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Urban Phonosphere: A Musicological View of the Origin, Types, and Significance of Sound Phenomena in the City

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Abstract

The ***urban phonosphere*** is highly complex as it is a mixture of various sound phenomena and the entire sonic environment. It consists of biophony, geophony, and especially anthropophony, and the combination of these—being considered as a sphere of sound phenomena that can be interpreted as different types of sonorities. In any phonosphere, including the urban one, it is possible to differentiate between various levels of specificity of sonic phenomena—from the general ones acting as a sonic ambience to the most specific. In the article, the origin, types, and meaning of these sonorities are discussed and they are classified according to their origin, and various other properties. The concept of ***sonor*** is central to understanding the structure of the urban phonosphere and is discussed in detail.

The musicological and cultural anthropological approaches to the study of urban sound phenomena in their totality as a phonosphere enable a holistic approach to its consideration in the cities around the world.

Keywords

Urban phonosphere, urban sonor, sonic environment, soundscape, sonority, anthropophony, archetypal sounds.

Introduction

Every city has its unique ***urban phonosphere***[1]—a physical and conceptual space of sounds and noises, sonorities (specific soundings of something) and ***sonors*** (unique sonorities) established by multiple cultural–historical, technological, industrial, and physical factors. The concept of *phonosphere* was advanced in the mid-1980s by the Russian musicologist Mikhail E. Tarakanov in connection with the growing presence and consumption of music in human life, and the development of technology. He claimed that "there is no longer any area of human activity from which music can a priori be excluded," and that "music … has won a total victory over the world in which we live: a 'phonosphere' encompasses the planet."[2] Later, the concept was further developed by the musicologist Ekaterina M. Tarakanova (Tarakanov's daughter).

I suppose, the concept can have several meanings and may be understood as:[3]

- the *totality of acoustic phenomena* in a given physical place (such as soundscape, city, planet Earth);

[1] All the words and collocations that are terms and concepts created by me (K.V.) will be italicized and bold at the first use. Italics will also be used for other terms, concepts, and book titles.

[2] Mikhail E. Tarakanov, "Folklore and Phonosphere," in *The UNESCO Courier* (April 1986), p. 17.

[3] For more details, see K. Volniansky, "What is Phonosphere: Defining the Facets of a Soundscape," *Min-Ad: Israel Studies in Musicology Online*, 18 (2021): 1–11.

- a *sonic* or *sound sphere* of an entity (such as culture, musical language, folklore, community, a religious cult, or human being);
- a *conceptual sound space* of a concrete object (such as musical composition, story, myth).

Consequently, the urban phonosphere may be understood as a totality of acoustic phenomena, a conceptual sound space, and the sound sphere of sonorities of the urban soundscape. The soundscape is a sound picture at a specific location, and the phonosphere is the sphere of sonorities that is an expression and essence of a soundscape. Therefore, we will distinguish between the concept of the phonosphere, which is the sphere of sound phenomena, and the concept of the soundscape, which is its realization in a certain place—although the soundscape is often understood as the phonosphere in soundscape ecology because the sounds within it are discussed as a whole. However, the phonosphere regarded as a sound sphere does not become a soundscape until it is manifested in a specific location/place and time. Thus, on the one hand, the phonosphere can generate a soundscape, and, on the other hand, analyzing a soundscape, one can speak of its phonosphere.

The urban phonosphere is highly complex; it is a mixture of various sound and ***sonoric***[4] phenomena and the entire sonic environment—sounds, noises, and even ultrasounds that are being created in it.[5] It comprises a vast amount of different types of sounds, and its structure is characterized by the totality of these phenomena and their vibrations produced in the city.

The urban phonosphere includes three types of sound sources: *biophony*—the natural sound phenomena of biological source (e.g. birdsong in parks, a dog's barking); *geophony*—nonbiological sounds of nature (e.g. the rustle of trees or a waterfall, wind, and rain);[6] and *anthropophony*[7]—all human-generated sounds and noises.[8]

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[4] Being related to sonority, colorful qualities of the sounding, of various sonorities—K.V.

[5] Inaudible ultrasounds or sounds and noises that are at the limit of the human auditory system, can also subliminally affect the listener's perception.

[6] "Geophonies are the result of sonic energy produced by nonbiological natural agents such as winds, volcanoes, sea waves, running water, rain, thunderstorms, lightning, avalanches, earthquakes, and flooding. Biophonies are the results of animal vocalizations (song, contact and alarm calls, voices)." Almo Farina, *Soundscape Ecology Principles. Principles, Patterns, Methods and Applications* (Dordrecht: Springer Science+Business Media, 2014), p. 1.

[7] In the early studies related to soundscape ecology, the term "anthrophony" was initially used in place of the more recent *anthropophony*. When I first saw it, it seemed logical to me that the term "anthropophony" would be used, as it is constructed from the Ancient Greek words *ánthrōpos* (ἄνθρωπος—human), and *phōnḗ* (φωνή—voice, sound), analogously to the word "anthropology" derived from the combination of *ánthrōpos* and *lógos* (λόγος— study). But I trusted the sources and used "anthrophony" in my article on phonosphere. I later found out that Bernie Krause had corrected the error and begun to use the correct word "anthropophony," and so did I. (See Bernie Krause, *Voices of the Wild. Animal Songs, Human Din, and the Call to Save Natural Soundscapes* [Yale University Press, New Haven–London, 2015], pp. 153–54).

