inAW Journal
Multidisciplinary Academic Magazine

BEATA GIBAŁA-KAPECKA

SPATIAL SOUND – THE FEELING OF BEING IMMERSED IN SOUND

SOURCE:

B. Gibała-Kapecka, T. Kamisiński, T. Kapecki: "O dźwięku, akustyce i hałasie w przestrzeni miasta", Krakow, 2019

ABSTRACT

What we perceive is not reality but just reactions of our brains. There is one reality but its representation in different brains is different. The more different the brains are, the more different the representations.
[John Locke]

(...) real is simply electrical impulses interpreted by your brain[1].
[Morfeusz do Noego, *Matrix*]

In the world of the Anthropocene[2], the world ruthlessly altered by man, in which the processes that take place often get out of hand, our vision of the world is incomplete and unpredictable but if we indulge our unfettered imagination, then at least we have the opportunity to broaden our and others' horizons – the field of vision.

KEYWORDS

architecture; sound; cymatics; anthropology of sound; interior architecture; ecological acoustics; acoustics; urban space; auditory architecture; aural architecture; auditory interior architecture; tranquility rating

[1] https://www.tvp.info/41375915/w-mozgu-odkryto-nowy-rodzaj-komunikacji-miedzy-neuronami [accessed on 12/06/2019].

[2] Dipesh Chakrabarty was one of the first humanities researchers who discussed the term "Anthropocene" in his article titled *The climate of history: four theses*. The term was proposed by Paul J. Crutsen and Eugene F. Stoermer (2000) to name a new geological era in which mankind is the main geological factor. Chakrabarty asks: "how the way we think about human history should change at a time of rapid and irreversible climate change". He analyses the assumptions of classical historiography and the latest work on global warming and concludes that "in the face of negative climate change it is necessary to complement the global history of capitalism with the specific history of humanity" (http://tekstydrugie.pl/auth/dipesh-chakrabarty/ (accessed on 28/06/2019.

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Publisher: Jan Matejko Academy of Fine Arts in Krakow, Interior Architecture Department

Editor: prof. dr hab. Beata Gibała-Kapecka, mgr Marika Wato

Graphic design: Marika Wato

Translation PL-EN: Ireneusz Sojka, MA

The 'inAW Journal' periodical was established owing to the subsidy under the project titled: "Designing the Future – the Program for Development of Jan Matejko Academy of Fine Arts in Krakow in years 2018-2022"

Fundusze Europejskie Wiedza Edukacja Rozwój
Rzeczpospolita Polska
Unia Europejska Europejski Fundusz Społeczny

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

prof. dr hab. Beata Gibała-Kapecka
Akademia Sztuk Pięknych im. Jana Matejki w Krakowie

Spatial sound – the feeling of being immersed in sound

SOURCE:

B. Gibała-Kapecka, T. Kamisiński, T. Kapecki, *O dźwięku, akustyce i hałasie w przestrzeni miasta,* Krakow 2019.

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Spatial sound. Overtone of shapes of forms – sound futurology

The "sensation of being immersed in sound" implies equivalence of occurrence for both the visual and auditory dimensions in the way we experience, feel, and then enter philosophically into, the process of conceptualizing urban space, including architectural, shaping the environment for human life. The aim is to create a reasonably unambiguous tool in a more precise language dimension for use in research, artistic experiments, design processes, discussions. Taking the view that spatial sound also consists of the overtone of form shapes, it can be argued that each shape of a form generates sound – **treating this sound as a means of artistic expression, a tool of creative statement, according to Oscar Fischinger's idea that "every material form, each shape, has its own being and its assigned sound equivalent"**.

Tokyo, Plaza Omotesando Haerajuku, Hiroshi Nakamura (photograph by B. Gibała-Kapecka).

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Cymatics. The shape of the form generates sound

„Everything is sound, a certain vibration that gives shape to all forms"[3] – – the influence of sound on matter, including its ability to shape substances in the taking of symmetrical, geometric and organic patterns or systems, are experiments derived from the work of the eighteenth-century German physicist **Ernst Chladini**. He described the phenomenon of physically tangible elements forming into geometric patterns under the influence of sound vibrations, proving that "the same sound tone always creates the same shape created by so-called standing waves". In the 1960s, **Dr. Hans Jenny**, who developed his method to create a new science, the so-called cymatics, was part of Ernst Chladini's research. He recorded on film the effect of sound on powders, liquids and other various substances. He noted that sound vibrations produced a variety of structured patterns with geometric shapes. Low frequencies formed simple circles described by rings and higher frequencies increased the number of rings placed concentrically around one circle and formed patterns with sophisticated shapes comparable to fractals because **complexity of these shapes, or rather precise systems**, grew with the increase in the frequency of waves. The acoustic effects of sound wave phenomena, which Jenny called "cymatic effects", are geometric patterns generated by sounds, showing the impact of these sound waves on many different types of materials, including liquids and powders. All the effects observed by Jenny during these experiences were documented and released in the form of a monumental work titled *Cymatics. A Study of Wave Phenomena and Vibration*[4]. The [Natural] substances and plastics used by Jenny for experimental purposes take on incredibly organic shapes that bring to mind the underwater world, or human cells, snowflakes, structures of microscopic matter. They are a proof of the extraordinary power of sound to create forms – "visible shapes of the content" (Ben Shahn). The effect of sound or sound waves of different lengths, amplitudes, different frequencies on a particular matter results in the fact that the matter is called to existence, adopting patterns of various, even magical (because so polysemic). shapes. You can find here a reference to **sacred geometry**[5].

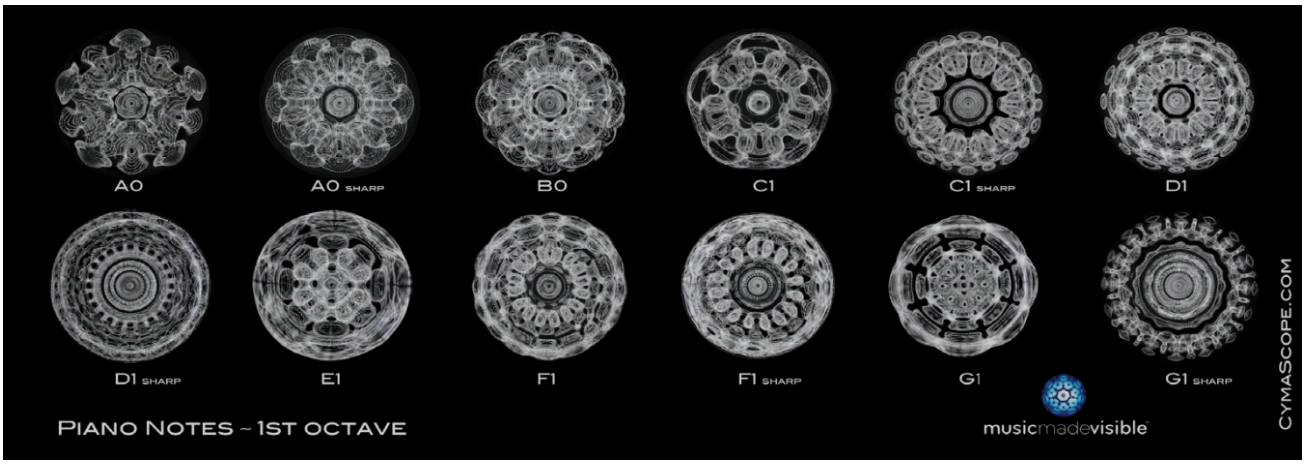
---

[3] http://www.nutao.pl/2017/09/24/cymatyka-cos-wiecej-niz-tylko-muzyka/ [dostęp: 23.04.2019].

[4] H. Jenny, *Cymatics. A Study of Wave Phenomena and Vibration*, vol. 1: *The Structure and Dynamics of Waves and Vibrations*, 1967; vol. 2: Wave Phenomena, Vibrational Effects and Harmonic Oscillations with their Structure, Kinetics and Dynamics, 1974, https://issuu.com/derekwillstar/docs/146864544-hans-jenny-cymatics [dostęp: 12.05.2019].

[5] *Chladini's figures,* http://www.nutao.pl/2017/09/24/cymatyka-cos-wiecej-niz-tylko-muzyka (accessed on 7/05/2019).

To this day, various experiments are conducted using devices such as CymaSkope, which **materialize sound in various geometric forms** while recording changes in geometry of their shapes depending on the sound type.

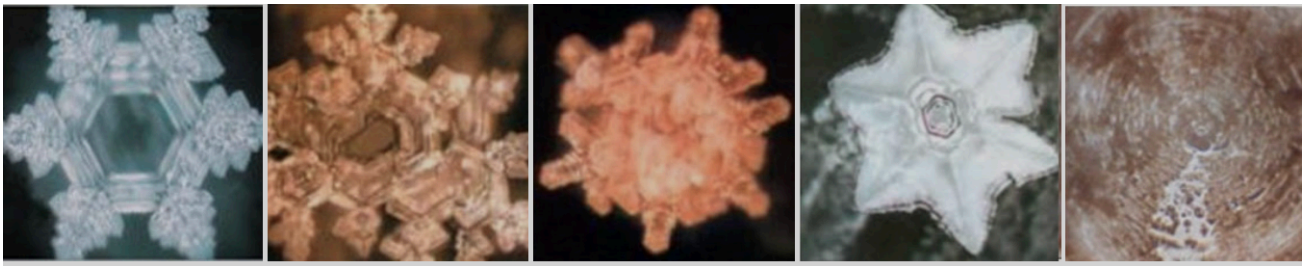


Cymatics Research – Musicology, http://cymascope.com/cyma_research/musicology.html (accessed on 10/04/2019)

Intriguing and promising experiments related to the geometry of shapes were conducted by Masaru Emoto who proved that when a given matter, in this case water, is subjected to the influence of various sounds, whether musical or prayerful, depending on what they are, crystallized matter (water) takes on such shapes. Thus, giving a form to each note, **sound was turned into a shape**[6]. According to the study of the researcher who hypothesized that "human emotions have a huge impact on water", all kinds of human activity, such as music, prayer, words or thoughts, but also environmental conditions, affect the shape of water crystals in an unlikely, immeasurable way. **Masaru Emoto's breakthrough achievement was to demonstrate through visualizations that the organizations of sound structures of interest to us, consisting of sets of acoustic waves with deliberately selected parameters, taking place over time, without excluding silence**, are accumulated by water as information data – the so-called "water memory". Water samples used in the experiments are crystallized and then, by greatly magnifying the image under a microscope, can be photographed and exposed. Emoto's research papers document illustrations of this type of "information crystals", which prove that they possess characteristics such as memory, as a result of

[6] http://www.nutao.pl/2017/07/31/masaru-emoto-i-jego-eksperymenty-z-woda (accessed on 17/05/2019)

which they can be duplicated while retaining the same form. This also applies to the diversity of crystal forms. Experiments visualizing water memory through recorded "retained" images resulting from contact with musical works evoke harmony or disorganization of the structure recording. Since the human body is made up of about 70% water, an analogy can be assumed as to the fundamental importance of the sound compositions listened to and created, if it is true that every sound, directly affecting the water in our body, affects cells and the whole body. Masaru Emoto subjected a sample of distilled water to an hour-long impact of music and then photographed its structure frozen in time.



