What is Phonosphere: Defining the Facets of a Soundscape

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Abstract: The concept of phonosphere is presented and considered. The study of a soundscape or any conceptual sonic space is based on an understanding of its structure and specificity. We consider the definition and implementation of the concept in relation to music, soundscape studies, and as a universal tool for analysis of any physical or conceptual sonic space or sphere. The discussion connects the concept of the phonosphere with some of the terms adopted in soundscape ecology, thus creating a new perspective for considering it.

Keywords: phonosphere, soundscape, sonority, sonor, phonospheric identity, keynote, soundmark, acoustic environment, sonic reality.

Introduction

The concept of phonosphere (Ps) was proposed in the mid-1980s by the Russian musicologist M.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,[1] and that "music… has won a total victory over the world in which we live: a 'phonosphere' encompasses the planet."[2] According to Nelli G. Shakhnazarova in *Grove Music Online*, "By analogy with the noosphere of Teilhard de Chardin and Vernadsky, he introduced the concept of the phonosphere, referring to the sonic background which surrounds modern man and influences his aesthetic notions and his mental and emotional make-up."[3]

The term has been adopted in various fields of research including music, philosophy, linguistics, literary criticism, and others, as a concept that refers not only to the global sphere of acoustic phenomena but also to a sphere of specific sonorities that make it unique. If Tarakanov considered Ps in the framework of musical art and its influence on humanity, then the application of this concept in other areas of research began to be interpreted in a broader and more abstract sense. More than thirty years later, in 2012, E.M. Tarakanova, Tarakanov's daughter, noted in an article dedicated to her father's ideas, that:

> [t]he phonosphere as a new geosphere is heterogeneous. It contains certain layers—"upper," "middle" and "lower," it allows social gradations (urban—rural, youth—children, mass—elite), it is able to influence national cultural priorities, etc. Various layers (defined in modern research by the same term "phonosphere"—with the addition

[1] Mikhail E. Tarakanov. "Folklore and Phonosphere," *The UNESCO Courier* (April 1986): 17.
[2] Ibid.
[3] Nelli Grigor'yevna Shakhnazarova, "Tarakanov, Mikhail Yevgen'yevich," *Grove Music Online* (2001).

> of concretizing words) form a structurally multidimensional phenomenon, divisible down to the "elementary particle"—the "individual phonosphere" of a particular work.[4]

The term Ps is a logical continuation of a number of terms created in combination with the word "sphere," such as: anthroposphere (Eduard Suess); biosphere and noosphere (Vernadsky); technosphere (Peter Haff); semiosphere (Yuri Lotman); geosphere; lithosphere; etc. Moreover, there are approaches in which the Ps is classified in a set of different sound spheres, as in the definition given by the linguist S.S. Shlyakhova:

> Phonosphere (soundsphere, sonosphere) is a sonic continuum, represented both at the material-spatial and abstract levels, filled with different types of biological (often unconscious), technical and cultural-semiotic sound systems. The phonosphere, forming at the level of the biosphere, sets numerous sound codes (musical, linguistic, bioacoustic, etc.). The phonosphere is marginal, since it exists in a "rift," a "gap" between the bio- and semiosphere.[5]

In Russian musicology, the concept of Ps is widely known due to M.E. Tarakanov and his followers. In Polish musicology, the homeland of the great masters and innovators of Sonoristics in the compositions of the 1960s, in addition to the term Ps, there exist many other terms similar to Ps, but with different connotations. According to Sebastian Bernat,

> researchers use various terms to describe phenomena associated with sound in space, e.g. audiosphere, phonosphere, melosphere, sonosphere, aural horizon, soundsphere, acoustic landscape, soundscape, acoustic space, phonic space, the sound layer of landscape, acoustic climate.… The first four concepts share the root, *sphere*, which denotes a spherical space extending around the listener, with a distinct centre and peripheries. The prefixes, *phono-*, *audio-*, *melo-*, and *sono-* indicate the relationship with sound and auditory activity.[6]

Bernat further states that "according to M. Gołaszewska [1997],[7] audiosphere is the acoustic environment examined from the perspective of human perception abilities,"[8] while "sonosphere refers to the sonic qualities, melosphere—musical qualities and phonosphere—phonic qualities [Misiak, 2009]."[9]."[10]

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[4] E.M. Tarakanova, "Phonosphere Concept at the Turn of the Millennium." In *The Contemporary Sound Space. In Memory of M.E. Tarakanov (1928–1996)* (The State Institute for Art Studies of the Ministry of Culture of the Russian Federation, 2012), p. 39. [Е.М. Тараканова (1928–96): «Концепция фоносферы на рубеже тысячелетий» в *Звуковая среда современности*. *Сборник статей памяти М.Е. Тараканова.* Отв. ред.-сост. Е. М. Тараканова. М.: ГИИ, 2012]. (The translation is mine – K.V.)

