

# ASTUCE Research Project: one way to evaluate urban soundscapes

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## ABSTRACT

ASTUCE, “Ambiances Sonores, Transports Urbains, Coeur de ville et Environnement” (Sound Ambiances, Urban Transport, City centre and Environment), is a research project aiming to provide a relevant methodology to improve the environmental quality of city centres by considering the concept of soundscape. The project gathers researchers from two laboratories belonging to two higher national schools of Architecture (GRECAU-Bx and CRESSON) and a National Transport Research Institute. The way the researchers want to approach this topic is by integrating the sensitive character of urban sound ambiances and the city dwellers sound experience. The goal of the project is to develop a global approach that helps local authorities, decisions makers, urban planners and town designers in the decision making process. By collecting information about the urban sound environment, identifying those that satisfy the city dwellers’ expectations and those that have to disappear or be modified, short- and long-term strategies will then be validated in complement of the noise action plans in line with the European Environmental Noise Directive. The paper deals with the first phase of the research project explaining how they brought together their own methodologies applied on two urban areas where several modes of transportation are available, among which the tramway and giving some results of the different surveys. A later phase will concern the elaboration of user instructions intended to the different actors listed above in order to consider the soundscape characteristics. After which they propose to work out a methodology that not only intends to avoid and abates noise pollution, but also to contribute to improve the environmental quality of the city centre. To assist urban design actors in this complex task the ASTUCE project aims to develop a guidebook which comprises recommendations on organisational settings, on the involvement of different societal stakeholders, including the public, and action planning process, in the future.

## INTRODUCTION

Within the framework of the implementation of policies (local strategies of Agenda 21 for example) aiming sustainable urban developments, local authorities must have suitable methodologies to make the most judicious choices on the level of the organization of the PADD, PDU, RAINED, SCoT... This is a necessary condition to ensure a qualitative sound environment, particularly in residential areas exposed to transport noise.

The improvement of the environmental sound quality is not only related to a reduction of harmful effects and annoyance, but it also has to do with a good balance between “calm and noise” according to the specificities of the urban area: residential, commercial, leisure... with adapted transport infrastructures. Summarizing, we could say that a situation just below the discomfort threshold is not agreeable, but an environment of quality ensures the absence of annoyance. It is thus necessary, as the authors of the PREDIT document (2007) « *Bruit des transports. Etat et perspectives scientifiques* » [1] underline, to propose indicators adapted to the qualification of

urban environmental noise in addition to the prescribed indicators as the  $L_{den}$  or the  $L_{night}$  which are used for the noise maps. Evaluating the urban sound situation by measuring only the energy values is not enough considering the complexity of sound environments, which are not necessarily saturated, as in the proximity of peri-urban infrastructures. The capacity to evaluate and describe urban sound environments in a general way (multi-source, multiexposition) in the outside spaces allows a better taking into account of their results and consequently a better integration in the proposals of urban development which induces an attenuation of their impact on acoustic comfort inside the buildings. Until a reflection on the sound quality of public spaces develops, the resident has much to gain in well-being (the possibility to live with open windows during a part of the year for example).

Consequently all the users of the city have to be concerned by these studies on the sound environment. It is necessary to know their representations of the urban ambiances and their requests of the acoustic quality, without focussing only on their experiences with annoyance, in order to develop relevant tools which assist the decision-makers in urban devel-

opment. This is exactly the objective of the project carried by GRECAU-Bx, Higher national school of architecture and landscape architecture of Bordeaux, 740, cours de la Libération, BP 70109 - 33405 Talence cedex, in partnership with INRETS, 25 Avenue François Mitterrand, 69675 Bron Cedex and the UMR CNRS 1563 (CRESSON), Higher national school of architecture of Grenoble, 60 av. de Constantine, BP 2636, 38036 Grenoble Cedex 2 and financially supported by the ADEME.