[8] The classification of different types of sounds according to their sources was made in the soundscape ecology: "Schafer recognized that sounds are ecological properties of landscapes, referring to soundscapes as "the acoustical characteristics of an area that reflect natural processes." His primary interest was in characterizing natural sounds that could be used to compose music. B. Krause later attempted to describe the complex arrangement of biological sounds and other ambient sounds occurring at a site, and introduced the terms "biophony," to describe the composition of sounds created by organisms, and "geophony" to describe nonbiological ambient sounds of wind, rain, thunder, and so on. We extend this taxonomy of sounds to include "anthrophony" (anthropophony)—those caused by humans" (B.C. Pijanowski, L.J. Villanueva-Rivera, S.L. Dumyahn, A. Farina, B. Krause, B.M. Napoletano, S.H. Gage, & N. Pieretti, "Soundscape Ecology: The Science of Sound in the Landscape," *BioScience* 61/3 (2011): 204. https://doi.org/10.1525/bio.2011.61.3.6

Biophony, geophony, and anthropophony are phonospheres in themselves, and each of them has its own different sets and subsets of sounds, which are phonospheres of groups and individual objects and beings. This model of macro–microstructure interconnection is changeable in terms of the dominance of one of its components and "[t]he interaction between geophonies, biophonies, and anthro[po]phonies determines peculiar patterns in the sonic environment."[9]

The natural sonic phenomena of biological and nonbiological origins, as a rule, are less acoustically prominent in urban areas. Since humans are the dominant inhabitants of a city, the sounds and noises emitted by humans, as well as man-made objects and devices, are major contributors to the urban phonosphere, making anthropophony a phenomenon of paramount importance.

Sonic Phenomena in the Urban Phonosphere: Sound, Noise, Sonority, Sonor

In any phonosphere, and the urban one is no exception, it is possible to differentiate between various levels of specificity of sonic phenomena—from the general ones acting as a sonic ambience to the most specific. In these distinctions:

- The concept of *sound environment* will be used to denote anything audible in the environment, including all types of sounds and noises. The term *sonic environment*[10] is frequently used to refer to the environment of overall sonic phenomena that exist in it—audible, and those that are beyond the hearing range of the human auditory system or, for acoustic reasons, are at the boundaries of auditory perception. I will implement these terms interchangeably, implying different levels of sound concreteness.
- The concept of "sound" is the most general name of any type of sonic phenomenon that can be acoustically perceived by the human auditory system.
- The sonority—a specific sounding of something, resulting from the timbral and acoustic properties of a sonic object and its combinations with others.
- Noises are not only aperiodic waves of indefinite pitch but also sounds and sonorities perceived and interpreted by human perception as negative, unwanted, or undifferentiated.
- Finally, *sonor*[11] is the word by which I designate the most specific and unique sonorities that function as structural elements of anything acoustical.

The term *sonor* was first coined by famous Russian music theorist Yuri Kholopov,[12] who implied by it a *sonoric complex* in which the intervallic structure cannot be differentiated by

[9] Almo Farina, *Soundscape Ecology Principles. Principles, Patterns, Methods and Applications*, p. 11.

[10] The concept of *sonic environment* is often used as a synonym for the *acoustic environment*, *sound environment*, *environment of sound*, *aural space* or, even—*an ambient sound of a place* (Jian Kang Brigitte and Schulte-Fortkamp (Eds.), *Soundscape and the Built Environment* [Boca Raton: CRC Press, 2016], p. 2.

[11] The term *sonor* that I propose has nothing in common with the term *sonar* in acoustics, or any connection with the German musical instrument manufacturing company "Sonor," headquartered in Berlin, Germany.

[12] Yuri Nikolaevich Kholopov, http://www.kholopov.ru/index2.html, accessed 17 February 2022;
Tat'yana S. Kyuregyan, "Kholopov, Yury Nikolayevich," *Grove Music Online* (2001), accessed 19 February 2022. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000048252, accessed 17 February 2022.

human hearing, and is perceived as a homogeneous sonoric entity (such as a cluster or other sound structures in the music of Krz. Penderecki).[13]

Sonors and Microsonors

Sonor in a broader context can be defined as a unique sonority—one that has acoustic properties that make it sound unique, associated with an entity or object: sonic sphere, conceptual space, musical language or composition, community, place, soundscape, etc. An object or an entity may include a large number of sonorities within itself. Sonors usually play a key role in a phonosphere, acting as a grammatical element of a sound system or a structural element of acoustic space (or both). These are the sustainable sonorities that maintain the structural stability of the phonosphere.

A *sonor* is a particular sonic phenomenon bearing special meaning for humans that can be defined, perceived, and distinguished from the overall sonic environment. In general, any specific sound has acoustic properties that establish its sonority and can make it definite and recognizable. However, sonors are the main sonorities that form the distinguishing features of one entity or object from others, establishing the uniqueness of its phonosphere.

Sonor can also be noise. Noise is a relative concept since it is not only aperiodic waves of indefinite pitch, but any unpleasant, unwanted, nondifferentiated, or noninformative sounds and sonorities can also be interpreted as such.[14] Consequently, a sonor is not only a typical sonority such as, for instance, bell ringing but also any noise as long as it acts as one of the acoustic structural elements in a phonosphere. For example, the sounds of a waterfall or thunder are both sonorities of indefinite pitch that can be perceived as noise but are still recognizable. Therefore, these sonorities can be named and classified as the *natural geophonic sonors* of a waterfall and thunder, being at the same time noises.

Microsonor is the smallest sound patch, particle, segment of a sonor that can be perceived and identified by a person. It is a perceptual, cognitive unit, as the minimal length of time required to identify a sonor is individual and depends not only on the specifics of the sonor, but also on the perception of each individual and other circumstances, such as the specifics of the landscape, and the structure of the soundscape itself.