Szarotka | *Aria na strunie G* | *Sutra* | *Folk dance* | *Heavy*
Dźwięki muzyki | *J. S. Bach* | *tybetańska* | | *Metal*

Nu Tao – harmony of sounds: http://www.nutao.pl/2017/09/24/cymatyka-cos-wiecej-niz-tylko-muzyka (accessed on 17/05/2019)

In many works over the centuries, including in our modern times, we find terms for sound, or its frequency, like "word" or "thought". Over time, it can be seen that they began to manifest themselves in an energetic and finally material form. If we assume that with words, and perhaps even thoughts, we have the ability to influence the structure of water, this observation can be applied to our body and the environment, which of course stimulates the imagination of scientists towards the opening possibilities of influencing the ecosystem, the entire biosphere…

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Anthropology of sound. The sound of objects – interior architecture. The status of the paradigm

When we allow the possibility of multiplicity of interpretations, including definitions, and put it side by side with a possibility that **sound can be perceived and felt by visual and emotional perception**, it is necessary to take into account the widest possible range of references to different fields of science and art, their disciplines and specialties, based on which valuable differentiation and, at the same time, common relationships can be revealed. Increasingly often we are looking to discover the necessary dependencies for the design process to be pandemic. The approximations to the concept of sound taken in different specialties clearly highlight the industry's differences, not to mention the differences resulting from culturally sanctioned circumstances. Therefore, **interdisciplinary cooperation between different industries, which are conditioned by a creative design process**, is indispensable. In this way we build planes and spaces of agreement in which further scientific and artistic concepts arise and are established. **Based on them and in relation to them an idea was taken to try to visualize sound generated by the shape (form) of an object and, further, a number of objects**. The form obtains coordinates on the basis of different assignments. The form also depends, each time, to varying degrees, on technical or technological conditions. This is also the case when the [conditions] are the starting point to the idea of an object. The shape is dictated by functional, aesthetic, philosophical and social factors; of course, to varying extent. In parallel, these factors are analyzed against the background of the chosen history of terms, in relation to sources of the type of experience, or are based on different cognitive motives and creative ambitions.

Cultural anthropology has developed a specialization dealing with human relations with the same acoustic environment in a way that is important for architecture, interior architecture and its elements of equipment, and has accepted that sounds and noises, the so-called "audiosphere", are the characteristics of a given space, place and integral objects. The human hearing is a multidimensional sense. An equally multidimensional phenomenon is the acoustics of interior architecture. An extremely complex issue which depends on many component factors and their parameters, ranging from the architectural structure of the interior, its volume, through the type of finishing materials, to the elements of equipment. In addition, sound insulation of building materials plays an important role, which is not always decided by us. This refers to two types of sounds: airborne and conducted. Groups of measurable acoustic parameters have therefore been identified in order to assess the

acoustics of interiors. These parameters can generally be divided into "objective" (patterned, very relevant, often crucial) and "subjective" (as the name suggests, related to the subjective assessment of the acoustic characteristics of the premises), which amounts to giving appropriate determinations to individual parameters in order to check the effectiveness of the design solutions adopted.

The comfort of our lives, the operation of architectural objects, their interior spaces – but equally also external spaces of public interest – and, finally, our well-being and health also strongly depend on acoustics. Its sub-fields include audio acoustics, which in turn is divided into interior acoustics, as well as architectural and construction acoustics, urban acoustics and environmental acoustics. Interior acoustics strongly focuses on the value of sound frequency, which describes the range of human audibility, that is, the frequency and volume, and consequently determines how sound behaves in the room. From the point of view of an interior architect, a co-designer of everyday reality, focusing only on the "sound absorption class" or "longitudinal sound insulation" is insufficient[7] Unwanted sounds heard, whether in the office, at home or at school, irritate, torment, destroy mental comfort, result in physical and mental fatigue. In order to ensure friendly acoustics and increase the comfort of life it is not enough to use only suitable finishing materials – a comprehensive approach to the design of the architectural structure of the interior is necessary. For example, the over-damping of an interior will cause it to be subdued because the so-called "acoustic background" is eliminated, resulting in a doubling of power of natural sounds, such as sounds of objects falling to the floor, the "falling pen effect" or the noise from the sliding of chairs. Movement, penetration, absorption, sound reflections are the most important acoustic aspects in the surrounding environment, both urbanized and natural.

Going further, the public space of the urban landscape – furnished with formally distinguished elements dictated by specific spoken, social and cultural needs for various functions – **creates an acoustic environment and, at the same time, sound phenomen**a that **transfer** and translocate socio-cultural influences, including stories, as well as aesthetics, of various cultures of urban communities – both local and, as in the case of Krakow, coming from conventional tourism.

An "acoustic phenomenon" that visualizes sound is a **sound written in a shape, a sound that is spaced, because it is not so much closed within the shape of an object as defined and identified by the form of the broadly understood object**, therefore perceived in the sense of being "received,

[7] http://www.sztuka-wnetrza.pl/5283/artykul/akustyka-wnetrz-na-co-zwrocic-uwage [accessed on 28/12/2018].

because seen and felt", that is, **heard**. Perceived by the senses, such as sight and touch, it is an experience of a kind of tactile from the empirical group, induced or dependent on the states of our consciousness (**neural states**). This, however, is different, as shown by recent achievements in neuroscience by Prof. Dominique Durand. "For the mind, as well as for any learning system, information is not an abstract measure of signal complexity but a measure of the impact of that signal on the state of the entire system. The undoubted breakthrough therefore requires further research into its nature and further search for answers to the question of the role of this newly discovered method of communication for the functioning of our brain. And thus the functioning of us as thinking beings"[8].

In our sensory process, form is therefore the basis, the essential. It is important what reactions it will trigger, such as "perception, recall, association string, verbal comment" or other action. The shape acts on the senses such as the visual, auditory, tactile and other pathways. Structures and forms grow, duplicate, expand and results reach the associative cortex and carry information, becoming images (**percepts**). These in turns evoke successive associations. "In fact, thought processes often shift, as cognitive scientists show, on the verbal/non-verbal axis, mixing abstract thinking based on symbols with imaginary thinking using motor and sensory cortex activation. This saves energy and makes it easier to infer at the symbolic level, generalize, which is difficult to achieve at the level of images (percepts)"[9].

Available research results[10] indicate that the presence of "desired" sounds, rather than the actual noise level, contributes to perception of the acoustic quality of an urban location as positive or acceptable. It can therefore be assumed that, as a result of the accumulation of percepts (images) with formal and programmed (functional) characteristics defined for urban landscapes, the **desired visual audio documentation is consolidated into a collective sound memory. Sound is a sound wave, and isn't the shape of an object the source of the sound? Is the surface, line, point, solid, or object not the source of the resulting sound energy** ("sound spectrum") **as a result of its**

[8] https://www.tvp.info/41375915/w-mozgu-odkryto-nowy-rodzaj-komunikacji-miedzy-neuronami [accessed on 08/03/2019].

[9] D. Dennett called it "contrasting heterofenomenology", that is the study of situations in which we can determine what is conscious and what is unconscious (https://fizyka.umk.pl/~duch/Wyklady/Kog1/B11-swiadomosc.htm (accessed on 12/01/2019).

[10] https://www.researchcatalogue.net/view/251049/251050 [dostęp: 1.06.2019].

shape[11]? Since the sound wave, **the acoustic wave, is a mechanical wave which spreads through the vibration of successive molecules**, it integrates two variations – over time and in space – resulting in cyclical compaction and thinning of the air ("areas with higher values of disturbance have a dark tint and areas with a smaller value are light"), and these density fluctuations move at the speed of sound in some direction, they certainly "fall" into an object which reflects its shape in the **compacted matter of air** – leaves the reflection of the shape on its own pattern – as a result of which the "spectrum of sound" becomes a reflection of the object, giving the **impression of sound: an image** of the resulting **(individual) sound** inherently associated with the object.

Ecological acoustics. The interdisciplinary alignment of science and art

In the deliberations made above it is important to introduce terms already commonly used in the literature on the subject, for example with regard to the "acoustics of the immediate environment" ("environmental acoustic") or "ecological acoustic", when a person is not in the environment constantly, although sometimes used equivalently to the term "acoustic landscape", abbreviated "soundscape" or "sound acoustic landscape". The author of the concept is Simon Fraser who already in the 1970s described e**cological acoustics as "an interdisciplinary mixture of philosophy, sociology and art"**. He attributed his fundamental contribution to the creation to musician R. Murray Schafer with whom he carried out a joint project in the late 1960s and early 1970s and who, in his "World Soundscape Project", developed the concept, emphasizing the importance of all sounds coming from the environment, that is, **the acoustic landscape**, because they provide not only physical information, but "a whole wealth of aesthetic impressions"[12].