## METHODOLOGIES USED FOR THE STUDY

### Methodology of GRECAU

To carry through the research on the urban sound environment, GRECAU bases its research approach on the concept of soundscape proposed by the Canadian composer R. Murray Schafer [2]. Taking inspiration from the work of Kevin Lynch "The image of the city" [3], it uses the soundwalk method. Binaural audionumerical recordings are provided following routes which are specific for the studied urban space, during a maximum time of half an hour.

All along the routes photos are taken in order to keep evidences of the urban morphology and the occurring "sound-scenes" (significant sound events [4]). The method is described in all details in the Special Issue vol. 92 of Acta Acustica [5].

The selection of the walking route depends on the objectives of the research: we can for instance study different urban forms with a similar type of traffic, or a particular urban space with a large variety of sound sources. The choice for a route of half an hour is related to the time it costs to cross by foot relatively homogeneous sectors of the average European city in terms of urban fabric or activities, while staying compatible with the variability of the same parameters.

It is obvious that the urban noises constantly fluctuate with time and the observation time of approximately half an hour is too short to create a complete picture of the site. Therefore, soundwalks have to be conducted several times a day and several days a week (at least 3 days: a working day, a weekend day and a holiday).

As the urban soundscape is composed of a large variety of sound sources, only a phonography (word proposed by Abraham Moles [6] about analogous sound recording by photography) is able to preserve the sound specificity of urban sites.

Thus the recordings can be used to interview people on their opinions about the quality of the urban sound environment [7] as well as to inform and consult the public. Listening to a city is trying to seize a mental representation which is essential for the comfort of city-dwellers and inevitably, it has to be taken into account by decision-makers and urban planners.

#### Data from the soundwalk

The recordings are carried out with a binaural microphone system (equivalent to a "dummy head") carried by walking persons and plugged to a digital recorder (see Figure 1). This recording equipment is very user-friendly. Moreover, all acoustic characteristics (intensity, frequencies, duration, and spatial effect) are registered.

Finally, since these recordings are performed at the soundwalker's height, and not at the standard height (height of 5m and 2m away from the facade), the obtained signals are similar to the natural binaural listening of pedestrians.

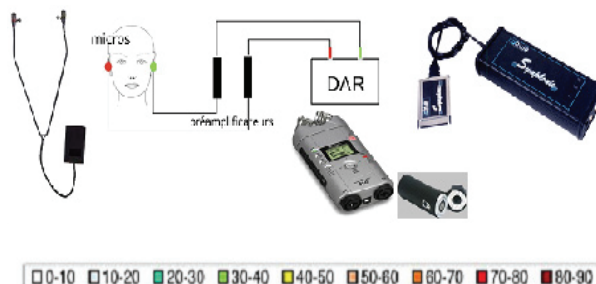


Figure 1. Recording equipment, Symphony card and the coloured scale of ESL.

All the soundscapes heard on the recordings are checked up on the photos and on the "acoustic images". The 2D representation corresponds to the evolution of the Equivalent Sound Level (coloured scale Figure 1) versus frequency (Y axis with lower frequency at the upper point) during the soundwalk time (X axis), and gives, as such, a visual translation of the auditory impression (Figure 2). By comparing the left and the right track at the same place and at the same moment it is possible to assess the role of the urban form, of the façade architecture, of the traffic or other activity on the evolution of soundscape. The spectral analysis also gives information about the pleasantness or the unpleasantness of a sound signal and about its effect on the soundscape compared to other sound sources.

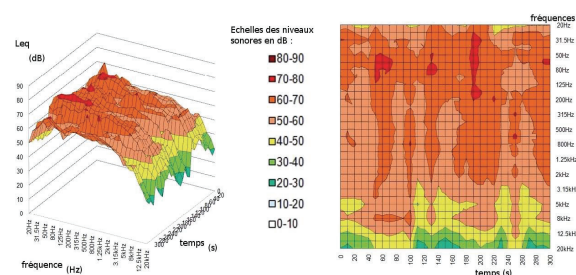


Figure 2. 3D spectra representation and acoustic images of the same soundwalk

#### Urban morphology data

Due to the essential role of urban morphology in sound propagation, all architectural characteristics (street-shape, facades' material, etc.) must be studied. To establish the role of the urban morphology on the soundscape, soundwalks are performed following a route that crosses sites with very different urban forms.