Sonor can be not only a single sound, but a special sounding of something complex, consisting of smaller elements, which may include individual sounds. For example, the sonor of rain consists of numerous sounds of falling raindrops; the ringing of church bells is made up of numerous strikes of bells. In all these examples, smaller sound elements can be extracted from the sonic texture of these sonors. The definition of a sonor is most comprehensive when its structural sound elements are of the same type, as in the case of raindrops, which belong to the unique set of *rain sonor*, and appear in it in different variants.

Thus, speaking in musical terms, if a sonor is a thematic unit—a motive, then its submotives are *microsonors*. Their definition, similar to the definition of musical units, depends on the

[13] Kholopov distinguishes between various stages of sound and chord colorfulness. He was the first to apply the concept of *sonoric harmony* and the terms *sonor* and *chord–sonor* in relation to sonoric qualities of a chord. At first, the colorfulness of the chord begins to dominate and enhance its phonic qualities (*phonism*). Later, the chord becomes an abstract sonoric element (*chord–sonor)*. By *chord–sonor*, he meant a chord in which phonic colorfulness becomes predominant and determines its musical essence and meaning in musical structure (for instance, Scriabin's Prometheus chord).

[14] The perception and interpretation of sound as noise by a listener depends on various circumstances, personal cultural background, and other factors. The issue of perception is not discussed in this article.

sonor itself—its acoustic properties, such as the type of texture and constituent elements, and the psychoacoustic properties that make its semiotic and semantic interpretation possible. So, in the case of musical phenomena, such as, for example, the muezzin's call to prayer, the entire melody of the vocal call, consisting of various melodic turns (units) arranged chronologically in the form of a melody, becomes the *religious sonor* of the call to prayer—part of the phonosphere of the Muslim religious service.

The relativity of the concepts *phonosphere*, *sonor*, and *microsonor* is conditioned by the way they are considered within the psychoacoustic and cognitive macro–micro perspectives. That is, how various sounds are perceived and what structural patterns will be created by the listener when these sounds are perceived as a homogeneous object—an undifferentiated sound mass (macro level—phonosphere), or when the differentiation of its components can be done and single sonorities can be named (micro level—sonors and microsonors). Consequently, the concepts of phonosphere, sonor, and microsonor can be used interchangeably. Thus, an urban street in a distant acoustic perspective can be regarded as an *urban* phonosphere—an element of the city with its various sonorities (sonors and microsonors). At the same time, the urban street may be perceived as a sonor in itself and its microsonors can be identified in close perspective. The same applies to the sonor of the playground, in which each child's voice, on the one hand, is a microsonor, and on the other hand, each of these voices in itself is a unique sonor of the individual human phonosphere.

Thematic Set of Sonors

Sonor is typically part of a ***thematic set of sonors*** that are related to each other by a concept within an entity, conceptual space, object, or soundscape. In a set, sonors act (or are used) as an organized group performing the same task.

For example, the *thematic set of sonors* within the framework of the Jewish synagogue service is a collection of unique sound elements that have certain ritual functions and are used as an organized whole that ensures the sound conduct of the service.

Or, during an air bombardment, various sounds and noises will be heard, which can be defined as a thematic set of air attack sonors—the rumble of aircraft, bomb explosions, firing from machine guns equipped on military aircraft and ground-based air defense systems. In this thematic set of sonors, some elements will be perceived as sounds and others as noise but they all will be a part of the event that we can identify as an air attack. The totality of this set (air attack sonors) together with other thematically related sets of sonors (for example, the sounds of ground attack) should be defined as the phonosphere of war. Another example is again the playground, which, when viewed from a macro perspective and perceived as a specific phonosphere, includes a thematic set of sonors, all of which are children's voices.

Sonor may be perceived as somewhat similar to Schafer's concept of *unique tones*, which he defined as follows: "Every natural soundscape has its unique tones and often these are so original as to constitute soundmarks."[15] However, sonor is not always a *keynote* as:

> [t]he reason for any sound being termed "keynote" is not because of any characteristic it has itself, but rather because of the way in which it is habitually perceived. Thus, a keynote sound may be part of the ambience, that is, at a low, constant level, such as an electrical hum or distant traffic; but

[15] R. Murray Schafer, *Our Sonic Environment and the Soundscape: The Tuning of the World* (Destiny Books, 1994), p. 26.

> it may also be a sound signal, that is, a sound that stands out in an environment and is clearly distinguishable from the ambient noise.[16]

Also, a sonor does not necessarily belong to a particular location and is not necessarily associated with a specific soundscape, but is a specific sonority in itself that belongs to a certain phonosphere. It is also not quite a *soundmark* (M. Schafer)—a location in which a certain sonority or sonorities can be perceived as the one that is "unique, or possesses qualities which make it specially regarded or noticed by the people in that community,"[17] because it can exist in a conceptual space of something beyond time and space and not necessarily be "specially regarded or noticed by the people in that community."[18] Therefore, on the one hand, in the phonosphere of a soundscape, some sonors can function as *soundmarks*, making the place remarkable; others may be *keynotes*—dominant sonorities in a particular location. On the other hand, sonors may also not be attached to a specific location but belong to a sonic conceptual space.[19]

Classification of Sonors

The classification of sonors within an urban phonosphere is a topic that requires special treatment as they can be classified and assessed from multiple points of view. Numerous researches have been dedicated to this issue of sound phenomena, and their classification was made from urban, social, cultural, acoustic, psychoacoustic, semiotic, semantic, and other points of view.