[11] http://www.fizykon.org/drgania_fale/fale_co_to_jest_fala.htm [dostęp: 16.06.2019].

[12] http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-0c260409-9688-4d15-9546-9380c14c5076/c/Lipowczan.pdf [accessed on 04/05/2019].

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

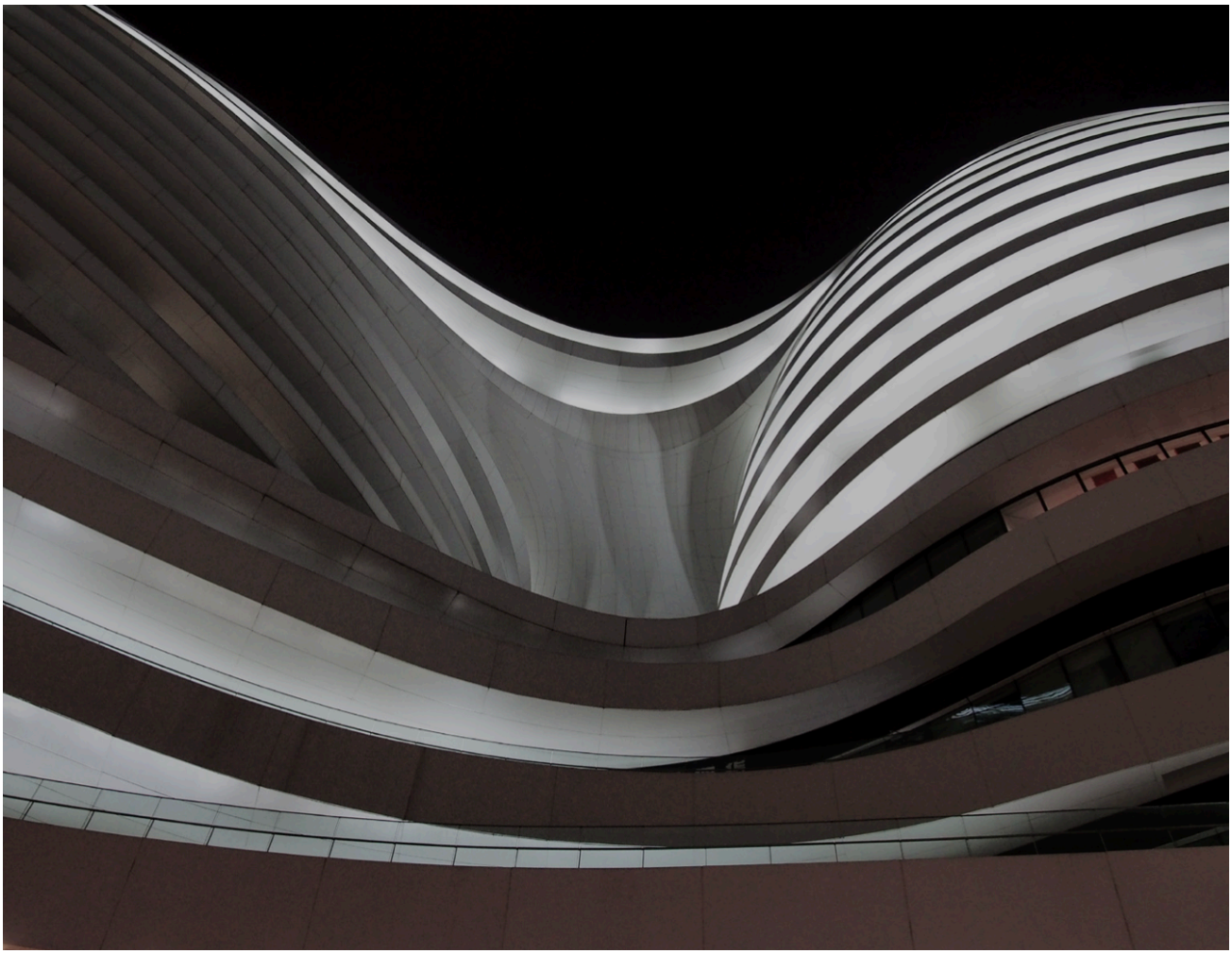
Materiality of sound. Modus. Physical object. Metaphysical object

The common judgment that sound as an object is closely connected to the source of the sound, that is, to **the sounding object**, seems indisputable. However, from the position of an artist engaged in creative shaping of human environment, inspiring reflection in aesthetic or philosophical dimensions, a designer engaged in shaping space and places, the closest environment of man, including architecture and its interiors, today **this combination proves to be fundamentally problematic**. This issue also touches on a broader context, is present in the design of landscape architecture and in urban planning. While all objects that exhibit mechanical or electrical motion also allow this movement of their own matter to be heard acoustically, the assumption is that the equivalent **material sound** is created generated by the **form of objects, the type of color, its texture depends on the preserved proportions of shapes and surfaces. It materializes** with the **mental process of visualizing images as a result of intensification of feelings and sensations, as a result of the philosophical and cultural context, depending on the neighborhood of other elements and objects present in it, on their compositional system, that is, all the complexity of forms, geometries and shapes, taking into account** the light sources that extract, conquer and modulate forms, activating, amplifying **the overtone of material sound (George Berkeley's psychology of perception)**[13].

Such **references** can be found in the ideas of architectural projects of the 21st century the interior and exterior spaces of which were designed **taking into account the emission of their own** materialized sound (creation of formal solutions), as a result of which they are also perceived acoustically. Examples include the Sky Soho in Shanghai by Zaha Hadid Architects and the WU Campus in Vienna with Zaha Hadid Library. Architectural structures formally expanded, with the

[13] According to Locke, we create so-called "simple ideas" based on stimuli emitted by material things, our senses record the ideas of these material things. Berkeley claimed that we have only two things: the stimuli themselves and the ideas generated from them. He questioned the existence of material objects because of the lack of direct access to them, as we do not know whether they actually exist or are just our ideas. He created the concept of "being observed". He claimed that something exists for us then, and only when we can observe it, that is, when we have in our memory the idea of an object, things like a table, but this idea does not have to correspond to the actual table because we are as well be to create ideas of non-existent things that we have never seen before. Berkeley urges us to recognize that there is no such thing as an objective being and that there is "momentarily" only what we are seeing at the moment, so it can be concluded that we are given directly only the content of our own minds (https://pl.wikipedia.org/wiki/George_Berkeley_(filozof) (accessed on 01/06/2019].

game of solids in the light, make the resulting "**sound projection**" while indicating the possibilities of managing **material sound (mental process)**. In power is the theory of shaping **auditory architecture, more broadly: the environment of the auditory landscape, as well as functional sounds. The phenomenon is particularly true in public spaces where comfortable work must be made possible both on the scale of everyday behavior and in architectural and urban space. The sonic effect cannot be an action of some cause but should include "the context surrounding the object and its appearance"**.



Shanghai, Sky Soho by Zaha Hadid Architects (photograph by B. Gibała-Kapecka, T. Kapecki).

Jean-François Augoyard and Henry Torque, designers of modern cities, distinguish between the **"sound effect" and the "sound object"** (*object sonore*) but the creation of acousmatic situations[14], when the emphasis is on the perception of sound matter as a separate being separated from its physical causes, consider it possible to think of an art installation or soundscape because it seems too wide and indistinct when the "sound object" is read as an elementary form. By definition, an object means: something can be seen or touched; an abstract, feature, or concept that concerns someone's actions, interests, or feelings; or a building or a complex of buildings, including field equipment"[15] – **so the "object" can therefore be considered as something that exists in the real world or in the world of ideas**. It can be said that sound, as it is elusive in the sense of a solid, belongs to the world of ideas. Increasingly often we come to the belief that "only the place of listening remains real" while sound becomes a "state of one's own perception", and **the object becomes metaphysical**, filled, marked with symbolic references and **creates meaningful contexts in space**.

The results of long-standing research by Dr. Iégor Reznikoff, a lecturer at the University of Paris, have brought the mystery of the creation of such metaphysical objects as the prehistoric paintings in the cave of Le Portel (Paleolithic gallery located near Ariège) closer to explanation[16]. Iégor Reznikoff, a specialist in early Christian singing and in acoustic archaeology, a connoisseur of ancient music, experienced while traversing the grotto a particular type of resonance in places where prehistoric paintings were located. He noticed a clear link between the placement of paintings and the quality of resonance. Then there was a suspicion that the Paleolithic image was combined with sound. **Acoustic impressions accumulated with optical ones**, creating a place marked by spirituality. The researcher showed that, for example, in the Niaux cave in Arisge, the most exquisite paintings were made in a place whose acoustic properties are similar to those of the Romanesque chapel. Thus, he assumed that there may be a link between the painting and its representation and the type of musical work or song performed in its vicinity. In his opinion, rituals were performed in the grottoes with paintings – sounds appear as "events", "turn on the context surrounding the object and

[14] Acousmatics refers directly to Edmund Hussel's phenomenological reduction theory which consists of several stages and consists in turning off the knowledge you have in order to replace it with a source of knowledge derived directly from objects, which in turn we can experience directly, and they create absolute reality. The next stage of the reduction is to get rid of all judgments about the object being learned about, which will limit our experiencing of a given phenomenon only to observation. The next stage is the eidetic reduction which reduces individual experiences to a common denominator and allows you to reach the essence of the object.

[15] https://sjp.pwn.pl/sjp/obiekt;2491478.html [accessed on 22/06/2019].

[16] https://nowosci.com.pl/jaskiniowe-rytualy/ar/11096582 [accessed on 06/05/2010].

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Wiedeń, Kampus WU, biblioteka, aut. Zaha Hadid (fot. Beata Gibała-Kapecka, T. Kapecki).

Shanghai, Zendai Himalayas Center ,Arata Isozaki (fot. Beata Gibała-Kapecka, T. Kapecki).

