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Wich Tools for the Research on sonic urban Ambiences ?

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Environnemental Sound

From Awareness to Action

Proceedings from "Stockholm, Hey Listen!"
Conference on acoustic ecology
Stockholm June 9-13, 1998

Editor: Henrik Karlsson

The Royal Swedish Academy of Music
in partnership with
The World Forum for Acoustic Ecology (WFAE)
Stockholm—Cultural Capital of Europe '98
World Health Organization (WHO)



Jean-François Augoyard

The Cricket Effect

Which tools for research on sonic urban ambiances?

Deficiencies in research about sound urban ambiances

With the return of springtime, the countryside re-echoes with an abundance of sharp rustles. If you approach to see the musician insect he doesn't seem to be there and yet he is again nearer, louder or slightly out of its place. The other insects start on it as if to make fun of your obsession to control everything with the eye. So you don't really know who is playing this ubiquitous impromptu. All of nature is resounding now and surrounds you with a bittersweet irony. This scene could remain as a splendid object of meditation if ethology didn't open up our eyes and ears. In fact, a deep functional wisdom has been given to crickets. Their small size causes a heavy handicap. They can emit very long distanced high-pitched sounds but only in one direction. So as to cover more generously their territories they twist around themselves like a pencil radar and in so doing sweep an extensive area.

This sonic pastoral image defines perfectly well the state of research about environmental and sound ambiances. This cricket-researcher shows up well, but he doesn't know how to revolve.

What are the research performances? There are presently two forms of research in physics, three types of interesting sounds and two application fields which are concerned with the qualification of sound in a constructed space:

- 1) Over the past twenty years, applied acoustics have developed two types of innovative and high performance techniques: the methods for simulation and measurement of room acoustics and new measurements of intensity.
- 2) All these efforts produced by science and technology deal with only three kinds of sounds: speech, music and sounds of discomfort.
- 3) The spaces at stake are theatres and trafficways. One can notice that buildings are only studied in relation to their sonic disturbances. (*See Diagram 1, page 117.*)