Schafer states that the "[s]ounds may be classified in several ways: according to their physical characteristics (acoustics) or the way in which they are perceived (psychoacoustics); according to their function and meaning (semiotics and semantics); or according to their emotional or affective qualities (aesthetics)."[20]

It seems that sonority distinctions in the urban phonosphere can be made according to their origin, uniqueness, universality, archetypality, cultural and social functions, semiotics and semantics, urbanity, and location when they are locally unique. There are several basic types of sonors and they will be classified.[21]

Primarily, the classification can be carried out according to belonging to the three above-mentioned sound sources: the *natural sonor* that originates in the natural soundscape and is subdivided into biological (biophony), nonbiological (geophony), and anthropophony.

The *biophonic sonors* can belong to mammals, birds, insects, and fish, including all their vocalizations and the sounds and noises they produce. The *geophonic sonor* reflects the types of natural phenomena, such as wind, rain, thunder, etc., and the *anthropophonic sonor* is all human-generated sounds and noises in the urban phonosphere.

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[16] Barry Truax, *Acoustic Communication* (Greenwood Publishing Group, USA, 2nd ed., 2001), p. 25.

[17] *Soundmark* **(**Schafer, ibid., 10) is a location in which a unique sonority or sonorities can be perceived as the one that is "unique, or possesses qualities which make it specially regarded or noticed by the people in that community. Once a soundmark has been identified, it deserves to be protected, for soundmarks make the acoustic life of the community unique."

[18] Ibid.

[19] For more on sonors, see K. Volniansky, "What is Phonosphere: Defining the Facets of a Soundscape."

[20] Murray Schafer. *Our Sonic Environment and the Soundscape: The Tuning of the World*, p. 133.

[21] Psychoacoustic properties of sounds, noises, sonorities, and sonors, and their perception will not be discussed here as they require special consideration.

Further, the classification of sonors is carried out according to their origin, importance and how they manifest themselves in the urban phonosphere, while the anthropophonic sonor is considered the most significant.

Anthropophonic sonors

The more elaborate definition of anthropophony is essential to detail its function and significance in the contemporary urban phonosphere. The definitions of anthropophony vary in different studies. Schafer gives a list of anthropophonic sounds, which includes:[22]

- sounds of the voice: speaking, calling, whispering, crying, screaming, singing, humming, laughing, coughing, grunting, groaning, etc.;
- sounds of the body: heartbeat, breathing, footsteps, hands (clapping, scratching, etc.), eating, drinking, evacuating, lovemaking, nervous system, dream sounds, etc.;
- sounds of clothing: clothing, pipe, jewelry, etc.

A. Farina, in the discussion of the sonic environment, sees in the anthropophony "the results of the movements of artificial devices such as cars, trains, airplanes, industrial machinery, and bells"[23] and "major cause of noise pollution, a phenomenon that has revealed dangerous consequences to all organisms and human health also, producing relevant modifications of behaviour in both human and nonhuman animals."[24]

B. Krauze distinguishes between different types of anthropophonic sounds that also can be controlled or incidental: "anthropophony comprises four basic types of human-generated sound: electromechanical sound, physiological sound, controlled sound, and incidental sound."[25]

Another overview of human-generated sounds is given in the "classification scheme for categorizing sound sources in any acoustic environment that can be used to standardize sound source reporting across different studies."[26] Here, the outdoor acoustic environment includes a list of anthropophonies that are classified by types of human activity and facility, including those with or without the use of external devices: motorized transport, human movement (footsteps, non-motorized, electrical installation, roadway traffic, rail traffic, marine traffic, air traffic), electromechanical—stationary and mobile (construction, ventilation, agriculture, domestic recreation, electrical installation), voice and instrument—amplified (voice, speech, singing, laughter) and nonamplified (music), social and communal (bells, clock chimes, fireworks, calls to prayer, alarms), and other human sounds (like coughing).[27]

From the perspective of considering anthropophony as a phonosphere, it should be defined as a ***human sonic sphere*** consisting of a huge number of sounds—noises, sonorities, and sonors of personal, social, cultural, technological, and industrial types that arise as a result of human activities. These sonorities are the individual sonic world of man and sonic diversity,

[22] Ibid., p.141.

[23] Almo Farina, *Soundscape Ecology Principles. Principles, Patterns, Methods and Applications*, p. 10.

[24] Ibid.

[25] Bernie Krauze, *The Great Animal Orchestra: Finding the Origins of Music in the World's Wild Places* (Little, Brown and Company, USA, 2012), Ebook, p. 302.

[26] A.L. Brown, Jian Kang, and Truls Gjestland, "Towards Standardization in Soundscape Preference Assessment," *Applied Acoustics* 72/6 (2011): 387–92. doi:10.1016/J.APACOUST.2011.01.001.

[27] Ibid. For the full scheme, please see the article.

which is the result of the cultural development of mankind and the technological civilization with its industrialism and globalization.

Human-produced sounds can be divided into two types of anthropophonic activities: *direct*—produced by people themselves, such as speech, various sounds and noises, including the use of external devices (for example, musical instruments), and *indirect*—as a result of human-created automated objects and machines emitting a wide spectrum of sounds and noises (factory machines, automobiles, airplanes, radio, etc.).

Specifically, in the urban phonosphere, the *anthropophonic sonor* implies sounds, sonorities and noises of:

- human social, communal, and cultural life within the city, including various sound types of cultural and social activities and related events (e.g. playing recorded music, concerts, live street music, festivals, street shows, parties, sports games and competitions, demonstrations, sounds of advertisements, social announcements, crowd noise, etc.). It also includes a person's self-expression in social and communal communication: phonic (speech) and other sonic expressions (e.g. screaming, singing, laughter, crying, movement sounds, noises, etc.), which are components of the individual phonosphere;
- various man-made electric and electromechanical objects, machinery such as vehicles, helicopters, airplanes, trains, etc. and their sounds and noises (e.g. sirens of security vehicles, traffic noise with its car horns, train whistles, general road rumble, the noise of industrial and construction areas, etc.;
- technological devices such as smartphones, tablets, smart televisions, players, radio, etc.

