

# Acoustic Design: Auditory Perception of Urban Public Spaces.

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## 1. An Introduction to WFAE and CRESSON in Relation to Multidisciplinary Design

Developing and adopting a heightened global perception of space as individuals and designers aspires for a superior sensory engagement within urban architecture. As experience and perception in urban architecture is discussed, the auditory perception of space as well as its connections to global perception and their interconnection to experience of space and place are the main focus. Taking an approach from the architect is not necessary when attempting to understand flaws in acoustic design. The architect is the designer of the space, therefore s/he is appropriated the roll of all areas of design at first hand, supposedly including all aspects of design, not just the visual aesthetic which tends to be the fundamental perception in an architect's work<sup>1</sup>. This opens discussion to the architect's design collaborators, if the acoustic design of our urban soundscape is going to be articulated upon meticulously, as is visual design; it must be initiated by specialists (acousticians, acoustic ecologists, sound artists, soundscape designers.) Sound awareness must be studied and practiced to establish an improved sonic environment for inhabitants of public urban architecture. Modal listening techniques are considered to heighten auditory perceptions. A number of practitioners including R. Murray Schafer, Pierre Schaeffer, Robin Minard speak of these listening modes<sup>2</sup> as they practice them themselves to sharpen their aural senses and gain further understanding of our sonic environment. Practicing sound walks and site-specific sound installations engages us with our sonic surroundings. Noise abatement and unawareness of sound takes place in everyday life which causes unprioritized design of urban space and decreased attention to acoustic design. Noise has proven difficult to comprehend (noise abatement<sup>3</sup>) as a pollutant as it lacks a visual reference, making it a lesser concern than other ecological matters.

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<sup>1</sup> D.J. Croome, *Noise, buildings, and people*, Pergamon Press, Oxford, 1977, p. 6.

<sup>2</sup> P. Schaeffer, 'Acousmatics', in *Audio Culture. Readings in Modern Music*, C.Cox & D.Warner (eds), Continuum, New York/ London, 2004, pp. 76-79.

<sup>3</sup> R.M. Schafer, *The Soundscape: our Sonic Environment and the Tuning of the World*. Rochester, VT, Destiny Books, 1999. p. 3.

*“Noise pollution results when man does not listen carefully. Noises are the sounds we have learned to ignore. Noise pollution today is being resisted by noise abatement. This is a negative approach. We must seek a way to make environmental acoustics a positive study program.”<sup>4</sup>*

Through exploration of the WFAE<sup>5</sup> (World Forum For Acoustic Ecology) ‘Soundscape’ Journal series (2000-2016) & CRESSON<sup>6</sup> (Centre for Research on Sonic Space & the Urban Environment) Research Projects / Articles this essay will investigate the design, experience and perception of urban space as perceptual beings, mainly in referral to our auditory perception. The World Forum for Acoustic Ecology (WFAE) has been evolving since 1993, and was founded by many members of the active international acoustic ecology community, such as Hildegard Westerkamp, Barry Truax, Bruce Davies, Peter Huse and R. Murray Schafer, some of the original members of the World Soundscape Project (WSP). It is made up by affiliated organisations from all over the globe; UKISC (United Kingdom), JASE (Japan), MFAE/FMEA (Mexico), FSAE (Finland), HSAE (Greece), CASE/ACES (Canada), AFAE (Australia), ASAE (America). This collective of organisations are all dedicated to the study of the acoustic environment. WFAE members represent a multi-disciplinary spectrum of specialists engaging in the study of the social, cultural and ecological conditions of the sonic environment.<sup>7</sup>

*“WFAE'S Mission:*

- *WFAE works in collaboration with its worldwide network of Affiliated Organizations to promote:*
  - *Education - in listening to the soundscape, sharpening aural awareness and deepening listeners' understanding of environmental sounds and their meanings.*
  - *Research and Study - of the social, cultural, scientific and ecological aspects of the sonic environment.*
  - *Publishing and Distributing of information and research on Acoustic Ecology.*

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<sup>4</sup> *ibid.*, p. 4.

<sup>5</sup> 'World forum for acoustic ecology', n.d., <<http://wfae.net/>>, accessed 9 Dec. 2016.

<sup>6</sup> 'Laboratoire AAU: Ambiances architectures Urbanités', 2016, <<http://aau.archi.fr/cresson/>>, accessed 10 Dec. 2016.

<sup>7</sup> 'About the WFAE', n.d., <<http://wfae.net/about/index.html>>, accessed 9 Dec. 2016.

- *Protecting and Preserving existing natural soundscapes and times and places of quiet.*
- *Designing and Creating healthy and acoustically balanced sonic environments.*<sup>8</sup>

CRESSON (Centre for Research on Sonic Space & the Urban Environment) was founded in 1979 at Grenoble's School of Architecture by Jean-Francois Augoyard (Philosopher), Jean-Jacques Deletre (Acoustician) and two of their architecture students Gregoire Chelkoff and Oliver Balay. CRESSON developed a cynosure for the perceptible environment in conjunction with architectural and urban atmospheres<sup>9</sup>. They are now a multidisciplinary organisation taking into account anthropology, sociology, geography, engineering sciences and anything else that could possibly contribute to or influence architectural design scenarios and processes, "a sensory ethnography of the urban world".<sup>10</sup>

*"After concentrating initially on the sound space, the laboratory extended the scope of its inquiries in the 1990s to include the many dimensions of in-situ sensory perception. Our research addresses phenomena related to light, heat, smell, touch and bodily movement. The research draws on original multidisciplinary methods, which exist at the meeting point between human and social sciences, between architecture and engineering science."*<sup>11</sup>

Speculation on the Methodological Sound Awareness Survey<sup>12</sup> completed in the time-frame of September 2009 to March 2010 by members of the WFAE debated the relationship between members of the public and their sound awareness in the selected urban spaces. Case study One focused on a Methodological Protocol / Experiment Survey on Global ambiance : Correlating perceptive and physical data, lead by the urban planner Solene Marry; listening to and understanding our public urban soundscapes. Case study Two focused on acoustic design, city planning and sound art installation within public urban architecture, in particular Bernhard

<sup>8</sup> 'World forum for acoustic ecology', n.d., <<http://wfae.net/>>, accessed 9 Dec. 2016.