[5] S.S. Shlyakhova, "Ponosphere (Soundsphere, Sonosphere)," [Шляхова С.С. Фоносфера (звукосфера, соносфера)] https://liconism.com/laboratoriya-dictionaries/terminologicheskaya-laboratoriya/615-fonosfera-zvukosfera-sonosfera.html, accessed 3 April 2021. (The translation is mine – K.V.)

[6] Sebastian Bernat, "Sound in Landscape: The Main Research Problems." In *Dissertations of Cultural Commission* No. 23/2014, p. 92. https://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-9a4eaa35-c6ab-4de6-be81-7680b2987fbd, accessed 3 April 2021.

[7] M. Gołaszewska, *Estetyka pięciu zmysłów* (Warszawa-Kraków: PWN, 1997).

[8] Bernat, "Sound in Landscape," 92.

[9] T. Misiak, *Estetyczne konteksty audiosfery* (Poznań: Wyższa Szkoła Nauk Humani-stycznych i Dziennikarstwa, 2009).

[10] Bernat, "Sound in Landscape," 92.

The term *sonosphere* was used by Paul Oliveros.[11] He claims that "the sonosphere is the sonorous or sonic envelope of the earth…" and "is vibrating sonically through and encircling the earth ... beginning at the core of the earth and radiating in ever-increasing fractal connections."[12] The term in some ways is similar to Tarakanov's phonosphere, but is defined only from the acoustical point of view and its physical impact on the human listener.

Sonorities and Sonors

We should take into consideration the fact that the understanding of a Ps and its components as an entity is always closely related to human perception, which allows an individual to differentiate, categorize, and assess the acoustic environment, highlighting sounds that are meaningful to him. The perceptual capabilities of an individual depend on his cultural background, personal characteristics, and the properties of the soundscape. Taking all this into consideration, it can be said the phonosphere comprises sonorities of different significance and importance.

Sound means something that sounds. The way it sounds constitutes its sonority, which is perceived as meaningful or not, or as noise.[13] In Western tonal music, the term "sound" can have several meanings. At times, the words *sound* and *sounding* are metaphorically used in the meaning of sonority. They may imply the sound of scale degrees (for example, the sound of the first degree of the C major scale—tone C), an instrument (the sound of clarinet), a performing ensemble (sounding of a quartet), a specific piece of music (the sounding of Beethoven's sonata), or a performer (the sound of Glenn Gould playing), etc.

The word *sonority* has multiple connotations. It is frequently understood as a specific sounding of something, resulting from the timbral and acoustic properties of a sonic object and its combinations with others. The famous American composer Aaron Copland, in his book *Music and Imagination* (1952) entitles a whole chapter *The Sonorous Image*,[14] which he dedicates to the concept. He discusses *sonorous image*, *tone color*, *sound image*, and uses the word *sonority* multiple times throughout the book. For him, sonority refers to the coloration of various sound phenomena, such as the combination of sounds, the sound of a piece, an orchestral sonority. He also uses it to describe dry, unusual, beautiful sonorities, etc., regarding it as an important quality of a piece of music and its structure.

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[11] Pauline Oliveros, "Auralizing in the Sonosphere: A Vocabulary for Inner Sound and Sounding," *Journal of Visual Culture*, 10/2 (2011): 162–63 https://doi.org/10.1177/1470412911402881
[12] Ibid.
[13] Why some sonorities bear meaning and some not, what is considered noise and what is the role of these sonorities for the human perception, is an issue that requires separate consideration.
[14] Aaron Copland, "The Sonorous Image." In *Music and Imagination* (Cambridge: Harvard University Press, 1952), pp. 21–39.

The concept of sonority is widely used to refer to various phenomena in the theory of harmony, polyphony as a term in the analysis of various sonic structures. This is the sonority of an intervallic structure—interval or a chord (for example, an interval of a fifth, a triad chord) in harmony;[15] a quasi-chordal sonority arising from the combination of contrapuntal lines in polyphonic texture in sixteenth-century music; or, linearly created chord-sonority resulting from voice leading (like the Tristan chord) in chromatic music of the nineteenth century. It is also used to denote combinations of sounds that create consonant or dissonant sonority.