Universal sonors

A ***universal sonor*** is a specific sonority, distinguished from the general sound environment, widely known, generally accepted, widespread, and present all around the world. Universal sonors can be of natural (geophonic, biophonic) and anthropophonic origin. Being common and widespread, they can universally appear in the phonosphere of different cities of the world.

This type of sonor can be "anonymous" for the city dweller, who takes it for granted and treats it as an existential norm. Although initially some of these sonors may have been formed and belonged to a unique cultural–historical community and locality, due to their wide distribution, they have become universal—and sometimes only anthropologists are aware of their historical origin.

For instance, the sound of children's voices heard from a playground, the sound of a mobile telephone ringing—these are all universal sonors that do not necessarily belong to an individual, a certain community, culture, or a place. In this case, even though the sonor can be recognized and the type of activity associated with it, and also its place can be identified (e.g. a children's playground), the sonor can occur in any city and is not unique to the phonosphere of a particular one.

Some universal sonors are to a certain extent abstract, and might have limited meaning for listeners. For example, a noise coming from a construction area may give a very general idea about the specificity of the work process; a high unidentified industrial sound might be perceived by an individual as a sound of technogenic origin without additional detailing. It probably bears partial information about the technological conditions and processes of the place where it comes from and the type of anthropophonic activity, but does not indicatively state the cultural and spiritual human condition and activity.

The ***universal sonors*** can be of two origins:

(1) *Archetypal*[28] *sonors*. R.M. Schafer, when discussing the "features of the soundscape,"[29] indicates that the *archetypal sounds* are "those mysterious ancient sounds, often possessing felicitous symbolism, which we have inherited from remote antiquity or prehistory."[30] He states that:

> [t]he *keynote sounds* of a landscape are those created by its geography and climate: water, wind, forests, plains, birds, insects and animals. Many of these sounds may possess archetypal significance; that is, they may have imprinted themselves so deeply on the people hearing them that life without them would be sensed as a distinct impoverishment. They may even affect the behavior or life style of a society….[31]

He also argues that the anthropophonic sonor of a culturally traditional type—the hunting horn is an archetypal sound: "I also spoke of the hunting horn as an archetypal sound. Only sound symbols which are carried forward century after century qualify for this distinction, for they knit us with ancient ancestral heritages, providing continuity at the deepest levels of consciousness."[32]

B. Truax, in his study of *acoustic communities*, refers to archetypal sonors as "sounds symbols and metaphor."[33] He sees in them *sound symbolisms* that, due to "[o]ver countless repetitions, the images created in people's minds by such sounds and their contexts build up coherent patterns,"[34] and that these "[s]ound symbols function analogously to Jung's (1964) archetypes (which are strongly visual) in that they are mental and cultural images of great suggestive power."[35] He also argues that [t]he archetype operates at the level of a pattern that it comes to symbolize,"[36] and that "[s]ome level of explanation for their effect exists because there are always comparisons to human features or those of the natural soundscape, with their age-old associations, but ultimately a sound that functions symbolically achieves its power because of its simultaneous uniqueness and universality."[37]

Following all these statements, it can be argued that ***archetypal sonors*** are sounds and sonorities that, according to C. Jung's concept of the archetype,[38] should be defined as archaic sounds, "collectively inherited, universally present, and ubiquitous in the individual psyche."[39]

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[28] "Archetype—the original pattern or model of which all things of the same type are representations or copies," *The Merriam-Webster Dictionary Online*: https://www.merriam-webster.com/dictionary/archetype, accessed 17 February 2022. "Archetype—a typical example of something, or the original model of something from which others are copied," *The Cambridge Dictionary Online*: https://dictionary.cambridge.org/dictionary/english/archetype, accessed 17 February 2022.

[29] R. Murray Schafer, *Our Sonic Environment and the Soundscape: The Tuning of the World*, p. 9.

[30] Ibid.

[31] Ibid., p. 10.

[32] Ibid., p. 47.

[33] Barry Truax, *Acoustic Communication*, p. 80.

[34] Ibid.

[35] Ibid.

[36] Ibid., p. 114.

[37] Ibid.

[38] "The Archetypes and the Collective Unconscious," in *The Collected Works of C.G. Jung*, Vol. 9, Part I. Edited and translated by Gerhard Adler and R.F.C. Hull, 2nd ed. (Princeton University Press, USA, 1968).

[39] Wikipedia contributors, "Archetype," *Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/w/index.php?title=Archetype&oldid=1063495374, accessed 20 February 2022.

Archetypal sonors are deeply rooted in the collective unconscious like *archetypal images* (C. Jung), which are "are so packed with meaning in themselves that people never think of asking what they really do mean."[40] The universality of archetypal sonors is based on the fact that "archetypes are not disseminated only by tradition, language, and migration, but that they can rearise spontaneously, at any time, at any place, and without any outside influence."[41] These are sonorities of anthropophony, such as crying, laughter, mourning, screaming, etc.; geophony such as wind, rain, sea noise; and biophony—birdsong, dogs barking, jackals howling, frogs croaking, etc.

(2) ***Widespread anthropophonic sonors****—common (generally accepted) sonorities* of anthropophony—sonorities of modern urban life of cultural, social, technological, and industrial origins that exist in different cities around the world.