But practices related to urban destinations (residences or office buildings, industrial or commercial areas...) also have to be analysed in order to qualify the soundscape. All the "sound-scenes" (significant sound events) are characteristics of urban activities. By accompanying the recordings in situ with photos, a soundwalk is representative for the sound-scenes that may occur in relation to the specific activities on the taken route. We are interested in the data which highlight the relationship between a site's soundscape and its morphology, because this is regarded as the first element the urban-planner will modify.

#### Subjective survey tool

The soundscape concept enables to describe the acoustical ambiances in a general way. To take into account how the city dwellers appreciate the sound environment of their town could explain also how they can appropriate it. With this aim in mind, a questionnaire is elaborated in order to identify the frequentation patterns of the studied sites, their use as well as the perceptions and evaluations of the users concerning the

different interacting environmental aspects, in particular the dimension of sound. Even if our main focus is the urban sound environment, it is nevertheless essential to approach it with the different dimensions of the physical and social environment of the studied sites.

In this way, the environmental study allowed us to seize the overall context of the frequentation of the different sites, in order to be able to interpret in a detailed way the collected evaluations of the sound environment. In the framework of the project, considering our objectives to create a representative sample of users of the area around the site (inhabitants, shopkeepers, passers-by and people working there), it is necessary to have at least a sample of 50 respondents. Besides, the questionnaires have to be distributed in situ, at the same time as the planned soundwalk.

#### Data collection

The so collected data are presented by means of card-indexes [8]. Each card-index contains data that are useful for characterising and grasping the site's soundscape quality. The recommendations for soundscape design based on the collection and assessment of these data from the point of view of future urban planning are listed on the last card-index.

#### Methodology of CRESSON

For the ASTUCE project, two types of intervention were carried out: a series of commented walks and a series of comments on amplified listening.

The commented walks [9].

This method makes it possible to cross contextual data, sensory impressions and representations. First we defined with the other teams a common route traversing each of the two sites; then selected and recorded a sample of "experts" commenting their own route in real-time. By expressing the felt impressions and by crossing criteria of various natures (visual, sound, tactile, olfactive, gestural, but also architectural, climatological, physical, cultural...), the collected words show the modes of perception in situ at the time of the survey.

The use of "experts", that's to say people aware of urban questions and/or problems of sound, allows the collection of more detailed and in-depth data than with anonymous passers by. The commented walk implies a true engagement on behalf of the questioned person. Second advantage: a few months after the survey we gathered these "experts" on each site in order to present them the first results and to collect their reactions and feedback.

Six commented walks were recorded on each site. Technically, the respondents are completely free in their movements and free from equipment. The recording of their comments and the ambient sound situation is carried out by a microphone on an "artificial head" carried by the researcher who walks next to them. The route, identical for all the 6 participants, was defined for each site: an outward and return route on both sides of the street in Grenoble; a large circle route around the place in Bordeaux, followed by a walk around the tower of the cathedral.

Comments on amplified listening [10].

Complement to the preceding technique, this type of interview allows to question the passers-by and inhabitants in an at random and quantitative way. It aims to seize as closely as possible the sense in the ordinary perception of sound spaces. Willing to go beyond the stereotypical talks in terms of an-

noyance and noise, the commented listening of identity sound fragments of the place generates stories about the daily experiences and imagination

Concretely, we chose and studied successively three particular places per site, named "zoom points. On each one we installed an armchair on which the respondent, recruited among voluntary passers-by, took place. This person is equipped with a mask completely blocking his/her vision, and headphones diffusing, a little more amplified, the local sound environment of that moment. After a few moments of acclimatization, the researcher engages the conversation around four key questions:

- The description of the sound elements
- The reference to similar places, city or elsewhere
- The typical sound environment of a downtown area
- Which film scene is evoked by this listening?