Sonority can be understood as a specific character of a sonic phenomenon—sound or noise, a combination of sounds or noises, or a mixture of sounds and noises with a specific timbre formed into an integral, distinct acoustic phenomenon with unique qualities of sounding.

Some sonorities are more significant in the structure of the phonosphere, while others are less so and can be perceived as part of the acoustic environment.[16] Among the various sonorities of the phonosphere, specific ones play an important role in the structure, determining its sonic uniqueness. In order to create a concept for these types of sonorities, the term *sonor*[17] will be used along with the terms *sound* and *sonority*. The term was first coined by famous Russian music theorist Yuri Kholopov,[18] who implied by it a *sonoric complex* in which the intervallic structure cannot be differentiated by human hearing, and is perceived as a homogeneous sonoric entity (such as a cluster or other sound structures in the music of Krz. Penderecki).[19]

By *sonor* we mean a sonority that plays a key role in a Ps, acting as a grammatical element of a sonic system or structural element of an acoustic space, or both, while *sonority* is a sonic image of an object.

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[15] The word *sonority* is frequently used in books on harmony theory. For example, in A. Schoenberg, *Theory of Harmony*; W. Piston, *Harmony*; V. Persichetti, *Twentieth-Century Harmony. Creative Aspects and Practice*; E. Aldwell & Carl Schachter: *Harmony & Voice Leading*; and others.

[16] The reasons why some sonorities are more significant in the phonosphere and others less so is an issue that requires special consideration.

[17] 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.

[18] Yuri Nikolaevich Kholopov, http://www.kholopov.ru/index2.html, accessed 16 April 2021.
Tat'yana S. Kyuregyan, "Kholopov, Yury Nikolayevich," *Grove Music Online* (2001), accessed 15 April 2021. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000048252, accessed 16 April 2021.

[19] 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, the Scriabin's Prometheus chord).

A specific Ps consists of unique sonorities and sonors, while sonors have the most important function. For example, the Church bells ringing is a sonor belonging to the Christian cult's phonosphere and it is always unmistakably recognizable in a soundscape.

In **musical systems**, the sonor is the main grammatical sonic element that functions as a structural element of the system.

The tonal musical language has its own set of sonorities and sonors existing within the tonal system based on the hierarchy of diatonic scale, melodic and harmonic elements, and their combinations. Diatonic scale steps and triadic chords represent two vertically and horizontally coordinated thematic sets of sonors that form the basis of its phonosphere. In addition, major and minor modes are created as more highly organized structures in the phonosphere of the system (*phonospheric* structures). Depending on the distribution and combinations of these sonors within the implementation of the mode, different sonorities are produced.

In dodecaphony, the segments of the series are the melodic and harmonic sonors, while the dodecaphonic series, being a realization of the *atonal decentralized mode* (Y. Kholopov) is an individually organized higher structure, based on the chromatic spectrum of pitches within an octave.

In jazz, there is a specific usage of modality; it has its own sets of sonors and ways of implementation, making its phonosphere easily discernible from the phonosphere of other musical languages.

In **soundscape studies,** the term *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."[20] However, the sonor differs in that it is not necessarily associated with a soundmark,[21] nor does it belong to a specific location, but it is a specific sonority in itself that belongs to a certain phonosphere. In the Ps of a soundscape, some sonors may function as soundmarks, making the place remarkable; others might be keynotes—the leading sonors in the area.

There are two main types of sonor. The *natural sonor* originates in the natural soundscape and the *anthropogenic sonor* is created by humans. The natural sonor can be non-biological, such as wind, waterfall, rain (geophony), or biological, such as birds singing, the croaking of frogs (biophony), while the sound of an orchestra or aircraft hum

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

[21] *Soundmark* **(**Schafer, ibid., 10) is a location in which unique sonorities can be heard and 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."

is generated by humans and their devices (anthrophony).[22] The multiple subtypes of both natural and anthropogenic sonors can be part of a particular phonosphere and may be assessed from different perspectives. In general, any soundscape can include sonorities of various phonospheres, where their complex mixtures, in turn, create the phenomenon of a new phonosphere.

The most important factor is that the sonors of a Ps are the main acoustic phenomena that principally determine its structure and character. For example, the phonosphere of the Orthodox Christian religious cult includes a number of specific sonors unique only to itself, which establishes it as a distinct sonic reality. Indeed, when we participate in divine service in a church, synagogue, or mosque, we find ourselves in the unique sonic space of the phonosphere of various religious cults. Meanwhile, other sonorities may play a secondary role in the soundscape. For example, the sonority of parishioners participating in worship varies from one religious cult to another, does not always have the same meaning for us, and in some cases does not radically affect our perception of its phonosphere.