<sup>9</sup> 'Describing urban ambiances: The CRESSON research laboratory', 6 Mar. 2013, <<http://wi.mobililities.ca/describing-urban-ambiances-the-cresson-research-laboratory/>>, accessed 3 Nov. 2016.

<sup>10</sup> Thibaud, J. (2010). A sonic paradigm of urban ambiances? SoundActs conference, September 23-25, Aarhus, Denmark [Audio online]. Retrieved June 20, 2011 from <http://www.ambiances.net/audio/Soundacts/sessions/JP-Thibaud.mp3>, accessed 8 Dec. 2016.

<sup>11</sup> F. Acquier et al., 'European Acoustic Heritage web', *Research Papers* [online journal], vol. 17, no. 18, 2012, <[http://europeanacousticheritage.eu/wp-content/uploads/2012/09/EuropeanAcousticHeritage\\_web.pdf](http://europeanacousticheritage.eu/wp-content/uploads/2012/09/EuropeanAcousticHeritage_web.pdf)>, accessed 19 Dec. 2016.

<sup>12</sup> S. Marry, 'Spatial and Sonic Evaluation of Urban Ambiances', *Sonic ambiances, The Journal of Acoustic Ecology*, vol. 10, no. 1, 2010. pp. 18-22.

Leitner's work *Ton-Field IBM Vienna*<sup>13</sup>. Analyzing case studies from these specific fields sums up a coherent discussion concerning our auditory perceptions of acoustic design in urban space and how can we lead acoustic ecology 'Soundscape Studies' and acoustic design into today's design and awareness of urban architecture.

*"Experience sound as something that can be handled, moved in time and space, stored, exchanged, independent of the ephemeral temporal and spatial contingencies of its coming into presence. That reframes the ecological functionalities that auditory perception can perform..."*<sup>14</sup>

## **2. Acoustic Ecology 'Soundscape Studies'**

*"The home territory of soundscape studies (Acoustic Ecology) will be the middle ground between science, society and the arts."*<sup>15</sup>

Acoustic Ecology or 'soundscape studies'<sup>16</sup> is an exploration of how living beings react to their inhabited environment through the mediation of sound and can be looked at through many different perspectives. Some perspectives involve the minimization of unwanted sound or noise pollution in order to nurture and preserve the characteristics of a sound environment. Others deal with how living beings relate to their sonic surroundings, (psycho-acoustics, physical acoustics, cultural meanings of sound) to provide an educational purpose guiding architects and other professionals when designing urban and landscape architecture to contemplate environmental sound. Another perspective is to use sound as an art-form or artistic element in which acoustic ecology brings forth use of sound, recorded sound or the creation of soundscape to stimulate environmental surroundings, heightening the importance of our sonic environment and conscious listening skills.

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<sup>13</sup> B. Leitner, *Sound: Space*, Cantz, Ostfildern, 1998. p. 182.

<sup>14</sup> A. Di Scipio, 'Sound Object? Sound Event! Ideologies of Sound and the Biopolitics of Music', *Soundscape. Music and ecologies of sound Theoretical & practical projects for a listening of the world. The Journal of Acoustic Ecology*, vol. 13, no. 1, 2013.

<sup>15</sup> R.M. Schafer, *The Soundscape: our Sonic Environment and the Tuning of the World*. Rochester, VT, Destiny Books, 1999. p. 3.

<sup>16</sup> K. Wrightson, 'An Introduction to Acoustic Ecology', *Soundscape. On International Noise Awareness Day 1999 two hundred students walked through the city and did nothing but listen. The Journal of Acoustic Ecology.*, vol. 1, no. 1, 2000. p. 10.

*" - Urban and landscape architects should take auditory perception into account. The perceptions of all senses should be dealt with to the same degree and the visual should not be favored...*

*- Urban and landscape planners and designers should create sonic environments, which form part of their context over both time and space. ... (For example, the sounds of water, wind, songbirds and the human body).*

*- Design tools dealing with auditory aspects should be developed to fit into the process of urban and landscape planning and design. ..."<sup>17</sup>*

Designing a space in relation to auditory perception is rarely practiced as design in 'Architecture' (*the complex or carefully designed structure of something*) falls foremost to the areas of 'most importance' such as visual design and its inhabitant qualities. Collaboration between the creators (architects, acousticians, environmental planners, etc.) of an urban or landscape environment must take into account the richness of sensory experience and global perception<sup>18</sup>, which is situated in the designed space. Thought must be applied to acoustic ambiance of public spaces, rather than scientifically considering sound in areas such as noise control and decibel level. Although noise pollution is very important, a comfortable ambiance for people to enter, experience and exit will have great impact even if the experiencer is conscious of this or not. If acoustic design is approached whilst thinking about our everyday sensory experiences in architectural space, noise pollution and suggested 'unwanted noise'<sup>19</sup> can be shaped by acoustics to become something we become mindful of, and aware of, instead of increasingly blocking out our sonic environment with our subconscious or personal listening systems.

*"... It is a matter of overcoming the narrow natural science based approach which remains at best capable of grasping noise as a function of decibels, and to ask instead what type of acoustic character the spaces in which we live should have."<sup>20</sup>*

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<sup>17</sup> Anon, 'Sonic Urban and Landscape Architecture'. World Forum for Acoustic Ecology Web Site. 1998. Available: <<http://interact.uoregon.edu/MediaLit/WFAE/noise/landscape.html>>, accessed 6 Dec. 2016.