The situation is recorded: comments + sound environment.

#### Analysis

This technique of guided qualitative interviews makes it possible to clarify the elements composing a complex situation which mixes the historical, the lived and the projected aspects. By crossing the answers between the concrete attitudes, the explicit words and the underlying images, this research method makes it possible to build a true panorama of attitudes and involved opinions, while respecting their nuances and the characteristics of their expressions.

#### PRESENTATION OF THE STUDIED SITES

The main hypothesis on which the ASTUCE project is based is that the degree of complexity of the urban sound environment implies an interdisciplinary approach which can take into account the multiplicity of the sound sources, the diversity of urban spaces in morphology and in use, and the expectations of the citizens with regard to acoustic comfort.

The corollary hypothesis is that even when the research teams which gathered to propose ASTUCE, are internally multidisciplinary, they have much to gain in confronting their respective methodologies in order to provide to the decision makers an original tool which allows not only to describe the urban sound environments but above all, to help them to understand the differences which enables them to act on the most determining parameters.

To test and to check these hypotheses, the partners of this project decided to work on two experimental research sites which present similarities regarding functions, urban activities and modes of transportation but are very dissimilar in morphology: The Place Pey-Berland in Bordeaux and the Rue Félix Poulat in Grenoble.

These two sites located in the heart of the city are spatially differently organized but are comparable with regard to the functionalities and transport systems. In the field of urban acoustics, the comparison in terms of architectural morphology seems to us an essential contribution to widen the reference field supporting our results.

#### Place Pey-Berland in Bordeaux

The Place Pey-Berland in Bordeaux on which the Saint André cathedral and the city hall are located is situated in the very heart of the city. Since the implementation of the tram at

the end of 2003, two lines intersect and have a stop on one part of the Place where also motorized vehicles are authorized (Figure 3).



Figure 3. Map of tramway lines Place Pey-Berland

The other part is only pedestrian and used as a church and town hall square with the café terraces around the place. Although sliding sports are forbidden, the square is used by many skaters and rollerbladers. It is a very mineral space in spite of the presence of some trees in the surrounding area. It brings many urban activities together, each with a particular sound, composing a multiform soundscape.

### Rue Félix Poulat in Grenoble

Rue Félix Poulat in Grenoble is the main axis of the downtown area. It covers the 200 meters separating the Place Victor Hugo and the Place Grenette, and changes then in the Rue Raoul Blanchard. The common trunk road of two tram lines passes by this street, with two stops at each end (Figure 4).



Figure 4. Map of tramway lines Rue Félix Poulat

Although it is officially pedestrian, bicycles, rollerbladers and, despite everything, many motorized vehicles pass through as the street has residential and commercial functions. This U-shaped, tree-planted street, unites the rather traditional problems related to the handling of the multiform soundscape of a downtown area.

## IN SITU SURVEY ORGANISATION

The aim of this project is to emphasize the most relevant indicators for the comprehension of the sound situation of two spatial differently organized city centers, but with comparable functionalities and transport systems. To analyze the chosen and developed research techniques of each team, as it is not a question of competition but of complementarity, it is necessary to confront these two methodologies. This is the first phase of the ASTUCE project. It allowed organizing the survey campaigns.

### Choice of the survey periods

The survey campaigns on the 2 sites were organized as close in time as possible: 15, 16 and 17 May, 2008 in Grenoble and 29, 30 and 31 May, 2008 in Bordeaux, in order to avoid variations due to climate, festivities, vacation... In each city, the two teams simultaneously applied each day the methodologies on three different moments according specific activities, morning, lunch hour, end of the afternoon. The choice of the three days (Thursday average weekday, Friday end of the work week and Saturday day off for part of the population), each marked a priori by different activities, allows once more to avoid another temporal bias.