ACOUSTIC & PSYCHO-ACOUSTIC RESEARCH CONCERNING THE URBAN ENVIRONMENT

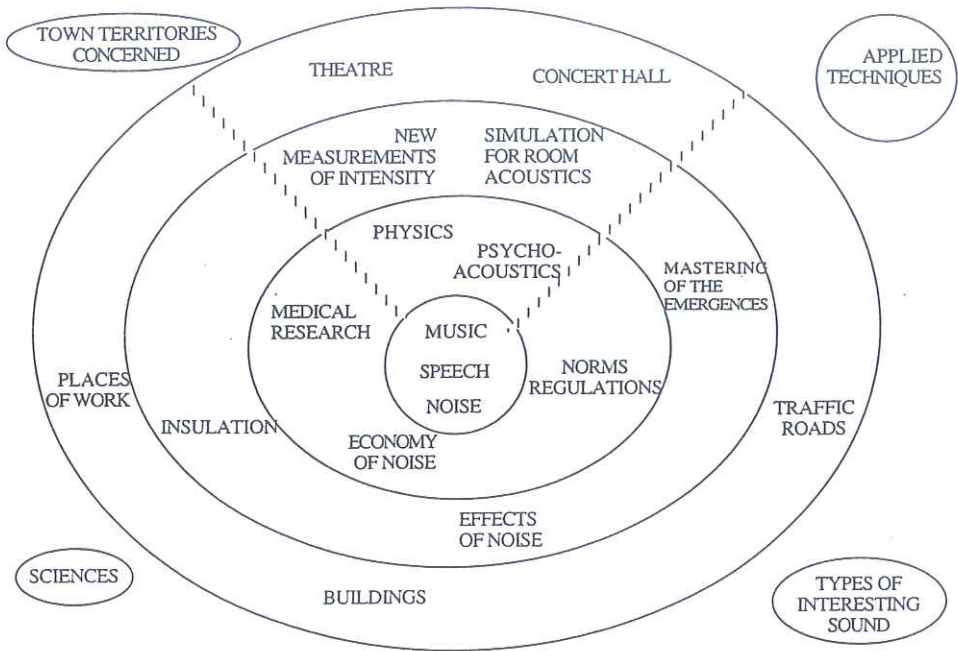


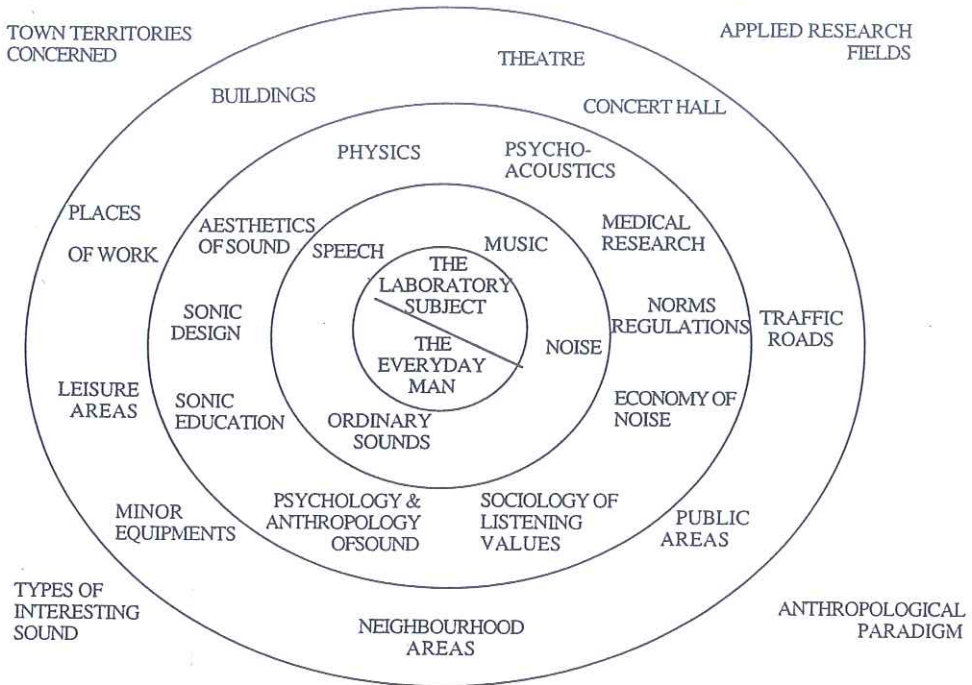
Diagram 1. Acoustic & Psycho-acoustic research concerning the urban environment

To summarise, even if the research goes very far, it is always referring to the same precise objects. Most elements of urban territories are neglected: housing, minor equipments, multi-functional and neighbourhood public areas. Only one matter is left to ordinary architecture : the norms and regulations concerning insulation procedures. Another handicap is that only 3 kinds of generic techniques are available : insulation, mastering of reverberation and the control of emergencies. In fact, only one anthropological theory can be found behind these scientific and technical attitudes: the traditional behaviorism always inspired by the same paradigm, that is, the laboratory subject. (See Diagram 2, page 118.)

An enormous amount of work in various directions remains to be done: on qualitative properties of sound, on social and cultural listening values, on sonic actings, on sonic dimensions in architectural conception, and on intelligent organisation of sonic life in urban centres. How to be an efficient cricket? Can the research efficiently sweep across this area?