<sup>18</sup> S. Marry, 'Spatial and Sonic Evaluation of Urban Ambiances', *Soundscape. Sonic ambiances, The Journal of Acoustic Ecology*, vol. 10, no. 1, 2010. p. 18.

<sup>19</sup> R.M. Schafer, *The Soundscape: our Sonic Environment and the Tuning of the World*. Rochester, VT, Destiny Books, 1999. p. 3.

<sup>20</sup> Böhme, G. (2000) "Acoustic Atmospheres: A Contribution to the Study of Ecological Aesthetics". *Soundscape—The Journal of Acoustic Ecology* 1 (1). p. 15.

Understanding our soundscape becomes of importance as it shapes our everyday listening experience, what is heard by the listener as an unpleasant sound or a pleasing sound? Proposing an acoustic environment upon an architectural design or structure shapes our perception of sonic identity in relation to that space. Soundscape design for an acoustic environment should enhance our sonic surroundings subtly with use of already existing sounds, (*“the original sounds must stay recognizable and the listener’s contextual and symbolic associations should be invoked.”*<sup>21</sup>) shaping our sonic world to be understood environmentally and developing a consciousness for heightened listening, understanding our ever-changing soundscape.

Our environment around us is sonically changing all the time. The way we perceive the world through sound is a very rich experience, which a lot of the time we choose to block out. Many areas including acoustics, psychoacoustics and noise abatement systems all take part in a relationship between the physical being and the sonic environment around a person. As most of us see our everyday soundscape as just ‘unimportant noise’ we tend to ignore it, having no second thought upon the sonic environment we live in. Our urban soundscape is seen as noise pollution and is therefore scrutinized and subconsciously ignored. We must not be drawn into the ignorance of blocking out the sonic environment we live in, but be mindful of the acoustic atmosphere around us to design soundscapes in a way in which we should all have a rich experience of. Sound should be something to take part in as we listen in everyday life, though some of us just may not pay attention. The further we develop acoustic surroundings and soundscapes the more pleasant it will become to really listen, train our ears to acoustically tune our environmental surroundings. We see people constantly adapting to the sonic environment, generally observing behavioral changes in listening, learning how beings react to their soundscape. Architectural acoustic design can be highly distinguished by creating new future soundscapes through artistic means; the placement of field recordings and subtle sounds in an environment will suggest the new and improved soundscape that is rich and greatly consumed by its inhabitants. *“The soundscape of the world is changing. Modern man is beginning to*

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<sup>21</sup> Truax, B. ‘Soundscape Composition as Global Music: Electroacoustic Music As Soundscape’. *Organised Sound*, 13 (2), 2008. p .105.

*inhabit a world with an acoustic environment radically different from any he has hitherto known.”*

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### Acoustic Ecology in Relation to Sound Art

*“Can artistic and ecological values coexist—or more specifically: can they inspire each other without trivializing each other and, at the same time, create something which is alluring and captures the mind and senses.”<sup>23</sup>*

The rise of knowledge concerning Acoustic Ecology has led to working sound artists responding at first hand to global environmental issues, blurring the line between art and environment or life, focusing on major issues such as noise pollution, pollution, energy use, sustainability, biodiversity and so on in their creative practice. These raised issues have been highly definitive towards a certain environmental movement of sound art *“Soundscape Ecology”*<sup>24</sup> (The combination of fields such as acoustic ecology, bioacoustics, psychoacoustics and spatial ecology.) As we see sound art delving into environmental concerns it brings forth a strong anatomy to an artistic multidisciplinary medium in which the effectual qualities and well being of the ecosystem are present in environmental soundscapes.

*“...when western society appears deeply conflicted about how to approach contemporary environmental issues... The arts can play a major role both in expressing thoughts and feelings related to these issues... helping us to conceive creative solutions.”<sup>25</sup>*

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<sup>22</sup> R.M. Schafer, *The Soundscape: our Sonic Environment and the Tuning of the World*. Rochester, VT, Destiny Books, 1999. p. 3.

<sup>23</sup> S. Breitsameter, 'Acoustic Ecology and the New Electroacoustic Space of Digital Networks', *Soundscape. ...acoustic ecology... an international symposium Melbourne, Australia. The Journal of Acoustic Ecology*, vol. 4, no. 2, 2003. pp. 24-30.

<sup>24</sup> *ibid.*, p. 25.

<sup>25</sup> J. Gilmurray, *ECOACOUSTICS: Ecology and environmentalism in contemporary music and sound art*, 2016, <[https://www.academia.edu/2701185/ECOACOUSTICS\\_Ecology\\_and\\_Environmentalism\\_in\\_Contemporary\\_Music\\_and\\_Sound\\_Art](https://www.academia.edu/2701185/ECOACOUSTICS_Ecology_and_Environmentalism_in_Contemporary_Music_and_Sound_Art)>, accessed 24 Oct. 2016. p. 9.