Each **human being** is a sonic micro-universe and has his own *phonospheric identity*[23] within an individual soundscape, determined by sustainable sonors and sonorities such as the timbre of the voice and individual sets of lingual (phonic) and sonic expressions, including all the sounds and noises produced by a person. All these are expressed in how someone creates a personal acoustic environment through physical actions (such as movement, the use of external objects and devices), through acoustic communication with humans, other living creatures and nature (speaking, shouting, singing, etc.) and, in general, by sonically demonstrating emotional and mental reactions.

The Phonosphere: Definition

The concept of phonosphere has not yet been comprehensively defined, and the term is not commonly used in Western musicology. In general, this term implies a sphere of acoustic phenomena within something that may be in physical space (more or less definite and clearly limited), or in a conceptual sonic space, which exists virtually.

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[22] 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. 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"—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

[23] The use of the word *phonospheric* and the collocation *phonospheric identity* are mine—K. V.

The first of the above expressions of Ps is closely related to the concept of a soundscape. In some definitions, Ps is used synonymously with soundscape, implying metaphorically that a specific sonic space of something may be identified as an enclosed structure—as shown in the definition given in the study of the animal phonosphere of ancient Greek and Roman cultures by Marco Vespa, who states that "[t]he term phonosphere, or soundscape, refers to all those elements in the acoustic environment that can be perceived by human beings."[24] However, Ps and soundscape are not the same. In numerous definitions of a soundscape from different perspectives and areas of study, it has always been associated with the acoustic phenomena within a particular landscape. In initial researches dedicated to soundscape ecology, the soundscape was defined as "the collection of biological, geophysical and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities."[25]

The second expression of Ps implies a sphere of sonorities that are not attached to a specific location or time. For example, the phonosphere of the Church is quite sustainable: in most cases it depends little on location—the Church may be in Africa or India—and depends on time even less; its phonosphere has changed slowly over the centuries. As an abstract entity, it can be presented and perceived as a conceptual model—the phonosphere of culture, language, community, or sonic space of any entity.

Therefore, the soundscape is a sonic picture in a particular location, whereas Ps is the sphere of sonorities that is an expression and the sonic essence of the soundscape. For example, the sonority of the jungle is not necessarily associated for us with a particular location but rather exists in our consciousness as a sonic image; the sounding ritual of the synagogue service is an event that is not necessarily connected for us with a particular location but rather with the sonic image of the synagogue service. In both cases, we actually imagine the phonosphere of each of the places and think of it as a concept. However, if a particular synagogue is considered, it becomes a sonic object attached to a specific location (e.g. the Great Synagogue of Jerusalem), and can be perceived as a soundscape. When it comes to the discussion of holding a synagogue service at a specific time, we can talk about a time factor, because the service stands for a sonic event. Thus, it becomes a soundscape, the sonic continuum of which flows and unfolds on the spatial-temporal axis.

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[24] Marco Vespa, "A Voice without a Muse," *Greek and Roman Musical Studies* 5/2 (2017): 160. doi: https://doi.org/10.1163/22129758-12341298

[25] B.C. Pijanowski, A. Farina, S.H. Gage, et al., "What is Soundscape Ecology? An Introduction and Overview of an Emerging New Science," *Landscape Ecology*, 26 (2011): 1213–32. https://doi.org/10.1007/s10980-011-9600-8

More concretely, the Ps may be understood in several ways as:

1) the *totality of acoustic phenomena* in a given physical place (such as soundscape, city, planet Earth);
2) a *sonic sphere* of an entity, an object (such as culture, musical language, folklore, community, a religious cult, or human being);
3) a *conceptual sonic space* of a concrete object (such as musical composition, story, myth).

Each one of these parts of the definition of Ps can be considered as being mutually complementary. For instance, a musical composition may be a *totality of acoustic phenomena* in a given physical place (a concert hall); to represent a *sonic sphere* of a particular musical language (e.g. a tonal one), and express a *conceptual sonic space* of a given piece of music (for example, in a symphony by Mozart).

Speaking of the totality of acoustic phenomena in a certain locality, we mean everything that exists in a given acoustic environment. Formally, it can include all sounds, sonorities, and sonors. When considering the sonic sphere of a particular entity, e.g. musical language, we can discuss the specific sonorities of which it is comprised.