For example, the *universal sonor–signal*[42] (that might also be called a *cue–sonor*) that, according to B. Truax, can be defined as "those sounds that stand out clearly against the ambient noise,"[43] such as a car horn, an ambulance siren, a ringtone of a mobile device, a noise of a construction area, etc., are likely to mean similar things to people around the world. In the discourse of possible "repair to the soundscape," R. Murray Schafer describes the *sonic cue* of the traffic light that he heard in several places in the world: "Consider, for instance, a sonic signal for a traffic crosswalk. There are several of these already in existence in different parts of the world.… The cue for the pedestrians is a special light plus sonic signal…."[44] That is, he defines its function as a universal sonor–signal in the urban phonosphere.

Culturally[45] ***universal sonors*** (universal culture–sonors) of anthropophony is a subtype in the category of universal sonors. These are sonors that have cultural–historical, traditional, and social meanings for human society. Being universal, they are the cultural heritage of mankind, shaping and preserving the human community as a whole—for example, the sonors of a concert, show, theatre, meeting, demonstration, happening, park activities, restaurant visit, etc.

In addition, many sonors of technological origin, such as a car horn, a police siren, or a smartphone ringtone, also have important social functions, and they become technological sonors with social functions.

Unique sonors

Unique sonors can be of two types and have numerous subtypes:

(1) The first type is a ***locally unique sonor*** of biophony, geophony, or anthropophony of any type. It appears only in a specific place or location. They are definite sonorities that in some cases could initially belong to a universal category, but appear as a unique variant in a specific location. These sonors have gained a unique interpretation and function in a particular soundscape; they have become an integral part of its phonosphere and bear special meaning for the urban community. Such is the grandiose Niagara Falls' *locally unique sonor* of geophonic

[40] "The Archetypes and the Collective Unconscious," in *The Collected Works of C.G. Jung*, p. 13.
[41] Ibid., p. 79.
[42] *Sound–signal* is a concept introduced by R. Murray Schafer and Barry Truax.
[43] Barry Truax, *Acoustic Communication*, p. 67.
[44] Murray Schafer, *Our Sonic Environment and the Soundscape: The Tuning of the World*, pp. 240–41.
[45] The word *cultural* will be used as relating to various types of human spiritual and social existence, including habits, norms, traditions, religion, art, social activities, and so on.

origin (local geophonic sonor), which became associated with the place as a unique sonoric phenomenon; or the sound of the human-made Big Ben bells,[46] which have become one of the symbols of London's *sonoric identity*.[47]

(2) The second type is ***culturally unique sonors*** of anthropophony, which have cultural–historical, traditional, religious, social, and other additional meanings; they belong to a certain community or society and are immediately identified with it, but are not necessarily associated with a particular location. They are part of a particular community phonosphere, have a special meaning and function in the community, and bring relevant information to its members. For example, a gypsy song remains a gypsy song anywhere in the world, and it is a cultural traditional sonor identified with the phonosphere of that particular community.[48]

The ***religious sonor*** is an important subtype of the *culturally unique sonor* of religious significance. It has sacred meaning, belongs to a certain community, and is immediately identified with it. *Religious sonors* are components of the religious cult phonosphere and acoustically represent the type and state of religious activity and the spiritual life of a particular community. These sonors can have multiple meanings, functions, and bring various information to the religious community (and not only), such as calls to different activities, being part of the service, etc. They also act as *sound–cues* (M. Schafer) in urban areas, indicating the soundmarked community locations (for the urban listeners who are familiar with them), and enabling the evaluation of a particular soundscape as a whole.

It is important to note that culturally unique sonors can appear all over the world. They can sound in certain venues (like a church or concert hall), while their specific location is not fixed. As opposed to soundmarks, they always bear a unique cultural meaning for a certain community and are not necessarily associated with a particular location. For instance, the ringing of church bells is a unique sonor that is a part of Christian worship and is related to its community activity; the muezzin's call to prayer refers to the Muslim practice of worship—both are heard worldwide in certain venues (church, mosque). The same applies to the national anthem of Israel, which is a ***unique cultural traditional sonor*** (of anthrophony) of the nation, and is heard not only in Israel but also on different occasions around the world. However, in essence, these sonors remain unique as they have a clear cultural, religious, traditional, and historical affiliation, meaning and significance.

Therefore, a distinction should be made between *universal*, *local unique*, and *cultural unique sonors*, each of which functions differently. The *universal sonors* appear ubiquitously because they are not unique to a place or a community, the *locally unique*—appears only in a specific place, and the *culturally unique sonors*, including the *religious sonor*, are specific to communities and venues but can be spread universally around the world.

[46] Big Ben is the nickname for the Great Bell of the striking clock of Elizabeth Tower in the Palace of Westminster, London, England.

[47] For more on the *sonoric identity of the city*, see K. Volniansky, "If I Forget Thee: The Sonorities of Jerusalem Soundscapes," *Min-Ad: Israel Studies in Musicology Online*, 17 (2020): 138–56

[48] This is a rough estimate based on the fact that the song will be kept as close to its original form as possible. In other cases where a song has been altered in some way to make it sound different, the question remains whether it will remain a unique, traditional sonority, or whether its origins will be forgotten and it will become a massive, anonymous work of art.

Urban Sonors

Urban sonors by definition and a priori belong to the urban phonosphere. They are the product of urban reality, inasmuch they are generated in it and are a part of urban life. There are numerous types of urban sonors.

Urban sonors of the cultural type, such as a street flash mob, an openair concert, a mass demonstration, a football match at the city stadium, street music, and many others are typical urban anthropophonic sonors that began their existence in the urban phonosphere as a result of urban cultural and social life. The same applies to urban sonors of technological and industrial types.