### 3. Global Perception: Auditory Perception

The dilemma the architect struggles with when designing urban architecture for global perception (perception of all senses) is due to the architect being trapped in a visual reality. The 'new' architect must treat design through the eyes of the inhabitant or experiencer, taking into account the visual, acoustical, comfortable and environmental experience we take part in when entering a new space<sup>26</sup>. Acoustic design falls short in the process of modeling newer architecture, disregarding the way a space should sound progresses to uncomfortable inhabitants and produces noise pollution concerns. If we foresee these design faults the imagined space will be perceived as a comfortable one for the inhabitants. If the architect cannot see the design of a space through the eye of global perception he / she must work with other design influencers such as acousticians and other specialists, *"This synthesis used to be the sole prerogative of the architect. Now he needs many different kinds of specialist to help him realize the total design."*<sup>27</sup> Modern architects are beginning to break down their obsessions concerning visual design elements and think more roundedly, in which a clearer sight is appearing for our sonic environment, *"Perception of architecture is not just a visual one, it's an emotional one too."*<sup>28</sup>

If we begin to think of the environment being perceived by everyone as human beings we open our minds to different means of perception. This takes place by deconstructing our perceptual habits and making way to the 'sense' or 'senses' we habitually ignore. Surely if we are increasingly susceptible to light, sound, ambiance, comfort, material and noise presence we will create a heightened experience or reality for ourselves and also the architect when designing a new urban space<sup>29</sup>. Compromises are made through disregard to our synaesthetic<sup>30</sup> (association of all the sensory impressions or interaction between two or several senses) being and comfort levels and emotional hindrances are caused if we strain to experience a good perception of a space. The correct ambiance must be created to shape our experience on entrance to a space and our sonic surroundings play a huge part in this, *"... sound presence can be unpleasant but*

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<sup>26</sup> A. Magen, *Soundscape. Sonic ambiances, The Journal of Acoustic Ecology*, vol. 10, no. 1, 2010. p. 2.

<sup>27</sup> D.J. Croome, *Noise, buildings, and people*, Pergamon Press, Oxford, 1977, p. 17.

<sup>28</sup> *ibid.*, p. 3.

<sup>29</sup> S. Marry, 'Spatial and Sonic Evaluation of Urban Ambiances', *Soundscape. Sonic ambiances, The Journal of Acoustic Ecology*, vol. 10, no. 1, 2010. p. 18.

<sup>30</sup> *ibid.*, .

*so can its absence; this contextual ambivalence of sound perception is the subject of the study presented here.*<sup>31</sup>

We move through a space (containing an ambiance) to experience it with our own perception guided by which movements we make and our awareness of certain senses, which Walter Benjamin terms as “*Erlebnis*”, a ‘lived Experience’ (A type of experience inscribed in primary reaction to the present and ephemeral moment)<sup>32</sup>. To audibly perceive a ‘space’ or a ‘place’<sup>33</sup> we undergo a completely different experience depending on who we are and what we objectify sounds to, or if we objectify a certain sound to anything at all, (reduced Listening<sup>34</sup>) “*This notion allows us to reconstruct the links, the connections, the bonds; instead of being reified objects, sounds invite us into an act of listening, constituting an experience by which we can change our relationship to the world.*”<sup>35</sup> When we use the term “place” we refer to an experience of another nature, a place we have experienced before or a place we would like to experience, or to recreate the experience of that place for other human beings to perceive it as an individual. When we try to recreate a place’s acoustic environment within a space we are extending the experience of the space, an extended experience within an acoustic environment. Hildegard Westerkamp is one of the initial pioneer’s of acoustic ecology, throughout her projects and academic writings she manifests how her music and sound environments stimulate our hearing, developing awareness of our acoustic surroundings. She had many considerations upon experiencing a soundscape and in many of her works several points of sonic reference, which would normally be overlooked, would be proposed to the experiencer, thus appropriating the space making these referrals form impact on the listener. It is important when structuring an ecologically aware sound environment to have these points of reference, because they relate to experience of ‘place’, the environment Hildegard Westerkamp intends to place the individual in. When the artist is recreating a ‘place’ for others to experience they are contributing an already

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<sup>31</sup> *ibid.*, .

<sup>32</sup> F. Duhautpas & M. Solomos, 'Hildegard Westerkamp and the Ecology of Sound as Experience. Notes on Beneath the Forest Floor', *Soundscape. Music and ecologies of sound Theoretical & practical projects for a listening of the world. Journal of Acoustic Ecology*. vol. 13, no. 1, 2013. p. 6.

<sup>33</sup> *ibid.*, p. 7.

<sup>34</sup> P. Schaeffer, 'Acousmatics', in *Audio Culture. Readings in Modern Music*, C.Cox & D.Warner (eds), Continuum, New York/ London, 2004, pp. 76-79.

<sup>35</sup> Duphatas & Solomos, *op. cit.*, p. 7.

lived experience (a continuous memory) of their own to condition another space<sup>36</sup>, proposing a 'place' situated in an existing structure. As for the newly experiencing individual being situated in the artist's already somewhat lived experience, they will have a completely different perception of the proposed place, *"constructs and metaphors captured as cognitive and perceptual attitudes of human beings in their making-sense of the world – underpin music by structuring in the first place the process of auditory experience. In turn, they are shaped, reinforced or countered, by lived auditory experience."*<sup>37</sup> The individual will be perceiving this 'place' or sound environment for the first time therefore it becomes a 'genuine' experience, a newly formed and perceived soundscape of their own, giving evidence to the possibility of individual experience (a type of experience inscribed in primary reaction to the present and ephemeral moment). Hildegard Westerkamp discovers new ways of making the listener ecologically aware of sound in their inhabited environment with the methodology of sonic 'place' reappropriation.<sup>38</sup>

Experience as 'form' considers first-person navigational experiences. A space contains many unique forms as each individual will experience a different temporal unfolding of a space as they navigate through it. We attempt to capture these experiences through sound recordings but they will never quite be the same as being in the space-time<sup>39</sup> of a sound event. Although we cannot go through the exact same experiential characteristics as the individual did, we can scrutinize the recorded soundscape and begin to understand their navigational experience. This develops material to initiate metaphors for our own understanding of someone else's experiential form, generating room for varied navigational interpretations of one perceived space.