Two basic tools exist: the sound object and the soundscape
To be honest, some pioneers can already be found in this great desert. Who is concerned

SONIC RESEARCH & URBAN EVERYDAY LIFE



J.F. Augoyard. CRESSON umr CNRS/Culture1563.1998

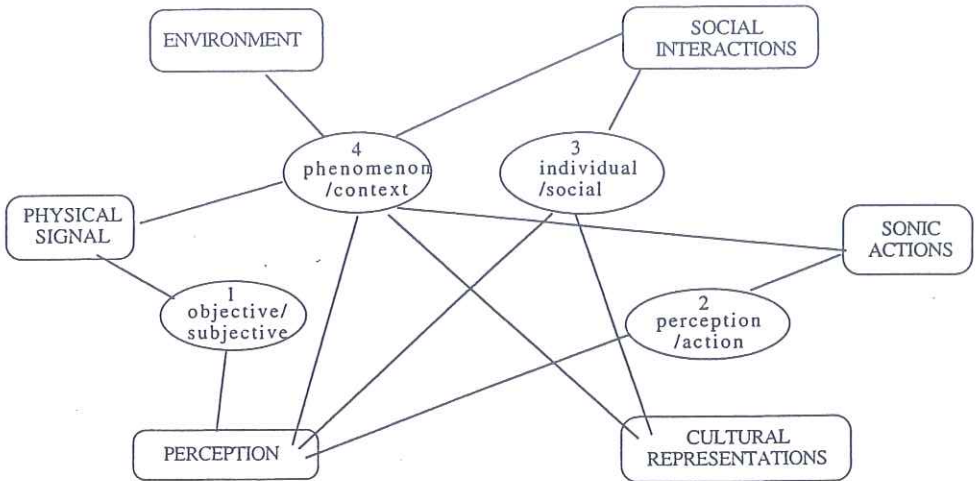
Diagram 2. Sonic research and urban everyday life.

about sound urban everyday life today? Some architects who can conceive shapes in a sonic way, some urban designers trying to use the ornamental function of the sound, some very rare psychologists (Edith Lecourt), historians (Alain Corbin), some lonely and passionate anthropologists (Viktor Zuckerkandl, Marshall MacLuhan, Steven Feld). And, at last, some public research offices in Europe (and recently in Canada) convinced of two certitudes: regulations and techniques have not reached their optimum conditions yet, and that they only deal with one part of urban life. But it is even more difficult to find, throughout the world, groups or laboratories which can bring together all the necessary disciplines such as acoustics, sound aesthetics, architecture, human sciences, social sciences to work directly on the urban sound space. Such a large pluridisciplinary challenge has only been rarely undertaken: by Pierre Schaeffer in the 60's, by R. Murray Schafer in the 70's and now by the Centre of Research on Sonic Space and Urban Environment (CRESSON) since the 80's. How has this been possible?

What are the necessary dimensions needed to explore the ordinary sound world?

1. All sonic phenomena *in situ* can be explored by starting one or the other of the following six fundamental dimensions: physical signal, environment, perception,

THE MAIN DIMENSIONS OF ORDINARY SOUNDS



4 NECESSARY RELATIONS TO RESPECT THE COMPLEXITY OF *IN SITU* URBAN SOUND.

Which basic tools to analyze urban sonic space in general ?

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Diagram 3. The main dimensions of ordinary sounds.

cultural representations, sonic actions and social interactions. However, in order to avoid disciplinary imperialism, none of these six dimensions must be neglected.

2. The difficulty about the multidisciplinary research is to take at least four connections into account: objective/subjective, phenomenon/context, individual/social, perception/action. (See *Diagram 3*.)

In fact, to make a short historical review, the first initiatives about rethinking the contemporary sound world came from the field of the musical research. Two imperatives have built up this new attitude : the return to basic sound phenomenon and the thinking of sound in a global and ecological way. Two essential concepts synthesise these works: the sound object and the soundscape. Discovered between the 50's and 70's, they are fundamental because they both succeed in bringing together three functions into one notion: the explanatory method, the descriptive method and the interdisciplinary model.