### Choice of the in situ routes

There is a lot of similarity between the currently used methodologies of CRESSON and GRECAU, as they use the same basic sources. In particular, they are based on ones experiences during a soundwalk or a commented walk in situ.

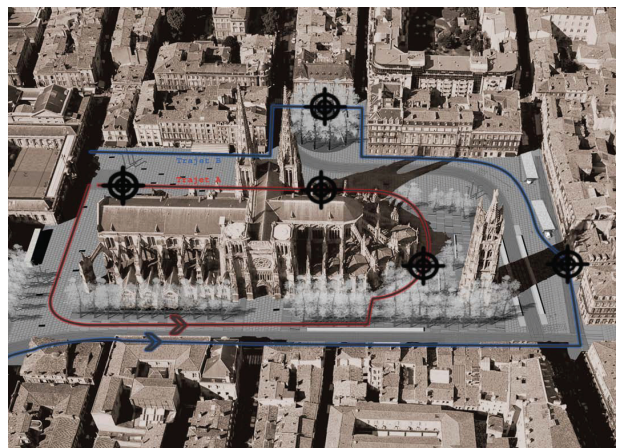


Figure 5. Routes A (inside in red) and B and fixed points Place Pey-Berland

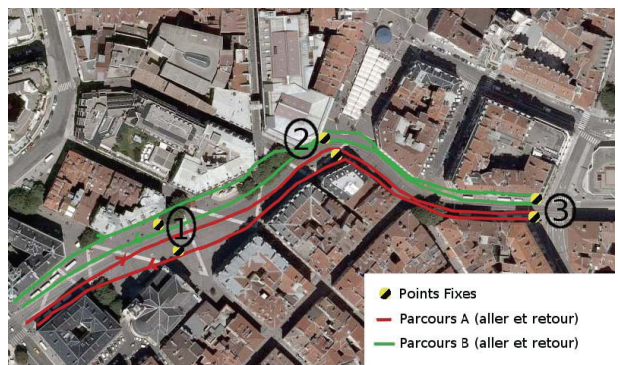


Figure 6. Routes A et B and fixed points Rue F. Poulat

In each site, the routes had to be walked simultaneously in order to determine the impact of the urban morphology (GRECAU) or be accompanied by an participant external to the project, but selected for his or her competences in urban

planning or sound environment (CRESSON), (Figure 5 and Figure 6). In addition a certain number of fixed points (or zoom points) were selected in order to make sound recordings (GRECAU) and have comments on amplified listening (CRESSON).

**FIRST RESULTS**

The goal of the research is not to assess, to evaluate and/or to compare the soundscape quality between several sites or moments, contrarily to other research projects such as SILENCE [11] for example. It rather concerns to highlight the more relevant data collected by each method and to enrich each other. So, the first results presented here want to underline the complementarity of the two methods.

**Urban morphology**

The data from the architectural site survey are shared by all the ASTUCE project partners and are also used by the urban planners. That's why they are necessary in the evaluation of the sound environment quality. For this project, they form one of the criteria in the choice of the sites: one is more or less open and the other is U-shaped and closed.

At the 2 sites, the cornice outlines of the façades are very close to the balconies, there are a lot of ornagements and stone surfaces. The collected data concern the buildings height, topography of the parcel, road and façade materials, urban furniture and all types of natural sound sources such as animals, vegetation, water in different forms (river currents, basins and so on).