*"As a phenomenon of human experience, sound is never really object and is always event. We can always attend to it as the audible manifestation of relations and interactions in the space-time unity of experience, in the here-and-now. A non-objectifying attitude is at work here, sensitive to the ecology of the living and embodied process that auditory perception is."*<sup>40</sup>

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<sup>36</sup> R. Minard "Sound Installation Art. Building New Realities" (1995) in *Robin Minard – Silent Music. Between Sound Art and Acoustic Design*. ed. B. Schulz. Kehrer, Heidelberg, 1999. p. 74.

<sup>37</sup> A. Di Scipio, 'Sound Object? Sound Event! Ideologies of Sound and the Biopolitics of Music', *Soundscape. Music and ecologies of sound Theoretical & practical projects for a listening of the world. The Journal of Acoustic Ecology*, vol. 13, no. 1, 2013. p. 10.

<sup>38</sup> Duphatas & Solomos, op. cit., p. 9.

<sup>39</sup> Di Scipio, op. cit., p. 12.

<sup>40</sup> *ibid.*, p. 12.

#### **4. Case Study 1: Solene Marry - *Methodological Sound Awareness Survey: Place Centrale, campus, Saint-Martin-d'Hères. Place Mistral-Eaux-Clares, urban regeneration zone, Grenoble. Place des Tilleuls, historical urban center, Grenoble* September 2009 - March 2010**

Solene Marry deals with urban public spaces and how the general city-dwelling public engage, understand and perceive them sonically. She works as an urban planner alongside other city planners and acousticians in the Laboratory: Pacte Territoire UMR 51 94, Urban Planning Institute of Grenoble at CSTB (centre for scientific and technical building studies), at the environmental and urban acoustics department. Over her time as an urban planner she completed her thesis, titled '*Ordinary sonic public space. Sound perception parameters in urban public spaces. Contribution to sonic ambiance knowledge*'<sup>41</sup>. Her presentations and oral communications strive to show the importance of sonic perception and ambiance in urban public space, establishing multidisciplinary approaches to new urban planning.

The Methodological Sound Awareness Survey took place within acoustic measurements of three different public squares, ("a square is a particular type of space; it constitutes the conceptual basis of the public space"<sup>42</sup> as manifested by its Greek root agora) and was studied for a time period of over six months (September 2009 to March 2010). A qualitative survey combined with these measurements appropriated the results, making it convenient to correlate perceptive and physical data. The participants involved were all general members of the public that weren't involved in any sonic studies, participants that would perceive the space without specification on how they should perceive it (globally perceived). There were two parts to the methodological survey to gather a wider range of results:

Part one consisted of a series of on-site questionnaires, which participants answered twice at each space, images were also taken by the interviewee's representing their global ambiance of each site; finally there were a number of on-site focus groups discussing how they experienced

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<sup>41</sup> S. Marry, 'Ordinary sonic public space. Sound perception parameters in urban public spaces and sonic representations associated with urban forms', *Sound Effects - An Interdisciplinary Journal of Sound and Sound Experience* [online journal], vol. 2, no. 1, Apr. 2012, <<http://www.soundeffects.dk/article/view/5231/5452>>, accessed 4 Dec. 2016.

<sup>42</sup> S. Marry, op. cit., p. 19.

each public square. Firstly the on-site questionnaires asked the participants to recover their thoughts on their general overview while in the public squares (comfort levels, environmental sounds, global ambiance) and about their habitual urban practices (travel, acts, behavior etc.). Secondly they were to explain and discuss the pictures they took and why they represented their idea of global ambiance. Thirdly they were asked to recreate how they experienced the squares sonically through diagrams, which area had a bad sonic ambiance and where was sonically ideal. Finally they had to study diagrams representing seven typical urban morphologies<sup>43</sup> (individual housing areas, public estates, private estates etc.) according to the perceived traits of their sonic surrounding, ordering them from better sonic ambiance to worse.

For Part two of the survey three selected groups of interviewees were made through assembling variables obtained in the first part of the protocol (people of a certain age, housing type, transport usage etc) to see if different residency alters sonic perception. This time the questionnaires were completed over two seasons and were focused further into sonic ambiance, sounds heard, levels of sound, pleasant or unpleasant sounds. As the surveys were in *situ* acoustic measurements were made in each season for general comparison. The purpose of this was to make a comparison between sonic environment and sound levels to the participants sonic perception. The measurements were taken at fixed points in each square to ensure consistent results.

The results show an interesting link when participants were asked to describe their global ambiance of each square. In all aspects their global perceptions were always linked to their sonic perception, use of the word 'quiet' (see Figure 1) was used many times for the global ambiance of *Place Centrale* and *Place des Tilleuls* (see Figure 2, Figure 3 & Figure 4). Also use of the words 'noise' and 'calm' in relation to sound were heavily used in the second on-site questionnaire. Results from the second part of the protocol, can be considered such that participants had a heightened understanding of their sonic ambiance because of their increased knowledge of the squares. This attention and focus towards sound and ambiance comes with knowledge of space, the more time the participant has spent there, the more vocal about sound and ambiance they are. "*Space knowledge seems to interfere with global perception and*

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<sup>43</sup> S. Marry, op. cit., p. 19.

*particularly in sonic perception.*<sup>44</sup> Integrating variables such as visual space and sonic ambiance establishes global connections, as we see in the outcome of this survey, when visual space is perceived as being an 'open' one, the sonic environment is commonly perceived in a constructive way. (see Figure 5)

All in all the survey aspires to determine our everyday sound perception in urban public spaces through an elaborate methodological protocol. The complexity of the study applies qualitative and quantitative data together to form a sophisticated pool of results and outcomes. As a result of this methodological survey we see that to move on in urban planning we must at first acknowledge sonic features in space. The importance of sonic ambiance is illustrated through varied evaluations of urban ambiances. Global or synaesthetic perception must be deeply examined seeing as the interconnections between visual and sonic ambiances correlate strongly. *"Sound perception should be considered as a significant aspect in urban public space appraisal and may alter city planning and urban furniture design. This evaluation could be used by urban planners to design urban public spaces as public squares."*<sup>45</sup>

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<sup>44</sup> S. Marry, op. cit., p. 20.