The process of the genesis of an urban sonor is complex and involves numerous factors. Some of them have been established for centuries while others are continuously created in the urban phonosphere. The creation of new sonors occurs constantly in all spheres of life as a result of the cultural, technological, and industrial development of mankind. Part of them are universal and others are locally unique.

Urban universal sonors appear in cities across the world. For example, sonor–signals such as air raid sirens, sonorities of power such as a police siren, sonor of the traffic, openair concerts, street noise, and others.

Often, sonors created in certain cities quickly became universal and began to appear in cities around the world. In the discussion of the Jerusalem soundscapes, I have given several examples of recently created urban sonors.[49] Both given here below are the new street flash mobs that appeared at the time of the global outbreak of the Coronavirus pandemic (COVID-19) in the early 2020s. The first example is "the collective singing from the apartment windows of the inhabitants of Rome, Naples, and Turin in Italy, as an expression of solidarity and mutual support among quarantined people."[50] The second is the "applause outside the hospitals in Israel, Barcelona, New York, and around the world, to thank the doctors for fighting the Coronavirus pandemic."[51] In these cases, "if at the beginning it was a *locally unique sonor* that was "born" in a particular location (no one is sure where it first started), due to its strong emotional existential context, it was picked up by communities around the world and quickly became the *universal urban sonor* heard all over the world."[52]

Locally unique urban sonors are sonorities that became unique for a particular city. These are mostly the sonors that were specifically created in a particular city as a variation of the universal ones, which have become unique in their phonosphere or a specific urban soundscape. Such is, for example, the waterfalls of Versailles—a man-made sonor that was originally the sonority of a geophonic archetypal type, existing everywhere. Or another man-made object—the chimes on the Spasskaya Tower of the Moscow Kremlin. Its bells ring uniquely and were created specifically for the city of Moscow, modelled on the universal idea of tower ringing clocks.

Urban noise sonors should be singled out as a separate category. To begin with, noise is not only an acoustic category but also a cognitive one. Therefore, some listeners may perceive certain sonorities as noises, interpreting them as negative, unwanted, or undifferentiated and

[49] For more details, see K. Volniansky, "If I Forget Thee: The Sonorities of Jerusalem Soundscapes."
[50] Ibid., p. 149.
[51] Ibid., p. 150.
[52] Ibid.

annoying, whilst for others (an individual or a group), the same sonorities may be acceptable and meaningful sounds.

It should be noted that even when noise is a recognizable sonority, it still can be unwanted. This means that noise can be a sonor, as stated before.[53] For example, the road hum is a road sonor, or the ambulance siren is a sonor–signal of the emergency vehicle. Both can be identified and classified and named, but at the same time are sonors of urban noise.

Noise is an integral part of the urban phonosphere. The main cause of noise in the city is human activity and its anthropophony, direct and indirect, largely created by man-made devices, but also by humans themselves. Anthropogenic chronic ambient noise is a constant in the sonic environment of daily urban life. Noise can come from three sources of sound—biophony, geophony, and anthropophony.

Urban noise sonors are partly universal, appearing in some or all cities of the world, and partly unique, i.e. specific to one particular city. For example, street noise is a universal sonor that is part of the urban phonosphere in cities everywhere but can sound uniquely in each city.

Invariance of the Sonors

The term *invariance* is borrowed from mathematics.[54] In the context of the topic under discussion, invariance can be understood as the property of sonors manifesting themselves in different sonic variants without losing the qualities and identity of their basic sonoric unit.[55]

Both universal and, to a lesser extent, unique sonors can sound different depending on the location, physical conditions, and other factors, changing their sonic appearance while retaining their basic sonoric properties, meaning, and function. These days, sonors may appear with slight variations or deviations in any urban area and be more or less equally audible in different cities.

For example, an unaccompanied gypsy song sung by a female voice will sound different if it is sung by a male voice accompanied by an ensemble. But, undoubtedly, the song will still be recognizable (unique sonor). The many variants of mobile ringtones will appear in cities around the world (universal widespread sonor). Human laughter is an archetypal sonority that can be found everywhere where people live (universal archetypal sonor).

In some cases, variations of sonors can cause quite serious transformations in their sonority and make them barely recognizable. For example, an ambulance siren is a well-known *sonor–signal* bearing a specific meaning and function. However, there are quite a few variations of this universal sonor that sound differently in different cities. So, in some places, the siren of an emergency vehicle may be slightly different—it might be either higher or lower, faster or slower, louder or quieter. Depending on all these factors, the siren may sound different, but is still recognizable, and we will know that it is an ambulance. And even if we cannot be sure that it is an ambulance and cannot discern the type of siren, at least it will be possible to identify that it is a kind of emergency vehicle.

Also, all of the geophonic, biophonic, and anthropophonic sonors may sound differently with changes resulting from the geographical, climatic, social, cultural, and other factors. This is the reason for familiar sonors sounding differently in other cities.

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[53] See the section "Sound phenomena in the urban phonosphere: sound, noise, sonority, sonority" in this article.

[54] "Invariance is the property of a mathematical object to remain unchanged after an operation or a transformation." *The Definitive Glossary of Higher Mathematical Jargon – Invariance*. *Math Vault. 2019-08-01*, accessed 17 February 2022. https://mathvault.ca/math-glossary/#invariance

[55] The implementation of the term and its definition in the given context is mine—K.V.

The property of sonors to manifest themselves in different sonic variants without losing the qualities and identity of their basic sonoric unit is typical to all universal sonors and even some of the unique ones. This means that sonors can appear in different variations around the world depending on many factors and circumstances.