Finally, considering the conceptual sonic space of a concrete object, such as, e.g. a piece of music, we can discuss the implementation of specific sonors and sonorities that belong to a particular sphere. Thus, in the conceptual sonic space of Beethoven's sonata, the totality of sonic phenomena will be confined to the sonorities of the tonal musical language and its individual realization by the composer.

Another important feature is that sonorities within a given Ps, typically, are thematically related, establishing a set or sets that define its overall sonic image and identity. Such would be a set of thematically related sonorities and sonors in a conceptual sonic space of culture, community, etc. For example, in the study of death and ritual lamentation in Albanian funeral customs, Bledar Kondi discusses the phonosphere of death: female weeping and mourning.[26] He sees Ps as a sonic sphere, points to the traditional system of mortuary vocal signals, and names its sonorities,[27] which are actually the thematically related set of sonors of the phonosphere of female lamentation and mourning.

Respectively, Ps is a set of thematically related sonic objects that constitute an enclosed physical or conceptual sonic space with its specific sonorities and sonors. Each Ps has its own thematic set or sets of certain sonorities and sonors, which are sustainable and can be completely or partially inherent only to it, forming its spectral and timbral core.

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[26] Bledar Kondi, "The Albanian Phonosphere of Death: Female Crying & Mourning. In *Death and Ritual Crying: An Anthropological Approach to Albanian Funeral Customs*, Part III (Logos Verlag Berlin, 2012), pp. 155–90.

[27] Ibid. Such as cuckoo and cooing—*kukatja*, the owl's hoot and the wolf's howl—*ulërima*, the wail—*kuja*, and others.

It should be noted, when considering the Ps, that not all sonorities are taken into account by default, but usually only special ones. It is these that are important for defining the phonosphere, making it unique and different from other Ps. These sonorities are most pronounced in the phonosphere and are sometimes inherent only to it, while other background sounds, noises, and some sonorities act as an acoustic environment.

Another aspect of the phonosphere structure is that some unique sonorities can also appear as common elements in different Ps, although they originally belonged to a specific one, as indicated above. For example, in musical works of the postmodern era, tonal triad chords may appear along with atonal vertical structures, creating a single conceptual space. In other cases, some general sonorities—usually not their distinctive sonoric feature—are heard across different phonospheres, for example, the sound of a road hum in an urban soundscape.[28] Special consideration should be given to urban soundscapes since their Ps are complex by definition—mixing sonorities from different phonospheres in one space creates the phenomenon of a multifaceted unified Ps.[29] In the Ps of an urban soundscape some sonors, such as *cultural sonors* of various types, can play an important role in its structure.[30]

The structure of the Ps in an urban soundscape can be more or less sustainable. Various factors of sociocultural, demographic, technological, and physical properties of a landscape can affect its sonic identity. In some cases, changes in one or more of them can cause changes and even profound transformations in the Ps of a culture.[31]

Phonosphere in Music

In the studies of musical semiotics, music may be discussed as a part of an overall Ps, regarding it as "a subfield of acoustic manifestations of all living beings in an area, which belongs to the animated and communicative phonosphere."[32]

In music itself, Ps may also be understood on different levels—from global to local. At the macro-level, the structure of the Ps may be discussed in various musical systems, and, at the micro-level, specific composition or a part of it may be considered.

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[28] The assessment of various acoustic phenomena within a soundscape depends on numerous factors, circumstances and perceptions and should be considered separately. Therefore, in many cases, the statements made are relative.

[29] Sonors classification within an urban soundscape is a topic that should be considered separately.

[30] For more details about cultural sonors, see K. Volniansky, "If I Forget Thee: The Sonorities of Jerusalem Soundscapes," *Min-Ad: Israel Studies in Musicology Online*, 17 (2020): 138–56.

[31] The change in the urban soundscape conditioned by the combination of sociopolitical and demographic factors that cause discontinuity in the vernacular culture of a certain locality is discussed in detail in M. Ritzarev, "Rothschild's Violin and a Russian Tune," *Min-Ad: Israel Studies in Musicology Online*, 17 (2020): 98–102.