<sup>45</sup> S. Marry, op. cit., p. 21.

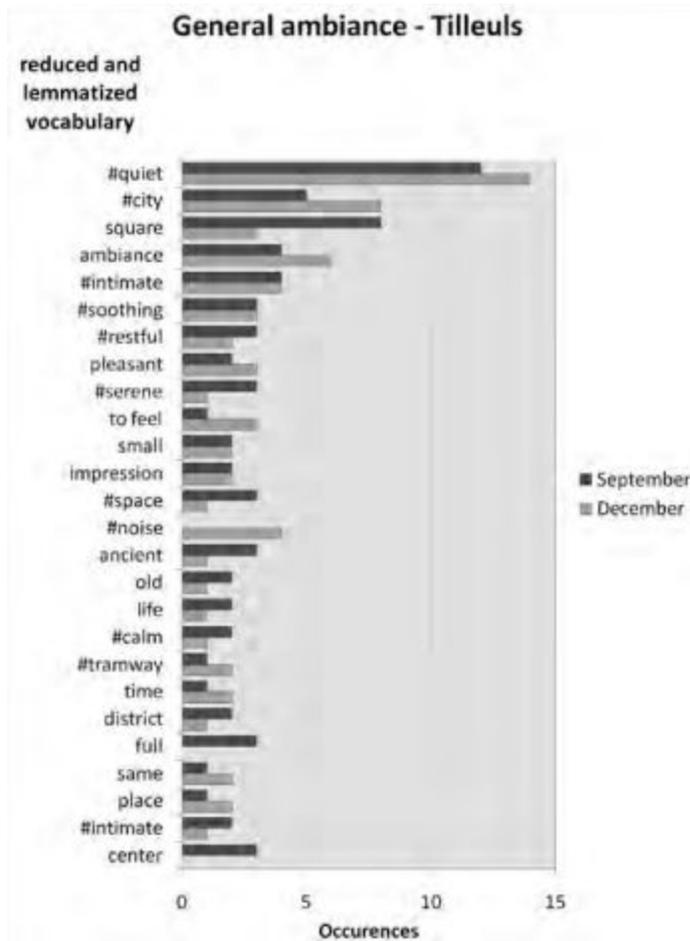


Fig 1. Occurrences of lemmatized vocabulary used by interviewees to answer the question “How would you describe the ambiance of this square?” for Place Mistral-Eaux-Clares at two seasons Place des Tilleuls at two different seasons.

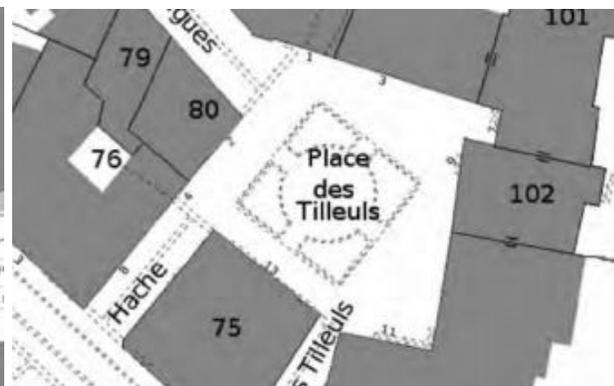
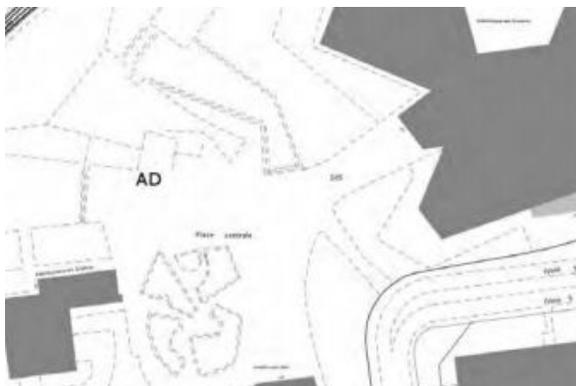


Fig 2. Place Centrale, campus, Saint-Martin-d'Hères. Fig 3. Place des Tilleuls, historical urban center, Grenoble.



Fig 4. *Place Mistral-Eaux-Clares*, urban regeneration zone, Grenoble.

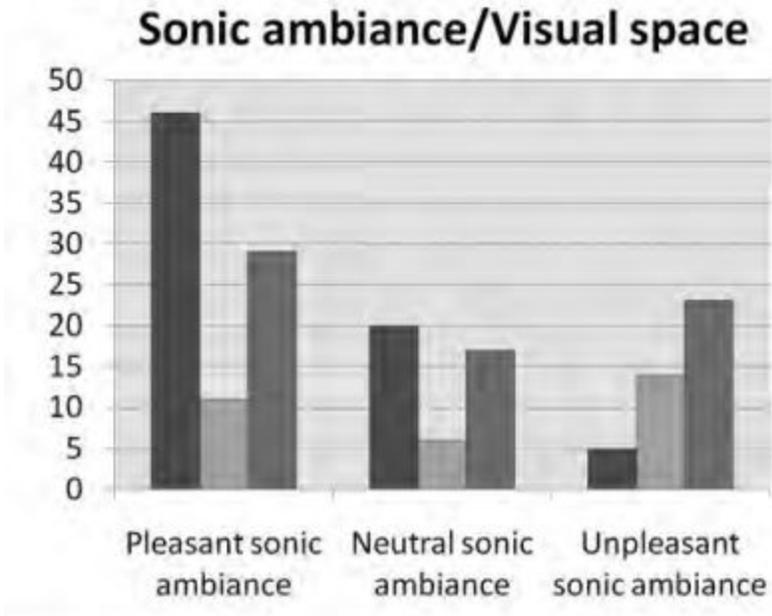


Fig 5. Cross table of the questions: “How does the sonic ambiance appears to you? (pleasant, unpleasant, neither of them)” and “How does the visual space appears to you? (opened, closed, neither of them)” in the questionnaires.

