other words, a situation where one is prevented from verifying a sound source visually (Schaeffer, Smalley). According to the French Larousse Dictionary, the adjective acousmatic derives from Greek and refers to a condition where a sound is apprehended, but an association to the source is unavailable. Acousmatics was used in ancient Greece when a lecturer hid behind a curtain for the purpose of concentrating the audience's attention on the speech.

Referring to the definition of the acousmatic concept it may easily be interpreted and designated to fit to all types of causes of which are not visually observed e.g. music heard on radio, telephone and computer. However, this is only partially true. The English music theorist Denis Smalley discusses the concept in terms of varying *acousmatic conditions*. He states that the concept of acousmatics is broad in that it can be treated within a wide frame of references. According to Smalley the heart of *acousmatic perception* concerns the everyday identification process; when lacking of visual contact with the sound source we automatically start to seek after references. These associations can be of different kinds, such as musical (the aesthetical qualities of the sound) social (who/what produces the sound and what is my relation to it), spatial and temporal (how could I orientate in regards to the sound), etc. The strength of the concept is therefore that it identifies phenomena that are based on experiences (we learn to detect sounds by experience) which also very often are culturally conditioned (how do we perceive the surroundings when meeting a new culture the first time?) (Smalley, Hellström 6).

The perception of a favourable acousmatic condition is when sound phenomena are totally freed from visual access and distraction. This means that when the listener does not know who is executing the sounds, where the sounds derive from or what they are made of, then s/he will gain access to the acousmatic world.

Acousmatic Environment in Commercial Space

Today the shopping culture literally dominates the urban space. Most public activities are connected to shopping; town centers, suburbs, streets, airports, hospitals, schools and Internet are highly influenced. Shopping does not only dominate urban activities, it almost constitutes the construction of the city (Koolhaas). Nowadays, it is hardly impossible to find non-commercial public spaces. In these environments we are exposed to all types of sounding artifacts: jingles from public loudspeakers, signals from mobiles, computers, technical installations, white goods, toys etcetera, as well as music and muzak – or sound perfume – directed towards consumption. Since we very often lack of visual contact with these sounds, I will claim that the sounds of the shopping culture together embodies a kind of *acousmatic environment*.

The reason why we need to develop deeper knowledge within this field is that these acousmatic environments expand very fast; due to the development of technology, new sounding products and services are incorporated in the environment

continually. It is also important to emphasize that an acousmatic environment not basically deals with single sound products, but instead it deals with sounding products as an ensemble, i.e. as an 'environment'. In fact, today it exist methodologies of how to design sounding products, e.g. criteria regarding signal, navigation, atmosphere an identity. In this respect a great many products are qualitative. But regarding sounding products as a group, we lack of precise methodologies.

So the acousmatic environment – the sounding products and activities as an ensemble – constitutes a new type of infrastructure, which is problematic for different reasons. The major reason is that we do not have any natural connection to most of the sounds in that they are not directed to our personal activities; the sounds are associated to individual use in a collective space. In comparison with road traffic where the infrastructure connects the vehicles, the acousmatic environment disconnects people and products from each other. Since we often are prevented from verifying the different sound sources visually, the sonic condition become even more blurred and confusing. One obvious effect is an increasing use of mp3 and iPod; in order to protect oneself music becomes a substitute for urban sounds (Bull).

Finally, one may therefore ask – How does the acousmatic environment affect people's behaviour in commercial space in regard to perceptual, temporal and spatial criteria? This question will be further investigated in future research.

The Concept of Noise Design

A last concept I would like to introduce is *Noise Design* (Hellström 6). It is chosen to highlight that noise is not always noise. Abstract and yet universal, the sounds around us express information that may be social in character but may also unleash aesthetic experiments. Noise develops networks of relationships that are vital for our actions in physical space. Noise design examines our rich and complex sound world. It adopts a structural approach to sound-related issues in general, and particularly to urban acoustic space. It explores the concept of transparent ad fluid space as a central principle for architectural conception. Urban acoustic space is seen as transient and immaterial, making public and private spaces less predictable, less monotonous. While most recent research efforts in the field adopt a defensive attitude by seeking to protect people from sounds, the concept of noise design celebrates our constructive and creative relations with the sound world and develops methods to manage sounds as mediators of qualitative information. That is to say, by entering deeply into the very complexity of the sound world, we pursue knowledge that does not hide our relation to the sound world, but rather reveals its riches.

SUMMARY

This paper has dealt with a structural approach to sound issues in general and more particularly to the commercial space. In most cases, sound research focuses on developing methods that aim at the measurable dimensions of sounds i.e. defining and encapsulating the sound world in quantifiable systems and units. This concerns not

only the technical dimensions of sounds (physical acoustics) but also perceptual criteria (psycho-acoustics). Though this paper does, of course, not oppose these fields of research, the intention has instead been to extend the subject by asking for theories and methods concerning the transient nature of sounds. It is, therefore, a matter of defining open theories and methods that will handle sound issues with sufficient precision as well as the wide spectra of qualitative information embedded in each sound message.

This paper is a result of ongoing projects at the acoustic consultancy company *Ingemansson Technology AB*, Sweden. It is also integrated in the ongoing research project, *Transmission*, executed by Urban Sound Institute (USIT, www.urbansound.org), financed by Swedish Research Council.

REFERENCES

[1] Amphoux Pascal, *L'identité sonore des villes Européennes*, rapport de recherché, no. 117, Cresson/Irec, 1993.

[2] Augoyard Jean-François, Torgue Henry, et al, *A l'écoute de l'environnement – répertoire des effets sonores*, Parenthèses, Marseille, 1995.

[3] Bull Michael, *Sounding out the City, Personal Stereos and the Management of Everyday Life*, Berg Oxford, 2000.

[4] Hellström Björn, *Modelling of Sounds in Public Space* (paper). Conference: Sound Practice. The Research & Postgraduate Centre, Dartington College of Arts, Totnes, England, 16-20 feb. 2001.

[5] Hellström Björn, *Noise Design – Architectural Modelling and the Aesthetics of Urban Acoustic Space*, ISBN 9188316386, Bo Ejeby, 2003.

[6] Koolhaas Rem, *S,M,L,XL*, Rotterdam, Benedikt Taschen Verlag GmbH, 1995.

[7] Lundequist Jerker, *Tools of Scientific Thinking*, The School of Architecture (KTH), Stockholm, 1999.

[8] Russolo Luigi, *The Art of Noises*, manifesto from 1913.

[9] Schaeffer Pierre, *Traité des Objets Musicaux*, Éditions du Seuil, 1966.

[10] Smalley Denis, (ed. A. Vande Gorne A.) *Acousmatic music: does it exist?* in *Vous avez dit Acousmatique?*, Ed. Musiques et Recherches, 1991.

[11] Homepage Björn Hellström: www.acousticdesign.se

[12] Homepage Ingemansson Technology AB: www.ingemansson.se

[13] Homepage Urban Sound Institute (USIT): www.urbansound.org

[14] Homepage University of Arts Crafts and Design (Konstfack): www.konstfack.se