Tokyo, Cocoon Tower (fot. B. Gibała-Kapecka, T. Kapecki).

its appearance".

Theorists and philosophers centered around the *Cybernetic Culture Research Unit* (CCRU), a circle placed between science and art, have already questioned the approach to urban space design in the 1990s, which attaches too much importance to the phenomenology of sound perception, in which "human hearing is given priority". Steve Goodman calls for the sonic effects to be expanded to include an "ecology of vibrating affections", which does not leave room for the assumptions of some perception in terms of ideas about complex *modi*[17] but "gives the possibility of the occurrence of changes in the whole sensorium, including inhuman beings". As a result, sound would be primarily determined by its action. This action is not intended to be purely receptively-theoretical, it is intended to have an anthropological and social empowerment and to be technologically generated (networks of sensory events).

[17] http://sady.up.krakow.pl/antfil.locke.rozwazania.htm#locke2.12 [accessed on 23/05/2019].

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Sound recorded in the shape of a form
The form generates sound

„All the Things that Could Possibly be Audible”[18]. The Sound Art Festival [19] places the medium, which is sound, beyond its musical contexts, broadens the perspective of awareness of the relationship between sound and the environment, looking and listening, hearing and contextual perception, and finally “speaks from the perspective of the medium itself”. As part of the “space”, creators, asking questions about the directions of evolution of this field of art, explore the issues of relations and connections of sound works with place and architecture. The *Façade scan* installation “translates components of the urban structure into auditory signals. We watch the streets with a series of front facades like the surfaces of the city. They are “scanned” with a sound tool and the facades and their individual elements are treated as musical scores. A sound specified in the rhythm is generated. The individual elements of the façade become tones, intervals and rhythms. It can be said that, in a sense, each building triggers its own individual, and thus unique, experience of sound, because changes in the architectural tissue in its individual structures, such as cavities, become audible”[20].

Tokyo, NOA , Seiichi Shirai
(photograph by B. Gibała-Kapecka, T. Kapecki)

[18] http://festiwal.sanatoriumdzwieku.pl/pl/program/sanatory17/ [accessed on 12/03/2019].

[19] Curators: Klaus Filip, Noid, Ulla Rauter.

[20] http://festiwal.sanatoriumdzwieku.pl/pl/program/sanatory17 [accessed on 05/05/2019].

Krakow, Kosciuszko Mound, enclaves (photograph by B. Gibała-Kapecka, T. Kapecki)

Nowadays we are faced with a variety of sound perspectives. Theoretical and practical attempts are made not only to think about sound, but also (to think) by sound, to raise in parallel human awareness that not only "by" looking but also "by" listening, they shift the relationship between a particular hearing and a contextual or reflective perception, illustrate, taking the sound beyond its musical context, thereby pointing to possible directions of evolution in this field.

Fluids[21] is an installation by Akira Wakita that "generates a real-time computer image not seen in the daily experience of air movement", three-dimensional iconic models of miniature chairs, examples of the 20th-century design, are observed by software rendering the movement and color of air particles flowing around the edges of furniture. By combining art and science, the artist and the engineer **point to the existence of an invisible and present reality "around" objects**. The concept of visualizing the sound generated by the shapes and matter of objects introduced into the interior, **which is surrounded by man**, allows new media to show **the full phenomena of space** and, thus, to observe how the void category changes. This three-dimensioning of sound gives you an opportunity

[21] https://magazynszum.pl/dzwiek-plynacych-informacji/ [accessed on 06/03/2019].

to enhance your **"sense of surroundings" with sound**. Nowadays, art, in interdisciplinary cooperation with other sciences, contributes unrivalledly to **enriching the perception of the recipient – the participant of events**.

The works by Paweł Janicki offer such possibilities, especially the *Vibra* project which boils down to an object that allows in an unusual way to extend the feeling of the sound with the help of bone conduction. The author of the project attempted to create an audio work, which is an unconventional method, consisting of the receiving of vibrations with the body, can start the perception of sound in a recipient for various reasons unable to listen to sound in a common way. These are works (sound art), focusing **directly** on listening, but as a social activity, and individual, "internal" experience.

Tokyo, Ayoama Omotesando, Chloe, AH Architects, Sophie Hicks, Architecture (photograph by B. Gibała-Kapecka).

Material generates sound

Each space has its own acoustic capabilities designated, for example, by the framework of its surroundings, also this architectural one is essentially created by its structure.

In this sense, the space and interior, together with the entire architectural structure, including the composition of the equipment, have been a sound installation from the very beginning. Only in the next stage are they subjected by "institutions" (creators, the industry) to various, now specific, treatments for the purpose of perception of the place or designed interactions between the audience and space[22]. These specific treatments are a type of activity which seeks to materialize also the acoustic capabilities of the particular space and, to this end, it is subjected to treatments which constitute its composition. The pioneers of acoustics used not only the body of the object but, essentially, interior architecture, that is, also finishing materials and fittings, to regulate its properties, for example reverberation. The Boston Symphony Hall (1893-1900) is the first room to be designed by an active physicist, Wallace Clement Sabine, as it turned out, the only scientist in the world at the time who had knowledge of architectural acoustics (he is considered its creator). The acoustic parameters that characterize a given space, nowadays included in mobile frames, allow you to adjust the perception of the place. They are treated as **works of sound art**.

The idea of visual acoustics

Research into the phenomenon of the origin of sources of the forms and content of the chapel in Ronchamp (Stuart Cohen and Steven Hurtt) highlights the complexity of Le Corbusier's artistic concepts, such as "**visual acoustics**" and "**landscape acoustics**", and their impact on the development of formal motifs. The architect recommended exposing the sculptures, but in open space, arguing that they "correspond to what I call acoustic plasticity" (*la plastique acousticque*), that is, "**forms that emit and listen**" to show "acoustic" resonance with the landscape and metaphorical connection to the world of infinite space[23]. Le Corbusier's reflections in recent years on the objectives of architecture from the point of view of the intriguing idea of **visualizing acoustics** presuppose that its predestination is intended to create "**inexpressible spaces**". This fascinating approach opens up the possibility of peregrination of this inspiring multidimensional metaphysical "**inexpressibility**". It can be assumed that, to some extent, Le Corbusier, by referring to the

[22] http://glissando.pl/aktualnosci/poza-ekspozycje-dzwieku-w-poszukiwaniu-nowych-frontow-audialnego-wystawiennictwa-wokol-projektu-niewyczerpalnosc/ [dostęp: 8.05.2019].

[23] http://quart.uni.wroc.pl/archiwum/2011/19/quart19_Was.pdf [accessed on 04/05/2019].

"unusual" or "extraordinary", moderated the extreme rationalism he pushed in the first decades of his work. Therefore, the unusual, phenomenal interior spaces of the Ronchamp chapel, marked by the ambiguity of moody metaphysical images created using existing and absent natural light listened to and condensed by three towers which also delineate **spatial acoustic threads**, to which the walls of the chapel inclined under the influence of resonance (reverberation) of the external surroundings (landscape) refer formally – "**addressing the words to the landscape"**.

Over time, the architect began to see the need to emphasize the importance of the **organizing role** of the work, the object, in the landscape, calling it a "passive environment" and accentuating its impact, and later also pointing not only to aspects of the **"speaking" of the work** but also to the need to take into account the architecture from the perspective of **the work manifesting the dimension of "listening"**, aimed at collecting and processing sounds from the landscape. In the formal planning of the Palais de la Société des Nations project in 1927, Le Corbusier worked on solutions of symbolic elements, translating the idea of "**visual acoustics**" into specific shapes. In order to exchange features between the landscape and the architectural object, as a result of opening up to sounds coming from the surroundings, the body of the entrance pavilion to the main palace was realized on the plan of an arched rectangle and from the inside facing Lake Geneva. This dialogue was complemented by an over-the-body extended monument with a group of sculptures also facing the water.

The concept of architecture listening to sounds of the environment, entering into a kind of formal dialogue with it, provides an opportunity to maintain the expected balance of visualizing in the acceptance of mutual characteristics. **Visualization of acoustics** from the outside of the object also moved to its interior as a result of the application of a clear curvature in the form of a ceiling for the meeting room. The bending of the floor plane of the room was aimed at strengthening the projection of desired sounds while the reference of the arch of the pavilion façade to the shoreline of the water reservoir constitutes a symbolic opening to the landscape of the surroundings. In the late 1920s, the architect increasingly emphasized the aspect of "listening", developing the concept of architectural dialogue with the environment, including the capture of landscape sounds into all the artifacts designed and found.

Eye-centricity. The visualization of sound

When considering issues related to human communication in general, we reach for its various forms, we look for interconnectedness between the mind, perception and functioning in the world. Focused on the transmission of information in visual form, we use different means of communication, reaching for such elements of expression as illustration, photography, typography, infographic, film or animation also when we design the immediate human environment. Visual communication when it comes to space is as important as the one relating to the Internet. Today, more and more often visual communication reaches for more complex forms of communication, of a hybrid nature, which use non-traditional formal language the meaning of symbolic references and the functions of social codes. Visual sensations extend to sensory experiences resulting from aural sensations because being in the world is constantly associated with receiving sounds due to the unique sound layers assigned to each of the places that equally determine the way a particular space is felt. Its distinguishing feature, of course, can be the metropolitan movement, the breeding area of birds, the local language, but also the landscape architecture in the form of the formation of the environment with its furnishings. It is clear that **sounds are an element that makes up a certain identity of a place** or cultural group, and these have their own unique sounds, but also the resulting remnants in the form of impurities consisting of "dead sounds that have accumulated during the day"[24].