Conclusions

Urban sonic phenomena can be viewed and classified from different perspectives in different disciplines. The urban phonosphere is filled with multiple types of sounds, noises, sonorities, and sonors that can be of biophonic, geophonic, and anthropophonic origins.

From the musicological point of view, it is possible to distinguish between various degrees of specificity of urban sonorities. The most specific sounds and noises are sonors. They are the most acoustically and semantically significant sonic phenomena and the main structural elements in any phonosphere—in particular in the urban one.

Classification of urban sonors, in the given musicological and cultural anthropological perspective, can be made according to their origin, uniqueness, universality, archetypality, cultural, and social functions, semiotics and semantics, urbanity, and location when they are locally unique. The cultural–historical, traditional, and social aspects are of paramount importance in the structure of anthropophonic sonors. Within these categories, there are many subtypes, such as *religious sonor*, which is a subtype within the *culturally unique sonor* category.

A brief overview of various types of sonors includes several sequences describing sonors and their relationships:

- biophonic, geophonic, and anthropophonic sonors;
- universal sonors of archetypal and widespread anthropophonic sonors with its subtypes: technological, industrial, and cultural universal sonors;
- locally unique and culturally unique sonors of anthropophony with its subtypes, among which is the religious sonor;
- urban sonor of universal and locally unique types.

There are cross-relations between the various types of sonors:

- universal sonors vs unique sonors;
- culturally universal sonor vs culturally unique sonor;
- universal sonor of all types and the urban sonor of universal and locally unique types can be from the three sound sources: biophonic, geophonic, or anthropophonics;
- locally unique sonor can be of geophonic (e.g. the Niagara Falls) or anthropophonic origin (the Big Ben bells). Locally unique sonors less frequently arise from a biophonic source in the contemporary urban phonosphere since the urban area is predominantly inhabited by humans and filled with mechanical devices.[56]

The **urban phonosphere** is highly complex as it is a mixture of various sound phenomena and the entire sonic environment. It consists of biophony, geophony, and especially

[56] Obviously, in ancient cities, when technology was not yet as developed as it is in our time, everything was different. At that time, the use of animals for transportation purposes, the technological underdevelopment of the city, and much more caused a greater presence of biophony in the urban phonosphere. See, for example, David Garrioch, "Sounds of the City: The Soundscape of Early Modern European Towns," *Urban History* 30/1 (2003): 5–25. http://www.jstor.org/stable/44598520.

anthropophony and the mixture of these. Each of these phonospheres has within itself different sets and subsets of sounds, which are also phonospheres of groups and individual objects and beings.

Sonors of any type and any sound source are part of the modern urban phonosphere. Their numerous subtypes are components of the urban phonosphere and act as its structural elements.

Sonors of anthropophony are prevailing in the urban phonosphere and exist in cities all around the world. There are culturally universal and unique sonors (of cultural, social, and religious type), widespread sonors of technology, industry, and human-made objects.

The universal archetypal sonors of the three sources are also present. Human archetypal sonors are embedded in human existence and, since humans are the main inhabitants, these sonors are heard everywhere. Human anthropophony of self-expression and communication is one of the prevailing sonorities in the urban phonosphere.

Geophonic archetypal sonors are sometimes naturally built into the urban space, and sometimes created by humans. For example, Tel Aviv (Israel) is located on the Israeli Mediterranean coastline; The Toronto waterfront is the lakeshore of Lake Ontario in the City of Toronto, Ontario in Canada; and Los Angeles lies in a basin in Southern California, adjacent to the Pacific Ocean. Some cities have large urban parks created by people based on the natural landscape. Such is the Chugach State Park in Alaska, United States or the Table Mountain National Park which is the world's second largest urban park located in Cape Town, South Africa.[57]

Biophonic archetypal sonors are present only to some degree in the urban phonosphere. In particular, they appear inside or near to places of geophonic origin, such as lakes, rivers, oceans, green urban areas, and forests in the urban parks.

Some of the urban sonors are locally unique and others are universal. Also, many universal sonors have undergone unique variation in the specific city and have become a locally unique urban sonor.

Noise is an integral part of the urban phonosphere. The main cause of noise in the city is human activity and its anthropophony, direct and indirect, largely created by man-made devices, but also by humans themselves. Anthropogenic chronic ambient noise is a constant in the sonic environment of daily urban life. Noise can come from three sources of sound—biophony, geophony, and anthropophony. *Urban noise sonors* are partly universal and appear in some or all cities of the world, and are partly unique, i.e. specific to one particular city.

In addition, sonors have the property of **invariance** and can be transformed and sound differently in various locations without losing the qualities and identity of their basic sonoric unit. This feature of sound phenomena, which allows them to universally sound somewhat different but still be recognizable, enriches each specific urban phonosphere and makes each city sonorously unique.

Also, the creation of new sonors occurs constantly in all spheres of human life, causing the increasing expansion of the urban phonosphere.

In numerous studies of the urban soundscape, sound phenomena in cities are interpreted and evaluated from different perspectives. The sound phenomena are often classified by their social, cultural, and other belongings and functions in the city. The urban soundscape is often assessed in urban studies in terms of noise pollution and the quality of the urban living environment in a particular city, as well as in terms of urban planning. The impact of a

[57] *10 Biggest Urban Parks In The World*. https://www.worldatlas.com/articles/20-biggest-city-parks-in-the-world.html, accessed 19 February 2022.

soundscape created in the city is measured to evaluate human reactions and perceptions in order to create a better living environment.

The musicological and cultural anthropological approaches to the study of sound phenomena in the city through an understanding of its phonosphere enables a holistic approach to its consideration in cities around the world.