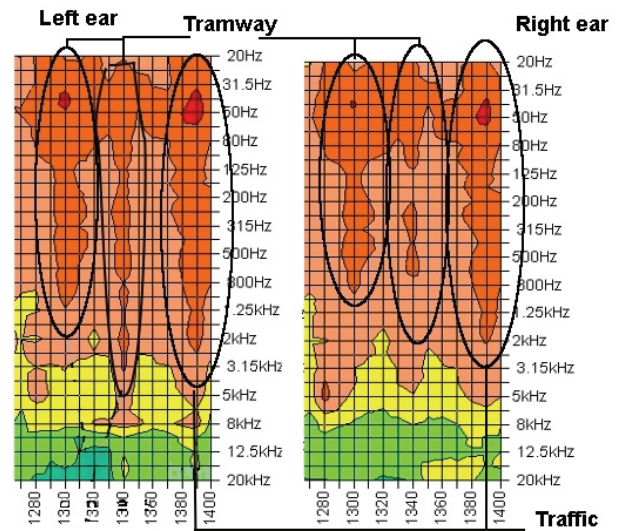
The data are gathered and arranged by means of tracings with pictures and drawings. They can complete or be completed by GIS data base information. The other urban information indexed and recopied on these tracings are: the modes of transportation, human and mechanical activities.

**Informations from acoustic images and questionnaires of GRECAU**

The analysis of the acoustic images and the listening of the soundwalk recordings allow to identify in each city, on different moments, the zones (called here "passages") with their characteristic sounds which vary little during all the day. This site segmentation can be done according different criteria, also complementary: urban morphology, types of activities or sound ambiances...The approach to do the two soundwalks always at the same time made this fractionation very fine.

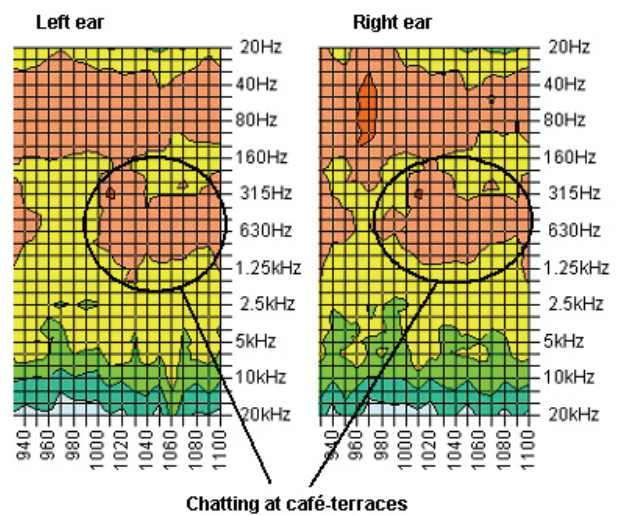
Some of the "passages" are characterised by an animated soundscape with a lot of human activities such as café-terraces or pedestrians zones (Equivalent Sound Level higher in the medium frequencies range on the acoustic images). Others are characterised by car traffic and public transportation (Equivalent Sound Level higher in the low frequencies range on the acoustic images) and in the quieter ones the natural sounds are more clearly perceived (weak background noise level).

As all the "passages" were determined a posteriori, it was not possible to carry out the same number of interviews on every "passage" for the questionnaire survey. Thus, there is no significant sample of responses per "passage" allowing to cross-check the opinions of the users with the underlined sound characteristics based on the analysed recordings. But some cross checkings show the relevance of making such a partition. It underlines the sound complexity of a site which seems to form only one urban area.



**Figure 7.** Acoustic images from Rue F. Poulat: tramways passing-by and traffic noise in a U shaped street

The analysis of the acoustic images allows to highlight the emergence of the urban activities in the soundscape: the tramway passing-by (Figure 7), a fountain jet, chatting at café-terraces (Figure 8)... It also highlights the role of the urban morphology in the perception of soundscapes thanks to the comparison between the left and the right tracks: strong visual similarity fits with a "closed" space such as an U shaped street (Figure 7) and/or spaces overflowed by noise, different patterns are the mark of an open space (Figure 8) in which the sounds are "diluted" but spatially more precisely perceived.



**Figure 8.** Acoustic images from the Place Pey Berland: chatting at café-terraces in an open space

The used questionnaire aims to identify the way the studied sites are frequented and used, as well as the perceptions and evaluations of the users concerning the various interacting environmental aspects, with a special focus on the in this way recontextualized sound dimension. The objective of the surveys in Bordeaux and in Grenoble was to approach the nature of the collected data, these of the results obtained from the analysis and the form under which the totality of this information could be produced.