Reflection on auditory forms of communication is so rare and rather random that it becomes indispensable to adopt an active attitude towards the audiosphere in order to sensitize us, the audience, users, to **sounds of everyday life** and, thus, to encourage us to take care of quality of our environment in its full spectrum. A tool that is used in the designing of sounds of everyday life, or its discovery and analysis for the purpose of working it out, is the practice invented by Hildegard Westerkamp. It consists of walks, during which sounds are recorded typical for a given space and a given place with the elements assigned to it, after which the collected materials are analyzed along with further forms of research resulting from the program and design process. The idea of stopping sounds in time and space, whether in the form of museums or otherwise, such as *soundspace* or *soundscape*, together with **the visualization of acoustics, even in Corbusierian terms**, seems essential in receiving reality in an unlimited way, generates a philosophy addressed to the recipient who can live reality indefinitely for a period of time and regardless of the concepts developed. What is suggested by this procedure is rather an attempt **to imagine the object, its form and shape, that is, sound, over time and in a spatial dimension**. Common references to his contemplation and

[24] J.G. Ballard, Wymiatacz dźwięku, translated by Z. Uhrynowska-Hanasz, http://robwal.cba.pl/ksiazki/Ballard%20-20Wymiatacz%20Dzwieku.htm [accessed on 02/12/2019].

inAW Journal
Multidisciplinary Academic Magazine

VOLUME 1, ISSUE 1 (2020)

Berlin, Muzeum Żydowskie , instalacja Menashe Kadishmana pt. Shaleschet, betonowa wieża wypełniona zwielokrotnionym krzykiem (fot. B. Gibała-Kapecka).

experience occur in the **ultrasonic** music of Ballard's *The Sound-Sweep*[25] – **felt but not audible, compressed** to such an extent that "the past, present and future are melting in simultaneous reception". This also applies to the unveiling of **temporal reception of shapes** of objects and, as a result, to the resulting **formal shaping of the environment**.

Back to the future. "Capital city's sound removal plant""

For Ballard, built-up spaces become museums of sounds, walls have ears, and listening to architecture becomes a form of revealing successive layers of time. Architecture becomes more than a living space. By storing sound directly, it also tracks the relationship between human presence and the shape of a built environment. Consequently, under such conditions, acoustic space becomes not only a function of materiality and one of the characteristics of buildings or built-up areas, but also a tangible object which can interact with itself.

> "The clearing the space of everyday trifles, like slamming the door, the sound of a falling-over somewhere, the whistle of the kettle, a few grunts" **turns into a ritual**[26].

> […] a strange neo-Corbusierian chapel of the Episcopal church pressed in between office buildings of the banking center of the city […]. The chapel presented a difficult and laborious task, requiring three hours of full focus. The Dean recently brought from the church of St. Francis of Assisi unique thirteenth-century portico, wonderful sound matrices, rich in seven centuries of Gregorian chants, covered with a layer of centuries-old tolling the Angelus. Mounted in the altar, they exuded an atmosphere of devotion – a whisper of a litany, a gentle depth of the hymn – which brought to mind the exalted images of prayer and meditation[27].

> […] just two years earlier the entire northern aisle of the Reims cathedral, with its untouched rosette window, purchased at a record price of one million dollars and built into the new St. Joseph's Cathedral in San Diego, was stripped of its priceless legacy of sound layers by a brigade of blunt sweepers who misunderstood the instruction and accidentally cleaned a wrong wall of sounds[28].

[25] *Ibid.* p. 99.

[26] *Ibid.*

[27] *Ibid.*, p. 109.

[28] *Ibid.*, p. 110.

A number of works were done to "extend the life of the porticos of Assisi by twenty years; without it, they would soon be tainted by various noises from the faithful"[29].

The desired "ability to sweep selectively – to remove from the walls of the chapel all unnecessary sounds, constituting disturbances, such as swathing, crying, the jingle of coins or the murmur of prayer, while leaving choral and liturgical chants, which further enhanced their lofty tones"[30].

Warnings – „sound resonances will reach such a degree of intensity that buildings under the influence of vibrations will begin to collapse and the whole city will collapse like Jericho"[31].

Muzak[32] fills public spaces, is their acoustic complement as a comforter and manipulator of the subconscious, finally hiding everywhere in the form of impurities. It is intended to create a special mood for shopping, hotel stays, work, offices and cafes or restaurants, also subjecting users to a kind of abuse. Thoughtfully selected and composed **music wallpapers** influence the behavior of the audience, making them desirable elements of marketing strategies, recognizable marks and, thus, distinguishing brands, companies or other organizations, associations and foundations.

The seemingly non-invasive **muzak** has created a specific profile of sound space policy management, while pointing to **a lack of responsibility** for sound in a public place. **Muzak expands its scope of influence, sweeps ever wider circles**, implies guarantees of safety, sending thoughtfully selected musical sounds to block entry, and thus the participation, of inappropriate or undesirable persons in accordance with the idea of ensuring safety of other specific recipients. This is how public space becomes **a tool in the categorization of the society. The process of its distribution to the public has been launched**, systematic spatial segregation is carried out, resulting in the creation of so-called "defended spaces", i.e. areas also planned sonically in a way attractive to model consumers, eliminating these "unwanted" while maintaining the process of social marginalization. On the other hand, spaces have been expanded by the extent of the impact on the outside environment, such as playgrounds, café gardens or car parks, while staying in which **we still remain within the same area**.

---

[29] *Ibid.*, p. 109.

[30] *Ibid.*, p. 110.

[31] Tamże, s. 111.

[32] A. Janikowska, *Audiosfera*, „Koncepcje – Badania – Praktyki", 2016, nr 2 (4) (http://pracownia.audiosfery.uni.wroc.pl/wp-content/uploads/2017/08/Audiosfera-2-2016_Janikowska2.pdf [dostęp: 2.07.2019]).

Muzak is programmed to mark a territory, is used to “create your own versions of space” so that you can freely moderate and manage them. In this way muzak interferes with our living space. The growing areas of sound interaction begin to intertwine, overlap, leading to a cacophony of sounds of different interests. Muzak has penetrated so deeply into the modern world and our lives that it seems that this kind of “sound architecture" must be subject to a design process on an equal footing with urban and architectural ones.

The interdisciplinary cooperation undertaken in the framework of the “NEW SPACE” project in the field of science and art raises the issues of producing democratic and inclusive spaces, draws attention to their complex acoustic diversity, thereby pointing to the need to bear responsibility for sound design, i.e. the implementation of new acoustic technologies, sound architecture and acoustic ecology, the essential component of which is the relationship between people and their surroundings, including cultural ones. On the one hand, it represents natural sound phenomena and, on the other hand, elaborated compositions of the sound landscape.

We evolve from the space in the auditory dimension to the concept of identity spaces as continuous, but time-changing, stories that allow us to look at this layer of public sound spaces differently, where you can listen to sounds of the past and present worlds, see their shapes and faces with your imagination, experience sound events.

The visualization (of the landscape) of sound

Public awareness of the dangers of noise is increasing, which is why, as a society, we increasingly demand that acoustic comfort be taken into account in the design of the immediate environment, indicating this factor as one of the most important because it determines the quality of everyday life. Noise emission directly translates into acoustic nuisances which contribute to the formation of social conflicts also in the family environment. As a result of changes in social, economic and cultural life, and, with the 21st century, the entry into information civilization, which is a global phenomenon[33], we are experiencing too rapid build-up of noise, which consequently exacerbates the disappearance of areas colloquially referred to as quiet, inherently acceptable. Since the beginning of the 21st century measures have been taken, known as the revitalization of public spaces and the state of the

[33] W. Furmanek, *Ogólna charakterystyka przemian cywilizacyjnych*. „Dydaktyka Informatyki”, 2004, nr 1, s. 17-27 (http://bazhum.muzhp.pl/media//files/Dydaktyka_Informatyki -r2004-t1-s17-27.pdf [dostęp: 17.06.2019]).

environment[34], green spaces, squares, pedestrian streets and walking alleys have been cleaned up and created, which, through implemented formal and functional solutions of an interdisciplinary nature, are associated with an improvement in aesthetics, thereby increasing the attractiveness of places and improving the acoustic quality of public spaces. The problem has been raised, but it still requires spectacular holistic action, not grassroots initiatives, because, on the one hand, **public space is starting to sound multi-voiced** and, on the other hand, the increasing globalization is causing the **unification of traditional sound landscapes characteristic of specific places**, followed by the loss of the so-called "distinguishing sound features of the landscape of space", which determine the identification of man with space and place, known as "identity elements".