## 6. Case Study 2: Bernhard Leitner - *Ton Field 1020 IBM Vienna 1992*

*“...it has become clear that public spaces are a particularly well-suited forum for my work. Both the work in the Parc de la Villette in Paris (“Le Cylindre Sonore” of 1987) and the “Ton-Field” (Sound Field) of 1992 in front of the IBM building in Vienna transform outdoor space into an entirely different interior space, integrating the people by altering scale and sensory perception.”*

46

Bernhard Leitner (born Austria 1938) firstly began his design studies in the area of architecture at the Vienna University of Technology in Paris. Progressing in his interest for designing spaces he then moved to New York to become an urban designer / city planner at the City Council of New York<sup>47</sup>. As he studied under the topic of architecture it became clear to him that he was beginning to work more consciously of space, and how we perceive it with all senses. His interest was not just on our visual perception of space, but that everything is linked, heard acoustically and endured physically or experienced “*bioacoustically*”<sup>48</sup>. At the time, aural perception in architecture was abated and considered as noise pollution, acquiring poor significance when compared to visual perception. Leitner, whilst becoming more attuned to the global perception of space, began to perform meticulous experiments with sound, space and the body, in which some of his core conceptual and theoretical thoughts and ideas were born. He made several intricate diagrams when planning each project and focused on the physical experienter (individual listening position), and how sound planes will travel around them in a specific space. When working in large public space, he specifically looked at the sound field of a placed sound object (no individual listening position), and how it would shape the space it is situated in. When Leitner designed a space with no clear intention to where the listener is placed, it suggested the sound field should be explored freely, developing an individual's own sonic structure through perception, and the experiential form they conceive. The idea of “*sound-space*”<sup>49</sup> became tangible for Bernhard Leitner around the year of 1968. The term sound-space thrived on thought about experiencing multiple aspects of space and architecture

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<sup>46</sup> B. Leitner, ‘*Conversation between Wolfgang Drechsler and Bernhard Leitner*’ in B. Leitner, *Sound: Space*, Cantz, Ostfildern, 1998. p. 10.

<sup>47</sup> Unknown Author. *Bio*. Bernhard Leitner, last updated 20 Sept. 2013, <<http://www.bernhardleitner.at/bios>>, accessed 15 Oct. 2016.

<sup>48</sup> Leitner, op. cit., p. 7.

<sup>49</sup> Leitner, op. cit., .

at any one time, sound perceived through listening and through the body (physically) and the link between them. Bernhard suggests his works should be spoken of as sound-space works, as they create a “*sound architecture*”<sup>50</sup> (fictive architecture) within themselves, “... essentially they have to do with space, with the experience of space, with space that is created and shaped with sound.”<sup>51</sup> Leitner saw sound as a structural material that he could build spaces with, for him sound was not related to music, it was related to sculpture and architecture, sound as a material form.

In 1982 Bernhard Leitner constructed his work *Ton-Field (Sound-Field) 1020 IBM Vienna*<sup>52</sup> in *Lasallestrabe* (public urban space), his architectural planning shows no guide in which the individual listener should follow or take stance, it is more an amorphous sound field to be experienced from any point of perspective while situated in the space. The diagram (see Figure 5) shows thirteen sonorous cast iron covered granite sound emitters or sound objects sunken into the ground, located over the front square of the IBM Vienna building, each placed in equal distance (equilateral triangles) from one another. The newly configured public urban space becomes an open sound-field, overlaying a new urban axis in its design. As well as developing its own accentuated field of acoustic design, *Ton-field* contextualizes itself into the already existing urban architecture and already audible urban soundscape. There are no boundaries existing in the ton-field other than visual ones, it draws attention aesthetically by its visual space, but when entered the soundscape delineates the boundaries caused by its visual entity. The ton-field is not there to suppress or circumvent the urban soundscape; it is there to attune itself to the existing sonic environment. It's a capricious space to be experienced by the public, heightening their senses and perceptions whilst approaching the normalities of their habitual day to day. *Ton-field* is a designed acoustic space that reintegrates our surrounding sonic environment perceptively, a composed acoustic space improving our listening experience in contemporary city planning and urban design. The noise surrounding Vienna IBM is noticed and applied to the sound field of its own accord, the work itself seeks but not to inundate the noise of the busy traffic and general public but to incorporate it, ton-field has no overbearing volume qualities as it sits in harmony with the cacophony of surrounding noise. Being conscious of

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<sup>50</sup> Leitner, op. cit., .

<sup>51</sup> Leitner, op. cit., .

<sup>52</sup> B. Leitner, *Sound: Space*, Cantz, Ostfildern, 1998. p. 182.

these aspects in the acoustic planning and design of a work encompasses a meaningful sonic experience for the public, as they determine their route through the public urban space. This appropriately designed sound-space creates a new conduct for city planning and urban design, a thought-provoking multidisciplinary process including all speculations to our global perception.

*“...Columns are linked acoustically.  
The whole field is a coherent sound space,  
continually changing in rhythm.  
From up front, from behind, from all sides -  
Sounds track the persons within the space,  
An interior space evolves within an urban exterior...”<sup>53</sup>*

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<sup>53</sup> *ibid.*, p. 192.