The analysis of the answers highlights that the questionnaire enables to clearly identify the practices, the uses of the places but also to collect the perceptions and representations of the site.

Thus, the Place Pey Berland in Bordeaux is mainly used by inhabitants of the district or those who regularly cross the place on their way somewhere else or shopping. Generally they stay some minutes to a quarter of an hour.

The users are very attached to the place, satisfied with its development, the activities it allows, and very satisfied from the point of view of its social aspects.

Generally speaking, the Rue Félix Poulat in Grenoble shows the same characteristics as the site of Bordeaux. However, this place is not suitable for a lot of activities.

Concerning the urban sound environment, we observe that the sound landscape of the two sites is on the whole made up of the same sources. However, among the identified sequences for the same site, each of them is marked by different evaluations as well qualitatively as temporally. These results underline the interest to make a fine space-time acoustic study of the considered spaces.

### Emerging elements from the surveys of Cresson

During the surveys, 23 interviews were carried out on the zoom points in Bordeaux and 25 in Grenoble. Three key points organize the results:

#### 1 - The feeling to be in the city [12], [13].

Which sound components give this feeling and reinforce this idea, and which don't? Which are the sound characteristics processing this perceptive construction?

a) It concerns a polyphonic world, composed of many sources selectively listed by the interviewees. This polyphony-diversity contributes to this feeling to be in the city.

b) Two spatial sound features emerge, as well in Grenoble as in Bordeaux: on the one hand, the sound of the fountains whose echo can be heard outside the installation site. Water is not necessarily very appraised by people, but it is present in many ways, in particular the rain.

On the other hand the soil. In Bordeaux, a space covered with gravel questions the urban quality of the place and has more to do with a garden or a park than a city center. The nature of the soil, from the point of view of its planning, is more revealed by its acoustic properties than its visual ones; soil noise is an important spatial feature.

c) The balance between mechanical noises and human noises. In the places of the city center, the presence of other persons manifests itself by the sound of voices, conversations, the proximity of physical bodies. But to create a downtown area, more largely "to create urban quality", one needs also mechanical noises. It is the balance between these two types of sound sources which is decisive for the place to become a real city. Concerning the proportion between the two, a lot of opinions exist. Some want to eliminate the cars completely, others, on the contrary, want to keep them because their circulation also belongs to the spirit of a downtown area. These choices shape the equilibrium of an often fragile sound world and reveal a consensus in constant evolution.

d) The territorial boundaries of city center noise. What does noise tell about the territorial boundaries of a city center? Very often those are determined by traffic regulations: a pedestrian space is bordered by axes of circulation. The demarcations precede consistent perceptions: sound, functional and visual go in the same direction. Thus, sound participates also in the creation of the territory of the city center, there where one can feel to be in the center.

## 2 – Mobilities and Temporalities.

a) From drone to silence. Between these two extreme poles unfolds the whole range of sounds: emergences, traffic circulation activities, events, markers, signals... All the sound elements which give rhythm to the life of the city space and which, most of the time, are related to mobility, movement and temporality. Sounds constitute a calendar on various scales: the rhythm of the seasons, that of the weather, the daily cycle, night/day, the hours, the holidays... Depending the hours and its users, the city is not the same.

b) Sonic markers of time. In the two studied cities, the church bell or the bell of the tram belong to the identity markers of the city. Depending the persons the equilibrium of what is a dead city or a animated city is different. A city considered to be too calm is not a real city; and a city with too much animation risks saturation. Animation wants to say a mixture of sounds, even becoming a nuisance: what is the nuisance threshold of the city? Sound is a good indicator of equilibrium points, points of tension or complaints to understand and measure social acceptance.

c) The tramway structures the space. It is a landmark of the main urban axis, a guide of movements presenting at the same time the kinetic and sonic feeling of the place. It identifies the urban quality of the place. The tram is, in the two cities, in an organic way of speaking, a constituent part. When the tram plays a primary role in the big shifts of population within an agglomeration, it plays a secondary part in the downtown area as it only gives access to populations who do not live there. This secondarity goes of course beyond the sound aspects, even if it takes an active part in it.