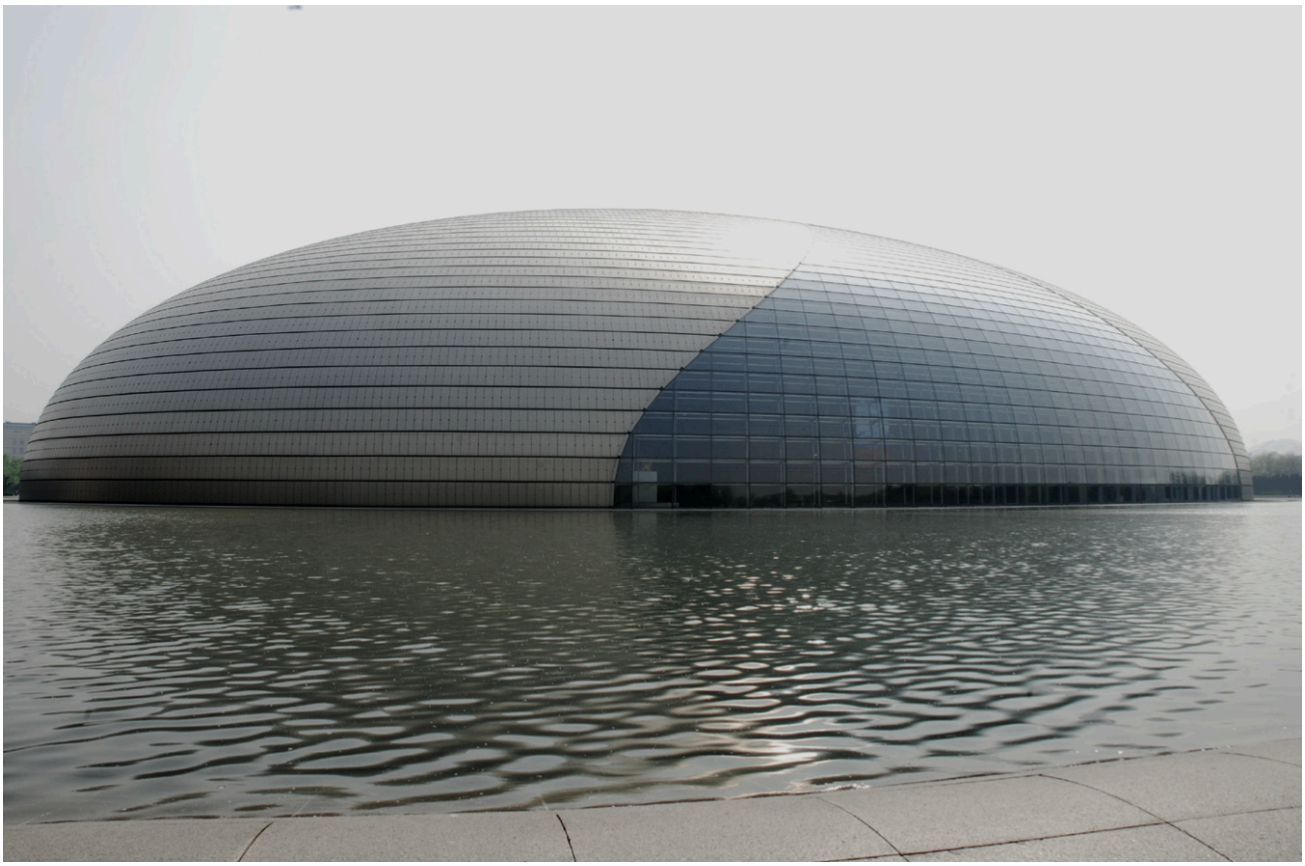
The research and design problem is now recognized so widely that there is a growing interest in creating detailed graphical acoustic maps included in the set of tools used for interdisciplinary research into the **broadly** considered creative shaping of space for human life, based on the experience of interior architects creating designs of public spaces and residential interiors. The essence of the comfort of human life lies largely in the satisfaction with functional solutions and qualitative formal (aesthetic) changes made, which make up to a large extent the feeling of social and mental state of one's own life. The list of basic conditions of well-being ranks very highly, inter alia, the cultural pattern which includes the above creations of **material culture**, as well as the established way of behaving and thinking, together with "assigned cultural characteristics characteristic for a given community". They can consist of surrounding unique sounds and noises, *soundmarks*[35] that make up the recognizable mood of places and objects. When field-recorded, they are phonic situations which are archived as a source of sound landscapes (R.M. Schafer).

Recording and analyzing recorded audio phenomena serves us, interior architects, to make transformations in public spaces, reconfigure their structures taking into account different zones and places, also in diachronic terms, for recognizing changes taking place. Perpetuating audio phenomena characteristic of the sound landscape of a given interior proves useful due to the needs of acoustic revitalization of architectural interiors. The nature of the reproduced architectural structure of the interior, the elements of its equipment and dictated by the function performed, are at

[34] S. Bernat, *Wizualizacja dźwięku w krajobrazie na mapach „dźwiękowych". Visualising Sound in Landscape on Sound Maps*, „Prace Komisji Krajobrazu Kulturowego. Dissertations of Cultural Landscape Commission", 2015, nr 28, s. 81-97 (http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-86b36b5e-bf81-40bd-9a67-71c4ca5c178a/c/PKKK_2015_28-6.pdf [dostęp: 12.03.2019]).

[35] Soundmark: a unique sound known to, and recognized by, a given community.

the same time guidelines for acoustic designers when making **acoustic reconstructions**. Sound maps (sound space maps) are also accompanied by auditory maps which complement the suite of tools used to shape the space. They can also function as a stand-alone criterion for phenomena. Sound is used as an alternative to vision for blind or visually impaired people, it is an interpretation of numerous phenomena specified on maps, characterized for example by such data as "location, volume, altitude, pace, duration, articulation. For example, a metallic sound can be used to present urban phenomena while a warm or mild sound can be used for rural phenomena"[36]. It is thanks to hearing, receiving sounds, that we are able to experience invisible situations. Sound gives you the ability to refer in a suggestive way to quality that would not be read and recognized in visual form. As it turns out, however, sound also needs visualization[37] to achieve greater sensory reality because auditory information may not be conclusive due to similarities of sounds emitted by different sources. Therefore, surveys on the sound landscape use drawings, mental maps or visualizations in descriptions and evaluations. In the course of the studies carried out it became obvious that visualizing the sound landscape of places in the form of drawings is easier – it shows a perspective closer to man.



PBeijing, the National Theater, Paul Andreau (photograph by T. Kapecki)

For the purpose of highlighting the sound layer of the landscape, so far, in addition to the verbal description taking into account **echoisms**, symbolic terms are also used, using **musical signs** or drawings. They present the shapes of things or objects, which represent the sources of sound, or shapes enclosed in forms of **wavy lines**, emphasizing the dynamics of sound or landscape elements, including colors that determine the location of the proposed elements and actions in places of their audibility. Of course, the most commonly used tool is photographic documentation. To enable the perception of a sound in an even broader context, you can use a moving image, i.e. a video recording or computer animation. Visualizing the sound landscape, however, is not an easy task. It seems obvious to say that no graphical image of sound presented in the form of color or linear compositions at present will replace its sensory experience in a given place and at a particular time. Justin Winkler even claims [38] that this way of imaging, presenting sound events is at most in the dimension and character of a "sound postcard", unfortunately it is not yet a visualization of sound landscapes. As always, the experience of researchers on the same issues is different. Bernie Krause believes that in the description of the sound landscape photos are certainly a much more valuable message than words. An important element in education is the acquisition of creative skills, including those aimed at developing various forms and methods of visualizing sounds in the process of "mapping" the sound landscape, recording the classification of sounds (alarming, focusing attention, warning, and finally also pleasant or unpleasant ones), and consequently creating from them to implement compositional systems of soundscapes.

Urban space

Urban space in the form of the interdisciplinary "NEW SPACE" project is considered as **a place with a multiplicity of multiple structures** which are the subject of various expressions and experiences, symbolic interpretations, ritual references (both religious and secular), exclusionary adaptations, practices usurping the right to appropriate these places to a greater extent than allowed. **The aim is to participate in the formation of diverse (inclusive) spaces of general interest as democratic spaces of general interest, while drawing attention to the holistic view of the problem of human relations with his surroundings**. In order not to impoverish our environment, it

[38] Winkler J., *Space, Sound and Time. A choice of articles by Justin Winkler in Soundscape Studies and Aesthetics of Environment 1990-2003*, Basel 2004 (http://www.iacsa.eu/jw/winkler_space-sound-time_10-09-19.pdf [accessed on 14/04/2019]

should take into account the widest possible spectrum of cultural stimuli, involving the participation of all senses, contributing to its physical and sensual character. Excessive focus on the intellectual and conceptual aspects of space contributes to the disappearance of answers to questions about human existence. Interdisciplinary tools and methods linked to spatial models are therefore necessary to analyze the shaping and revitalization of urban space, taking as a starting point cultural, aesthetic and psychological guidelines, including those taking into account the experiences of its inhabitants and users.

Juhani Pallasmaa, forcing us to reflect philosophically and culturally on the condition of modern civilization, both in *The Eyes of the Skin* and especially in *The Thinking Hand*, draws attention to the "existential and embodied wisdom" contained in architecture, in the wider space, recognizing that it grows out of the experience of architecture and general reflection on man, what role the human body and senses play in this cognitive process. An equally important component of spatial experience alongside visual aspects is, besides, the auditory dimension. Michael Bull, editor of "Sounding Out the City" magazine[39], says that "none of the urban theories work, starting with Georg Simmel's theory of the early 20th century, through the study of the sound landscape of R. Murray Schafer, major urban theorists such as Walter Benjamin, Michel de Certeau, Max Weber, Marshall McLuhan, Theodor Adorno, Herbert Marcus, Michel Foucault, Jacques Attali, Michel Chion, Gaston Bachelard and, more recently, Peter Szendy because they rely to a large extent on the visual epistemology of urban behavior" while in urban space projects and their research he always had to deal with significant dimensions of sound matter, **the sound area**. Together with Les Back, dealing with possible future ways of developing *sound studies*, they say that "when they think with their eyes, they are given an opportunity to broaden their critical imagination".

Denis Cosgrove attributes to the Renaissance the giving of a fundamental importance to mastering the possibilities of the human eye, justifying his view of the need for society to become more efficient in controlling space and urban fabric at this stage of development. As a result, this led to an escalation of the development of different urban planning concepts, clearly aimed at introducing a formal order in order to gradually reduce the visual chaos (spatial entropy) that was a natural

[39] *„New opportunities for listening". Sensory culture in the digital era and the sustainability of utopia*, the interview with Michael Bull, Violeta Nigro Giunta et Nicolò Palazzetti (https://journals.openedition.org/transposition/1580, (accessed on 21/02/2019). Theorists important for the discipline, mentioned in the interview: Michel de Certeau, Walter Benjamin, Max Weber, Marshall McLuhan, Theodor Adorno, Herbert Marcuse, Michel Foucault, Jacques Attali, Pierre Schaeffer, Michel Chion, Peter Szendy, Gaston Bachelard and Brian Kane.

consequence or result of urban forms developing organically. It seemed obvious, therefore, that chaos was subordinated to geometric compositional systems, seeing in them the possibility of efficient surveillance of urban communities, thus providing the basis for strategic urban planning.

> Ideas confronted to reality often turned into their own caricatures. Social relations and politics were the most common drivers of urban change. They set the directions of the transformation of space, they brought new structures to life or led to the ruin of the existing shape of space. In any case, however, the idea of the city was, and is, its plan. It is fascinating to discover the ideological layers of the city hidden, or perhaps enchanted, in their geometry, spatial systems and meandering history of urban development[40].