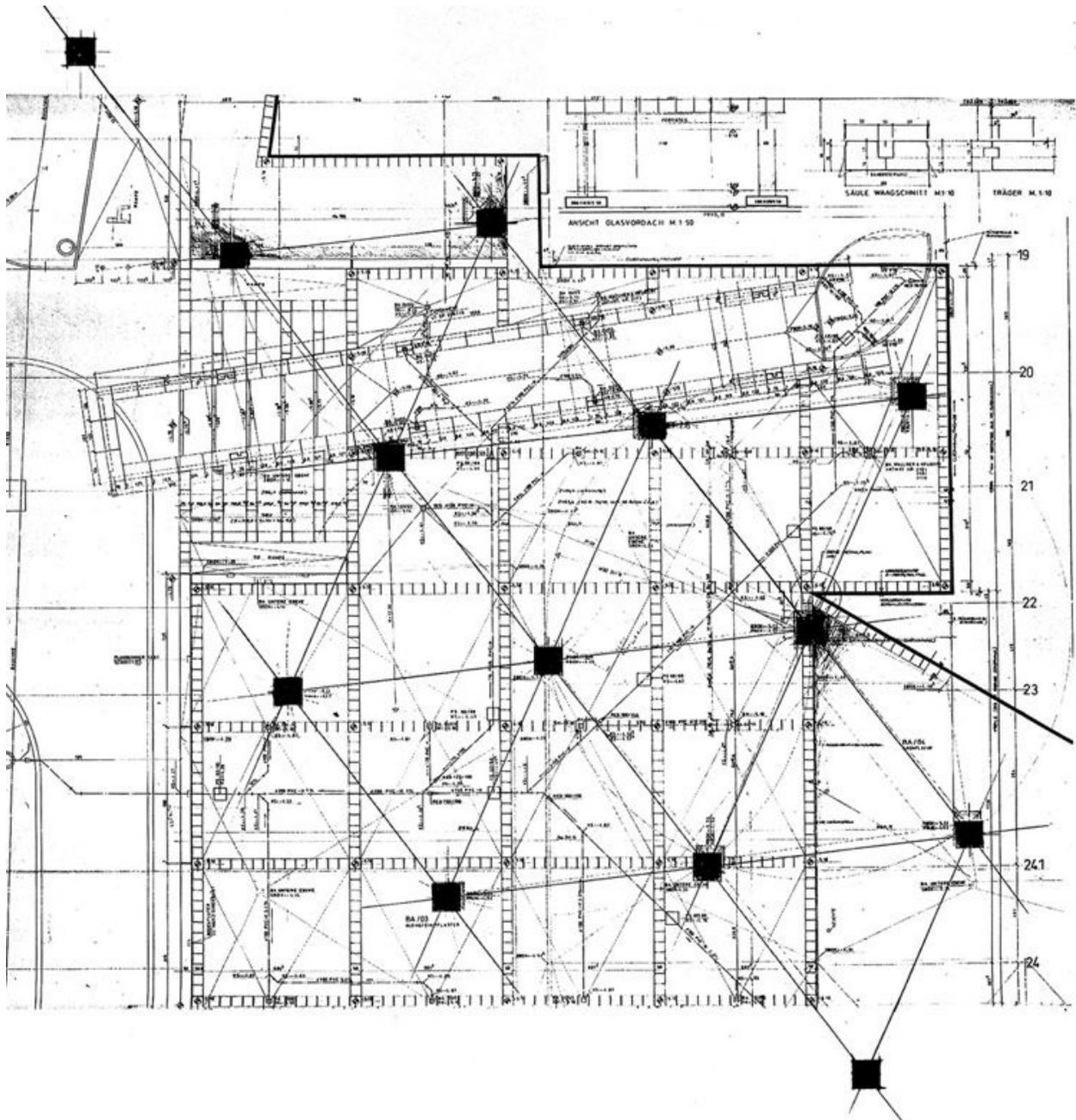


Fig 6. Bernhard Leitner, *Ton-Field 1020 IBM Vienna*, Vienna, 1992.

## 7. Conclusion

This work has considered the influence of acoustics on the experience and perceptions of people and the design of buildings and spaces. Considerable research has been carried out to show that it is not just the visual perception of a space that influences the experience of people within that space. The pressures on architects designing buildings today means that costs, energy use and visual aesthetics have the most influence on building design. The acoustic design of a space is often overlooked and the use of sound to enhance the experience of a building or space user is commonly not considered. Case studies have shown that the careful consideration of acoustics and the use of existing sounds can significantly enhance the user experience of a space. It is acknowledged that, in many cases, the user needs to be 'trained' to become aware of their auditory senses after years of 'blocking' unwanted sounds out of their perceived spectrum. Acoustic design needs to have more exposure to the general public, architects and building clients so that the capacity for this potentially powerful design tool is fully realised.

*“A new model of intelligibility, combining built-up forms, perceived forms and represented forms, provided a way of testing new horizontal or interdisciplinary methods: commented routes, recurrent observation, comparative metrology, and multidimensional analysis for design.”<sup>54</sup>*

### **Word Count: 5062**

Excludes cover page, contents page, footnote references and bibliography.

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<sup>54</sup> D. Paquette, 'Describing urban ambiances: The CRESSON research laboratory', *vol. 7, no. 1. Sound Moves*, 6 Mar. 2013, <<http://wi.mobilities.ca/describing-urban-ambiances-the-cresson-research-laboratory/>>, accessed 3 Dec. 2016.

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Fig 1. Solene Marry. *General Ambiance -Tilleuls*, 'Spatial and Sonic Evaluation of Urban Ambiances', *Soundscape. Sonic ambiences. The Journal of Acoustic Ecology*, vol. 10, no. 1, 2010. p. 22.

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