#### 3 - If it was a film scene? The imaginary space [14], [15].

Four elements are mentioned from the point of view of the imaginary construction of the space by sound, such as people hear the place.

a) The development of a daydream of expectation, of transition. When the respondents are asked whether the "listening" of the place makes them think of a film scene, they answer and speak in terms of a past scene or a future scene. The present is rather lived as an "in between", as between two actions even if these actions are very distant in time. Characteristic of what people are hearing, is this expectation, this position of waiting. Respondents evoke a feeling of transition, installed and permanent. There is a kind of serene potentiality, openness to the nondefined, the unexpected possibilities. This attitude is extremely interesting from an urban point of view as it characterizes one of the important functions of the public space: permissiveness, the possibility to imagine and express freely.

b) A varying imaginary scene, between peaceful climate and stress. Certain listeners will find the listening extremely stressing because of the screeching tyres of a passing car, of a delivery truck or of two trams passing each other... Without this event, sometimes very short, the environment is considered to be calm. So, one is at the mercy of a stressing sound against a peaceful background noise which will overwhelm for a time the conscience.

c) The fictitious scenarios they tell are linked to real sounds. Sounds related to transport, circulation, meetings, voices, etc. So it is not a question of pure imagination, but sounds wake the imaginary existence. Their story starts with the sound which gives a direction. Each film or imagined scene is led by a set of real sound indices, all of a different nature, given by circulation, transport, people who meet each other, voices revealing people of different age and sexe. The indices give

the direction: the sound fully determines the construction of the sense, and thus of the construction of a scenario. A public space with strong sensory characteristics is a source of imagination, even when it can't be told.

d) The daydream connects different epochs. As well in Bordeaux as in Grenoble, the relatively peaceful atmospheres that people hear are often associated with an "old French film" or an old film. One person expressed it as follows: "sounds of the 21st century in a patrimonial space". Here the distinction is made between the "heard" space and the "felt" space. There is thus a logic which mixes various epochs, linking to a history, to a chronology the detected perceptive elements at that moment. What means an old French film? Is it in black and white? To which period are they referring? Without entering in details, it concerns a collective resurgence of a memory, a real shaping of a collective memory caused by sounds.

## CONCLUSION

At this moment we finished all the interventions on the two sites and the main part of the analyses method by method. The mass of information collected in situ is considerable, as well as regards recordings of soundscapes as morphological and sociological descriptive comments. The distinctive sound characteristics of each site are clearly related to the presence of traffic, passing trams, conversations on cafe terraces, water, the nature of the soil... as much as the user can think about. The method of GRECAU is based on the site as it is and as it is perceived by the citydwellers. The method of CRESSON calls on their memory and their imaginary abilities to underline their expectations with regard to the urban soundscape.

In order to achieve the project, there still are two phases to be passed: the first consists in establishing the link between these data and those which result from the measurements or calculations meeting the standard NF S 31-130 or the European directive being used to establish the noise maps, at this moment the only available tool for decision makers. These comparisons must feed the debate between quantitative and qualitative approaches, not to oppose them in an unfruitful way, but to better specify the real relevance of each one as well as the fields where it is not legitimate, in a multidisciplinary objective of complementarity.

The last phase of the ASTUCE project leads to the development of a specification chart aiming to develop a methodological guide of sound ambiances, from subjective to rational: to create a method, a toolbox, which links keywords as territory, implementation, transport, heart of the city, perception, feeling, acoustics, acoustic energy or noise level.

This guide which could be called "Multidisciplinary tools for the description of urban sound environments" wishes to take part in a general approach which allows the decision makers and the urban developers, already in an early phase of the pro-gramming and then the urban project, the taking into account of modifications of the soundscapes which can result from the operations of reorganization of the city.

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