In this famous *Traité des objets musicaux* (1965), Pierre Schaeffer shuffles the classic classifications between noise, sound and music. The main concept around the *sound*

object can be applied to any sound of the environment. It doesn't refer to a certain classification but rather to a way of plunging into the sound by the means of the "reduced listening". This attitude we accidentally practice, becomes with Schaeffer the basis of a theory with three goals: first, questioning the sound experience common to all listening; second, showing that all sound phenomenon necessarily imply the physical signal and intentionality; third, isolating the elementary unit of a new solfège of sounds. The project overran Schaeffer's initial desire to lay the foundation of a new musicology. In fact, it deals with a general phenomenology of the listened world. Pierre Schaeffer brings about a fundamental change in the way of considering sounds. Nevertheless, this valuable process has its limits. The sound analysis follows too closely the linguistic model. Concerning non-musical situations, its application involves a sound by sound procedure, which is too heavy. And lastly, it puts context and environment in parenthesis.

It's precisely this other necessary aspect which later on R. Murray Schafer, with the concept of soundscape will bring forth. The process of the famous *World Soundscape Project* proposes that the sound environment can't be reduced to quantitative acoustic evaluation nor to a struggle against noise. We can listen to the sound world as an organised ensemble which expresses a culture. We have to learn how to discriminate this compositional dimension in the most ordinary sound situations. And yet, some conditions are necessary: to re-educate our listening attitudes in the sense of getting "a clear ear" (or ear cleaning); to encourage the pattern given by nature or by cultures which protect themselves from the horrors of noise; to give importance to the clarity of the hi-fi as opposed to the low-fi, which destroys sound culture at the scale of humanity. Above all, the soundscape determines what in the sound environment can be perceived as an aesthetic unit.

R. Murray Schafer's interdisciplinary and ecumenical research has brought a breath of fresh air in the scientific context, which is obsessed by sonic disturbances and automatic and technical answers. It rehabilitates ordinary and forgotten sonic cultures. It points out the immense didactic interest for genuine ecological listening. As a result, ordinary sound aesthetics can become understandable. Analysis of urban space, the theoretical aspects linked to the concept of soundscape however pose some problems. What to do with noisy or indistinct sonic situations in the low-fi category? Can we ignore them? Can ordinary sonic aesthetics break away from an organisational pattern which preserves something musical? Finally, can the concept of soundscape become free from an occidental landscape tradition marked by the logic of the eye? Since the 1970's, such an eloquent notion has been so re-employed and distorted that it has somehow become more vague. R. Murray Schafer's concept is very pertinent in the analysis, creation, preservation, and in aesthetic and cultural education. However, is it often too large for detailed analysis of urban life.

To summarise, if we want to describe and place a name with sufficient precision on the sonic forms observable in daily life at the scale of urban architecture, then we

are lacking in concepts. If we take the analogy of language, the soundscape is useful at the level of a text structure as a whole, whereas the sound object corresponds to the elementary level of words or syntagms. To work at the intermediate level, we lack the tools which can describe the grammar of a sentence. We don't know sufficiently the code of the possible configurations between the components of an urban sonic ambience: acoustic sources, constructed space and sound perception.

The Sound Effect: where does it come from?

Since the beginning of the 80's, the Research Centre has been asking questions about the deficiency of multidisciplinary tools. The notion set at the centre of our proceedings is the Sound Effect. It appeared step by step, emerging from questions issued from three fields of research.

1. The Sound Effect was first observed in the field of human science. Our work about perception and sound daily practices (1978) mapped out the existence of four important psycho-sociological procedures: the sound marking in the living space, the sound coding of interpersonal relationships, the creation of symbolic value linked to daily sonic phenomenon and, lastly, the interacting between sounds heard and sounds produced. These 4 procedures are active not only in daily urban life but in noisy situations, as well as in any musical listening. They can't be described as either simple reactions to stimuli nor as ordinary subjective impressions but rather as aesthetic processes. They are localised configurations of physical sound matter. In this respect, information gathered in surveys were analysed as effects in the sense of phenomenon linked to a context. Even the verbal information from the consulted inhabitants somehow directly express certain effects.