The death and life of America's great cities is a collection of Jane Jacobs texts published in 1961, which turned out to be one of the fundamental works about architecture and the city, which were published in the 20th century. It started the fight against the radical ideas of Le Corbusier and, thus, also against modernist urban planning, with the domination of blocks and shopping centers, parking lots and high-speed routes, while presenting specific solutions for the regeneration of cities, fostering the natural and harmonious development of their inhabitants as well. "By arranging cities, as in other activities, we need art to help us understand life, to show us the meanings, to illuminate the relationship between our lives and life beyond us. Perhaps we need art the most to assure us in our humanity. Although art and life are intertwined, they are not the same"[41].

At the turn of the 20th and 21st centuries two important documents were produced: "Carta Megaride" (Naples, 1994), which provides basic guidelines for the planning of modern cities, and "The New Athens Charter", subtitled *Visions of a 21st Century City* (2003), which in turn corrects the effects of the guidelines contained in the CIAM's Athens Charter of 1933 and points to the need to restore forgotten values such as the scale of the city and the paradigm of coherence of its various elements. Since then alternative ways of social sustainable cohabitation, such as smart grow, "new urbanism", or slow cities, have been developed, negating, above all, the development model of accelerated urban development. An opening was initiated for humanistic reflections, for urban research focused on sensory issues, which gained paradigm status in the 21st century. Hence the desire to **revaluate listening** as an activity that is an essential component of man's ecological relationship with his spatial and cultural environment. Also, the concept of "aesthetics beyond aesthetics" by Wolfgang Welsch, created under the influence of the latest technologies, inspired to

[40] Z. Paszkowski, *Miasto idealne w perspektywie europejskiej i jego związki z urbanistyka współczesną*, Universitas, Krakow 2011, p. 9.

[41] J. Jacobs, *Śmierć i życie wielkich miast Ameryki*, Fundacja Centrum Architektury, Warsaw, 2014, p. 383.

consider the problem of "the functioning of visual metaphors as the most adequate representation of thought processes".

Against the background of these reflections it can be seen that the concept of sight-centrism does not refer only to the dominance of one sense over the others but describes a broader stream of reflection (*sensory studies*) that have opened art and humanities to forgotten and consequently overlooked aspects of sensory experience, mediated not only by sight but also, alongside touch, sense of sense and taste, by hearing. In this way, the field of research has been broadened, as it is impossible to understand sound in a single discipline. It continues to concern urban planning with architecture, technical sciences, history with literature, has become an essential part of art and culture, sociology, social sciences and humanities. Today, sound research also includes human geography and *media by proces*, the practice of everyday life in the city. It became multisensory, which resulted in an in-depth awareness of the quality of the living environment.

Aural architecture. The auditory architecture of interiors

Steen Rasmussen asks if architecture can be heard[42]. He compares sound to light which objects reflect, revealing their qualities (**form and matter**), even though they do not radiate it. The architect points to the analogous influence of sound which also reflected from the object and completes the impression of its form and matter. These sensations provide us with spaces and interiors in a diverse dimension, because they depend on their formal shape and substance content. So we experience space and its objects aurally. Through audible, characteristic sounds, as a result of perceived acoustic effects giving the impression of the length of the structure, the types of surfaces that resonate with the sounds of different times and stories, the cylindricality of the form, the thickness of walls, they become powerful instruments on which people learned to play – "Those gathered in St. Mark's Basilica heard not only two orchestras. They also heard two dome-covered rooms, one of which spoke with silver tones and the other responded with powerful gunmetal sounds"[43]. Rasmussen refers to Hope Bagenal[44] who clearly proves that the polyphonic music performed today at the Westminster Cathedral is directly due to its architectural form and the "open vowels of Latin". Bagenal also demonstrated relationships between the interior architecture of St. Thomas's Church in Leipzig, its

[42] S. Rasmussen, *Odczuwanie architektury*, Murator, Warszawa 1999, s. 224.

[43] Tamże, s. 230.

[44] P.H.E. Bagenal - teoretyk architektury i akustyki, który wprowadził naukowe podejście do projektowania akustycznego budynków.

Gothic structure, and the compositions created by organist Jan Sebastian Bach. He recorded his works in several tones due to "the absence of tone, that is, the area of response in the church"[45].

Biennial of Architecture in Venice, 2010, Olafur Eliasson: "Your split second house", the installation combining light, water and sound (photograph by B. Gibała-Kapecka)

[45] S. Rasmussen, *Odczuwanie architektury*, dz. cyt., s. 231. We wnętrzach kościoła średniowiecznego dźwięk trwał od sześciu do ośmiu sekund, dzisiaj - od dwóch do pięciu.

Today, it is Barry Blesser and Linda-Ruth Salter, scientists and theorists of **auditory architecture**, who raise the question of the need to consciously and intentionally shape the audiosphere considered on a macro scale, that is, especially with regard to the development of urban space, in the planning of new investments, because, as it turns out, the sound reality surrounding us still remains outside the area of interest of urban planners. The researchers prove that by designing the sound landscape of individual places in advance, it is possible to improve the nature of space and its objects, and significantly that "the acoustics of a given space models its experience to a large extent." **This means that responsible shaping of the space for human life is planning in a holistic sense**, so that the sound of a particular area with its backgrounds and symbolism of characteristic importance together with the local architecture "expresses **the identity of the community** to the extent that the inhabited areas are recognizable and characterized by their **sound landscapes**". American scientists transposed Schafer's demands into architecture, thus formulating auditory architecture reverences, including the above design guidelines for emerging buildings, along with thoughtful planning of the sound nature of their surroundings. The idea is to re-raise awareness of the auditory reception of the everyday environment, and the idea itself was born of the modern necessity of the successive elimination of the growing range of acoustic sensations, which we are subjected to independently of us.

In our Polish realities the current process of architectural interior design takes into account only acoustic design within the compliance with the requirements of standard **soundproofing in so-called "building partitions"**, and in practice it is limited to this. The auditory aspect raised by interior architects in the design of the most important spaces for human life, which are multi-family buildings, for obvious economic reasons, is fully realized only at the finishing stage, when only half-solutions can be applied. **Most often, however, only after a certain period of use of space, object or interior, due to psychosomatic symptoms and as a result of recognized causes, such as irritability, a feeling of anxiety, prolonged state of denial**, users discover a reluctance to stay in the space and use it, as a consequence human relationships become disturbed.

Unfortunately, the process of influence of sounds in the psychological or psychophysical dimension is completely overlooked, because it requires a significant individualization of design work. Such a socially sanctioned reduction approach causes the growing architectural autism to take root in our common reality, thereby depriving architecture of one of its most important tasks: giving a person a sense of security, an existential backing in the world. However, it is necessary to examine

the problem from the side of the liberally understood right to privacy ("my home is my castle"[46]) – **the privilege**, although regulated, but allowing you to make noise within his own apartment or house. As early as the 19th century, the reception of all stimuli, including sound, was considered to be individual sensations, such as individual things, against which objective measures are difficult to apply.

The research on noise and, consequently, conflicts that arise from it, carried out by Karen Bijsterveld and Emily Thompson as part of English legislation on noise, has shown that they are strongly marked by social realities, to the extent that they reflect interclass divisions, and the final regulations on its inclusion and exclusion from the fields of everyday life, that is, attempts to "discipline" sound or channel it, were left to local communities, i.e. bottom-up community regulations.

The acoustic environment in a transdisciplinary perspective

Interdisciplinarity is necessary here because in the so-called "visual culture" one forgets about public space, and with it about coexisting, especially visual, architecture and interior architecture, that is, design art. It would seem that John Cage in his performance *4'33"* (1952) and James Graham Ballard in the short story *The Sound-Sweep* (1959) reopened spaces of art for sound in terms of a wide spectrum of impact as something elusive but giving a sense of time and space, albeit hidden inside our minds. Raymond Murray Schafer dealt with what is outside almost in parallel, in the late 1960s. He started the "World's Sound Landscape" project with a novel action in the field of sound ecology. In the case of musicology, medicine, philosophy, later acoustics and the theory of cinema, it can be said that reflections arise from the dawn of time but theorists of sound studies are of the opinion that the spectrum of references is disintegrated and, consequently, parceled out. **That is why it is so important to deepen the understanding of sound from an interdisciplinary point of view on issues related to the wide-ranging multidimensional space, architecture**[47] **and design arts**, as well as to present architectural reflections on opened and closed interiors including objects contained therein, taking into account social aspects of these phenomena. Sound, penetrating and filling space and architecture, not necessarily in an organized way, constitutes their integral, even the same

[46] The concept is strongly established also in the Polish tradition.

[47] Architects dealing with the subject of sound include Georges Teyssot, Steen Eiler Rasmussen, Klaus Schuwerk, Bernhard Leitner, Buckminster Fuller and Juhani Pallasmaa.

element and, at the same time, defines, and becomes an obvious carrier of, social relations, both in the private field and in the public sphere.

Efforts made are essentially aimed at appealing to conscious generation around a proper phonosphere, which means planned management of sound waves. It should be stressed that the investigations and analyses are carried out in the both directions. When interpreting space and architecture, with its interior structure, with the help of sound properties, sound is also presented from a new perspective with the accompanying scientific reflection, for example in terms of performative character, such a significant aspect of modern reality in its various cultural variations. From the point of view of designers of space and its interiors, sound, through the practice of in-depth listening, becomes a tool for creative learning, analyzing and creating new formal, aesthetic values and, thus, the mental comfort of the user, recipient or participant. It can therefore be a research method in which there is creative potential to initiate these qualitative changes in the way space and places are experienced and conceptualized. What is important about the practice of in-depth listening to the research process is "the sensitivity of the researcher himself and, what is most important, that it contributes to understanding the importance of his reflexivity in the process of generating knowledge"[48]. This form of self-reflection, called **autoethnography**, leads directly to performative ethnography, a **methodological approach**, one of the few types of art-based research in which not only data collection activities play an important role but also how they are presented in the form of artistic messages, such as an installation, painting, piece of poetry, song, visualization, drawing, film or project.