[32] Wolfgang Wildgen, "Musical Semiotics: Natural Forms, Meanings, and Dynamic Models" (2018), p. 4. doi: 10.13140/RG.2.2.12157.41447

The phonospheres of different musical systems can differ significantly. For instance, the Ps of the Arabic maqam modal system (especially the microtonal variants of the modes), dodecaphony, and tonality are completely different. Undoubtedly, the Ps of the tonal music considered as a musical language differs in its set of sonors from the atonal musical language, such as dodecaphony. Thus, in A. Schoenberg's dodecaphony, some sonors and sonorities, namely triad chords, octave doubling, and other diatonic structures, which are distinctive attributes of tonality, were excluded by Schoenberg in order to break the structural and aesthetic connection with the classical tradition, tonal thinking, and avoid mixture of the two different phonospheres.

In the music based on tonal language, there is a division into various historical periods of the music development—Baroque, Classical, and Romantic; national schools and individual compositional language of a composer that caused the phonosphere of tonal music to develop and expand its sonorities and their implementation. The Ps of tonal language has expanded through a period of more than 250 years of development of the system, when new sonorities and sonors were added to the existing vocabulary. This process was relatively slow during the Classical period and it was only at the beginning of the twentieth century, in the music of Romanticism and the Avant-guard, that a tangible transformation of the phonosphere occurs, marking a radical change in musical thinking. If in late Romantic music harmonic language, melodic units, and overall sound structures gradually became more and more chromatic, in the Avant-guard of the early twentieth century, totally new sonorities began to appear.

After the decentralization of the tonal system as the only musical language, numerous attempts were made to create new musical systems that would replace tonality. On the one hand, new musical thinking and, on the other, an expanded understanding and advanced use of tonality led to the creation of numerous new sonorities that enriched the existing phonosphere and also established new ones. Suffice to recall the new sonic vocabulary introduced by the composers of the Polish school of Sonoristics in the 1960s (such as, for example, the new sonorities introduced by Krz. Penderecki and W. Lutoslawski).

The global phonosphere of musical language was expanded also due to the development of electronic music. This enabled the creation of extra-diatonic sonorities that are not based on modal thinking, which are microtonal and, timbrally, do not resemble anything heard before. Such are the electronic works of I. Xenakis, P. Boulez, E. Varese, and others.

Almost immediately following, composers of acoustic music, influenced by the timbral impact of electronic music, began to create new sonorities (e.g. the music of G. Ligeti, L. Berio, and I. Xenakis). Some not only expanded the sonic vocabulary with new sonorities, using the traditionally produced sounds, but also introduced extended

techniques on acoustic instruments into performing practice. The new sonorities of microtonality and multiphonics have become a part of the expanded Ps.

Another group of composers, in search of a new musical language, created Spectralism, which is "a tendency in contemporary art music that takes the material attributes of sound as the point of departure for composition."[33] It originated in France and Romania in the 1970s, and its most prominent representatives are G. Grisey, Tr. Murail, and H. Radulescu.[34] The unique approach to pitch organization led to the creation of new multiple sonorities and mainly new musical Ps. The same applies to serialists, who reorganized the chromatic spectrum of the octave and succeeded in producing new sonorities (e.g. P. Boulez and L. Berio).

In the postmodern era, which began already in the 1960s, a new tendency to combine traditional sonorities with newly adopted ones brought the musical phonosphere to a new stage of development. Nowadays, composers freely use sonors and sonorities from different musical languages and aesthetics in the conceptual space of their compositions, making them an integral part of an individual phonosphere. It seems that now there are no longer any technical or aesthetic restrictions for the continuous expansion of the global musical phonosphere.

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In conclusion, we may summarize that phonosphere is a concept yet to be explored. The global phonosphere is an integral part of our world. It exists in everything embracing the material and non-material components, encompassing all acoustic phenomena. Ps may exist in time and beyond it. Being manifested on the temporal axis in a specific location, it consists of sonic events. On the other hand, it can also be presented as a conceptual sonic space outside a specific location or time.

The concept of Ps may be used as a tool for defining, studying, understanding, and evaluating any acoustic space and its components from the planetary scale to the soundscape and individual sonic space of a person. The planetary phonosphere is a substance and entity that is constantly being developed, and new sonorities are being created and revealed. Each new sound people add, be it the sound of a new technological device, a new musical composition, or the voice of a newborn baby, together with new bio- and geo-sounds resulting from the transformation of the natural soundscape, contributes to the establishment of the global phonosphere and the sonic identity of our world.

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[33] Eric Drott, "Spectralism," *The Routledge Encyclopedia of Modernism* (Taylor & Francis, 2016). https://www.rem.routledge.com/articles/spectralism, accessed 27 April 2021, doi:10.4324/9781135000356-REM1010-1

[34] Ibid.