Let us take the example of one of the first effects studied. In the psycho-sociological discussions carried on with the inhabitants we often found expressions describing some sound situations in terms of "falling", "rupture", "cutting". The qualitative and temporal structure of these moments was always the same: a rapid transition of a rather strong or durable intensity to a clearly weaker one. This process is a very important organiser of urban perception. It marks out the strong limits between public and private, hostile and familiar, as well a border between two districts and that between two time sequences. This "cutting effect", as the inhabitants call it, has spread out in various sectors of culture: world music, phonetic effects in theatrical speech, connections in ordinary ways of speaking or in the cinematographic narration. It has a strong power of scansion in arts as well as in daily life. We decided to keep it as a universal paradigm. Other effects have been gradually discovered, some appearing more obviously in the organisation of the psycho-motricity, some clearly inscribed in the semantic field, some others more connected to space. Some effects were known in acoustics but not very much explored in neighbouring fields. For example, what is

the anthropological meaning of the reverberation, of masking and of filtering?

From this first point of view, daily urban life can be considered as the biggest potential supply of sound possibilities, an instrumentarium not only used for a hedonist or ill-fated aim like discomfort (nuisance), but more largely available as a tool in daily human relation.

2. However, how could we observe a sound effect with some objectivity and at the same time know the spatial conditions which favours it? We first explored the fields of architecture and urbanism so as to put the psycho-sociological information given by the inhabitants to the test.

If some effects like those bound up to memory or to semantic effects are independent of the physical space, most of them are directly dependent. The volume, the shape and the materials directly determine the propagation of sounds by producing effects such as the reverberation, resonance and natural filtering. Traffic planning, the noise of the socio-economical activities, local customs and soundmarkers offer the inhabitants other sonic data possibilities or other perceptual interpretations. It's the combination of the morphology of the constructed space and the sonic sources which produce in the urban environment such remarkable effects as those of resonance or ubiquity. For example, the "cutting effect" often depends on the angle of the street, on the brutal stopping of the mechanic sound or on the orientation of a pedestrian walk. Cuttings are of great importance in the sonic geography of a town. Often out of phase in regards to visual and tactile marks, sonic limits cannot be considered as lines but rather as *interference zones*. They are gradients which are time variant.

3. In this new perspective, what about acoustics? The pure physical signal is a laboratory abstraction. As soon as it spreads out into a concrete environment, the sound is immediately shaped by the morphological properties of that place and by the physical circumstances of audition: location or mobility. So that in the "in situ" measurements the quantitative value indicates only a part of the sound phenomenon. However, this knowledge is very precious. It often helps to guide qualitative observations. It allows to forecast more clearly the acoustic performances of a planned architectural form. To carry on with our example, the acoustic analysis of the "cutting effect" points out that variations of intensity are often linked to reference levels and more, and that a modification limited to only a part of the spectrum can be very adequate. Therefore we have analysed in detail other types of cutting using the frequencies or the colour of reverberation. Finally, the notion of "effect" itself found an ancient definition in the acoustic science. Relying on the theories of the relativity, a physics of effects has centred its efforts around these phenomenon depending on modality as well as on causality. Some examples in the field of acoustics: the Doppler effect, the mask effect, the cocktail party effect, the Lombard effect.

Definition of the Sound Effect

In fact, the Sound Effect can't be reduced exclusively to either objective or subjective data. It allows for a meeting point, an interaction and a correspondence between the measurable objective environment, the soundscape of a cultural community and the *inner* space of any individual.

In our opinion, the Sound Effect is not just the result of a physical cause. It refers to the logic of the event. The peculiar term of "effect" we use takes its bearings in the fields of physics, in audio-visual sound effects and in the contemporary stringed instrument industry. The effect itself is not an object. The conditions accompanying the apparition of the effect as a whole in a precise context might describe it. A sound "in situ" never exists without one or several other effects. In the Doppler effect, for instance, it is the relative speed between the observer and the emitting object that characterises the sound heard. With the effect of natural filtering and reverberation, the particularities of the spatial volume transform the original signal. In short, the word "effect" is very useful in indicating the concrete place and time of sound.