Tranquility Rating (TR) – evaluation of the calm of the environment

Every day, sounds along with contextual functions and visual qualities regulate our presence in space. They inform, instruct, warn, incite, allow, bring to mind, identify with a place to fully understand them. Their repertoire is constantly expanding. We remember space, city and place through images. Characteristic sounds corresponding to them tell us their old and everyday stories, they speak with their own voices. If recognized, they become necessary and useful, locating, give us a sense of safety and peace. The philosophy of the authors of the "WELL Building Standard",

[48] A. Kacperczyk, *Autoetnografia – technika, metoda, nowy paradygmat? O metodologicznym statusie autoetnografii*, „Przegląd Socjologii Jakościowej", 2014, nr 10/3, s. 32-75.

expressed by the certification system created by the IWBI™ International WELL Building Institute™, focuses on aspects that are of specific importance for the health, comfort and awareness of users. Research and regulation is undertaken for functions grouped into ten categories, setting the necessary and optional conditions: Air, Water, Nutrition, Light, Movement, Thermal Comfort, Acoustics, Materials, Mind and Community. It is the first system that focuses solely on the health and well-being of users of architectural spaces. It is based on the assumption that the physical environment has a significant impact on people, benefits the health, productivity and well-being of users, which is supported by numerous scientific and medical studies analyzing this relationship. The certification is a proof that the way their space is designed promotes health and well-being[49].

[49] https://plgbc.org.pl/szkolenia-well/ accessed on 26/12/2018].

REFERENCES

J.G. Ballard, *Wymiatacz dźwięku*, translated by . Z. Uhrynowska-Hanasz, http://robwal.cba.pl/ksiazki/Ballard%20-20Wymiatacz%20Dzwieku.htm [accessed on 02/12/2019].

Bernat S., *Rewitalizacja akustyczna uzdrowisk w Polsce*, „Problemy Rozwoju Miast. Kwartalnik Naukowy Instytutu Rozwoju Miast", no. 13, 2016, vol. 3, pp. 45–56.

Bernat S., *Wizualizacja dźwięku w krajobrazie na mapach „dźwiękowych". Visualising Sound in Landscape on Sound Maps*, „Prace Komisji Krajobrazu Kulturowego. Dissertations of Cultural Landscape Commission", 2015, no. 28, pp. 81-97.

Dennett D., *Dźwignie wyobraźni i inne narzędzia do myślenia*, Copernicus Center, Krakow 2015.

Furmanek W., *Ogólna charakterystyka przemian cywilizacyjnych*. „Dydaktyka Informatyki", 2004, no 1, pp. 17-27.

Jacobs J., *Śmierć i życie wielkich miast Ameryki*, Fundacja Centrum Architektury, Warsaw 2014, p. 383.

Janikowska A., Krakowiak K., Kłosak A. (ed.), *Słuchawy. Projektowanie dla ucha*, Fundacja Bęc Zmiana, Warsaw 2009.

Janikowska A., *Audiosfera*, „Koncepcje – Badania – Praktyki", 2016, no. 2 (4).

Jenny H., *Cymatics. A Study of Wave Phenomena and Vibration*, vol. 1: *The Structure and Dynamics of Waves and Vibrations*, 1967; vol. 2: Wave Phenomena, Vibrational Effects and Harmonic Oscillations with their Structure, Kinetics and Dynamics, 1974, https://issuu.com/derekwillstar/docs/146864544-hans-jenny-cymatics [accessed on 12/05/2019]

Juskowiak P., *Przestrzenie wspólnoty. Filozofia wspólnotowości w perspektywie badań nad miastem postindustrialnym*, „Monografie Wydziału Nauk Społecznych UAM", Poznan 2015.

Kacperczyk A., *Autoetnografia – technika, metoda, nowy paradygmat? O metodologicznym statusie autoetnografii*, „Przegląd Socjologii Jakościowej", 2014, no. 10/3, pp. 32-75.

Kijaczko S., *Krytyka języka nauki i metafizyka „języka świata" w immaterializmie George'a Berkeleya*, „Archiwum Historii Filozofii i Myśli Społecznej", vol. 37, 1992.

Löw M., *Socjologia przestrzeni*, WUW, Warsaw 2018.

Michnik A., *Współczesne nurty* sound studies – *wprowadzenie. Prezentacja z Audioriver Lab 2018*, http://glissando.pl/aktualnosci/wspolczesne-nurty-sound-studies-wprowadzenie-prezentacja-z-audioriver-lab-2018 [accessed on 29/05/2019].

Pallasmaa J., *Oczy skóry. Architektura i zmysły*, Instytut Architektury, Krakow 2012.

Paszkowski Z., *Miasto idealne w perspektywie europejskiej i jego związki z urbanistyką współczesną*, Universitas, Krakow 2011, p. 9.

Przesmycka N., *Metody kreowania tymczasowych przestrzeni publicznych*, „Teka Komisji Architektury, Urbanistyki i Studiów Krajobrazowych O.L. PAN", 2015, vol. 4.

Rasmussen S., *Odczuwanie architektury*, Murator, Warsaw 1999.

Sikora P., *Locke'owskie pojmowanie przestrzeni a treść percepcji*, „Analiza i Egzystencja", 2012, no. 17.

Wąs C., *Znana czy nieznana? Kontrowersje wokół interpretacji kaplicy w Ronchamp*. „Quart", 2011, no. 1 (19).

Welsch W., *Estetyka poza estetyką. O nową postać estetyki*, Universitas, Krakow 2005.

Winkler J., *Space, Sound and Time. A choice of articles by Justin Winkler in Soundscape Studies and Aesthetics of Environment 1990-2003*, Basel 2004.

Zimpel J., *Praktyka pogłębionego słuchania w badaniach miejskich*, „Koncepcje – Badania – Praktyki", 2015, no. 2.

http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-2c13ad67-619c-4d5b-a15f-ae93df63a649/c/Audiosfera_2_2015_Jadwiga_Zimpel.pdf [accessed on 11/05/2019].

https://journals.openedition.org/transposition/1580, *„Nowe możliwości słuchania". Kultura sensoryczna w erze cyfrowej i trwałość utopii*, wywiad z Michaelem Bullem, Violeta Nigro Giunta et Nicolò Palazzetti [dostęp: 21.02.2019].

http://bazhum.muzhp.pl/media//files/Dydaktyka_Informatyki -r2004-t1-s17-27.pdf, W. Furmanek, *Ogólna charakterystyka przemian cywilizacyjnych* [accessed on 17/06/2019].

http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-86b36b5e-bf81-40bd-9a67-71c4ca5c178a/c/PKKK_2015_28-6.pdf, S. Bernat, *Wizualizacja dźwięku w krajobrazie na mapach „dźwiękowych"* [accessed on 12/03/2019].

http://pracownia.audiosfery.uni.wroc.pl/wp-content/uploads/2017/08/Audiosfera-2-2016_Janikowska2.pdf [accessed on 25/03/2019].

http://glissando.pl/aktualnosci/poza-ekspozycje-dzwieku-w-poszukiwaniu-nowych-frontow-audialnego-wystawiennictwa-wokol-projektu-niewyczerpalnosc/ [accessed on 08/05/2019].

http://quart.uni.wroc.pl/archiwum/2011/19/quart19_Was.pdf [accessed on 04/05/2019].

http://festiwal.sanatoriumdzwieku.pl/pl/program/sanatory17/ [accessed on 12/03/2019].

http://festiwal.sanatoriumdzwieku.pl/pl/program/sanatory17 (accessed on 05/05/2019)

https://magazynszum.pl/dzwiek-plynacych-informacji/ (accessed on 06/03/2019)

https://nowosci.com.pl/jaskiniowe-rytualy/ar/11096582 (accessed on 06/05/2010)

https://fizyka.umk.pl/~duch/Wyklady/Kog1/B11-swiadomosc.htm (accessed on 12/01/2019)

https://www.researchcatalogue.net/view/251049/251050 (accessed on 01/06/2019)

http://www.fizykon.org/drgania_fale/fale_co_to_jest_fala.htm (accessed on 16/06/2019)

http://yadda.icm.edu.pl/baztech/element/
bwmeta1.element.baztech-0c260409-9688-4d15-9546-9380c14c5076/c/Lipowczan.pdf (accessed on 04/05/2019)

http://www.sztuka-wnetrza.pl/5283/artykul/akustyka-wnetrz-na-co-zwrocic-uwage (accessed on 28/12/2018)

https://www.tvp.info/41375915/w-mozgu-odkryto-nowy-rodzaj-komunikacji-miedzy-neuronami (accessed on 08/03/2019)

https://www.tvp.info/41375915/w-mozgu-odkryto-nowy-rodzaj-komunikacji-miedzy-neuronami (accessed on 12/06/2019)

http://www.nutao.pl/2017/07/31/masaru-emoto-i-jego-eksperymenty-z-woda (accessed on 17/05/2019)

http://www.nutao.pl/2017/09/24/cymatyka-cos-wiecej-niz-tylko-muzyka - Figury Chladiniego (accessed on 07/05/2019)

http://www.nutao.pl/2017/09/24/cymatyka-cos-wiecej-niz-tylko-muzyka/ (accessed on 23/04/2019)

https://plgbc.org.pl/szkolenia-well/ (accessed on 26/12/2018)

https://sjp.pwn.pl/sjp/obiekt;2491478.html (accessed on 22/06/2019)

http://tekstydrugie.pl/auth/dipesh-chakrabarty/ (accessed on 28/06/2019)

http://sady.up.krakow.pl/antfil.locke.rozwazania.htm#locke2.12 (accessed on 23/05/2019)

http://www.iacsa.eu/jw/winkler_space-sound-time_10-09-19.pdf, “Space, Sound and Time. A choice of articles by Justin Winkler in Soundscape Studies and Aesthetics of Environment 1990-2005” in: Contemporary Aesthetics, vol. 3, June 22, 2005 (accessed on 14/04/2019)