Second characteristic: the Sound Effect is connected to an interpretation. The most simple sonic perception necessarily supposes a work of semantic selection. Cultural and social characteristics will add other interpretations. One remarkable effect precisely happens to be the effect of *synecdoche*: one single sound can give sense to the rest of the soundscape. This is the case of the soundmarkers described by R. Murray Schafer. What we hear is never sounds as such (in the physical sense of the word) but Sound Effects produced by three kinds of distortions: spatial, perceptive and cultural.

Third characteristic: a Sound Effect only makes sense in its expressive dimension. In daily space-time, listening is always bound to the psycho-motricity which first helps to adjust oneself to an environment then to find its place. A splendid example is given by the *crenel effect* which reinforces the vocal expression of the market sellers with an efficient adjustment of the timbre, the intensity or the occurrence. On a collective scale, the sound is a privileged tool to "faire de l'effet" (have effect) on the body and spirit. Without a doubt sound has an emotional power that all cultures benefit from and that all contemporary audio-visual arts use abundantly. And so, the effect of ubiquity which is very much favoured by urban shapes is also one of the most convincing tools used by political or religious power.

To which class of logic tool does the Sound Effect belong? Is it not exactly a concept but rather a paradigm. Half way between the universal and the singular, at the same time model and guide, it allows a general discourse on sounds but it cannot function without examples. Rather than determining a closed definition of objects, it encircles a category of phenomenon by giving precise information on its nature and function. Moreover, the aspect of the designed object is either modal or instrumental. An abstract notion through analysis, it is a concrete tool in the creation of architectural forms. Thanks to these characteristics, it can cross very different fields of experiences and become enriched.

A Repertory of Sound Effects

For twelve years CRESSON researchers have been making patient and detailed investigations in many fields: physics and applied acoustics, architecture and urban planning, physiology and psychology of perception, sociology and culture of everyday life, musical and electroacoustical aesthetics, literature and audiovisuals arts. They have recorded and described one hundred of Sound Effects. Sixteen basic and transversal ones have been explored and distributed in five categories belonging to their predominant description.

1. The elementary effects. Those that deal with sonic material and the acoustic modality (reverberation, delay, filtering...).
2. The effects of sonic composition directly relevant to spatial morphology (mask, cutting, ubiquity, telephone effect ...).
3. The effects connected to the perceptive organisation, memory or culture (metabolism, asyndeton, synecdoche, phonomnesis....).
4. Effects of psycho-motricity. Effects which necessarily involve the existence of an action (crenel, attraction, phonotonic effect...).
5. Semantic effects: sound effects playing on the variations of sense between a given situation and its emergent meaning (imitation, repetition, Sharawadji).

What is the use of the Sound Effect?

It's a basic educational tool. Listening and marking the Sound Effects sharpens the sense of hearing as a result of its high transversal abilities.

It constitutes a genuine pluri-disciplinary approach to the urban environment. The analysis of Sound Effects respects the complexity of the "in situ" phenomenon and shows the interaction between human, spatial and physical dimensions. The sound embodiment of a society goes through these effects which create the relation between nature and culture.

Concerning acoustic measuring, on the micro-scale, the effects help to choose the right process and to confront the results with quality and subjectivity.

It is a good tool for the architectural conception. The Sound Effect allows to synthesise a great part of the efficient characteristics of a place and to qualify the planning and the sonic cartography. The effects typically connected to space can be straight away predicted; others can be inferred. They precisely indicate how to create the sound identity of a place.

To summarise, the published book (and the CD-ROM we are now working at) constitute a multiple directions repertory. It contains clearly described sufficiently well known effects and which are easy to find or “in situ” or through hearing. It gathers the “classical” effects of culture and urban environments. Finally, like in music, the meaning of the effect is long-lasting only if it is really played, performed by actors as well as by listeners. Motionless competence is not sufficient. Let us be good crickets!

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