

father Křížkovský, leave me at least the *intradās*. I like them so much that if I could, I would allow cannon to be fired during them.”⁹ The faithful, after some resentment, accepted the reform rather positively. Church choirs consisted of enthusiasts who diligently studied the new liturgical compositions, and the level of performance was at many places very high. The Cyrilian associations were strongly patriotic and contributed markedly to cultural life, which made them gratifying.

One of the basic ideas of Enlightenment was equality. This did not mean the equality of men and women; the emancipation movement and the beginnings of feminism, however, have their roots here. In the church milieu some preference for men over women persisted for a long time, and the Cecilianists further enhanced it. Church choirs consisted of boys’ and men’s voices; only in the country could church choirs not do without women.

The spread of the reform depended first of all on the opinion of the choirmaster and local priest. There were churches that were literally immersed in the reform, while others emerged untouched. In Prague the reforming ideas were carried out at, amongst others, the church of St Adalbert (kostel sv. Vojtěcha, Nové Město), the church of Ss. Cyril and Methodius (Karlín), the church of the Holy Spirit (Nové Město), and the church of the Holy Cross – Piarist church (Nové Město).

The General Cyrilian Association was dissolved – together with other associations and communities – in 1953. Its ideals, however, have persisted until today, and continue to influence church musicians who aim to purify liturgical music from any secular elements.

Changing the Scale of Perception: A Composer’s View on Spatial Composition Strategies and the Spiritual Aspect of Music

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Quite a wide range of scholars has dealt with the influence of music on our perception and experience. Apart from psychological aspects and the potential in music therapy, it is most often temporality – that is, the ability of music to influence our perception of time, which is the subject of research by a number of musicologists. We talk about physical time, musical-structural time, and, in some situations (especially in the case of the magic function of music in numerous non-European cultures), even about musical-transcendental time.¹ However, our perception of music is holistic. It takes place not only in time, but also in space. In our lives, time and space are bound just like flesh and soul. In this article I will focus on various inner spatio-temporal compositional strategies (inside the musical structure) leading to changes in the scale of perception. About the dislocation of instruments and different approaches to the spatial setting (outer strategies) I have written elsewhere.²

The spatial hearing of man is absolutely unique in comparison to other creatures on this planet.³ In this respect, humans occupy an exceptional position among primates, too.⁴ From experience, we know that even among people themselves, there are often surprisingly significant differences in the classification and interpretation of what we hear. Obviously, our way of listening is highly subjective, and it is influenced by culture, religion, geographical influences, and even by our current physical and mental condition.

¹ Vlastislav Matoušek, *Rytmus a čas v etnické hudbě* (Praha: Togga, 2003), 49f.

² Slavomír Hořínka, “Hudba v prostoru, prostor v hudbě”, in: Rataj, Michal – Hořínka, Slavomír – Trojan, Jan – Dvořák, Tomáš, *Zvukoprostor – Prostorozvuk* (Praha: Nakladatelství AMU, 2018).

³ Viz., Richard R. Fay – Albert S. Feng, “Mechanisms for Directional Hearing among Nonmammalian Vertebrates”, in: William A. Yost – George Gourevitch (eds.), *Directional Hearing* (New York: Springer-Verlag, 2011), 179–213.

⁴ Viz., George Gourevitch, “Binaural Hearing in Land Mammals”, in: William A. Yost – George Gourevitch (eds.), *Directional Hearing*, op. cit., 237–243.

⁹ Jiří Sehnal, “Chrámová hudba na Moravě od cyrilské reformy do současnosti“, *Opus musicum*, vol. 33, no. 4,(2001), 4–18.

It is also necessary to realize that the European way of listening and the time-linear perception of music is something very specific, related not only to the concept of time but also to the way of life itself. It is not surprising that, for example, in Bali, where the traditional calendar takes place over several simultaneous cycles of various lengths, music is based on complex simultaneous rhythmic patterns, which appear to be impenetrable to a European listener.⁵ And, to take another example, in the Trobriand Islands, culture exists, as it were, in a constant presence. This applies not only to the language which refers, for example, to the same vegetable in different states (ripe or overripe) by different names but also to traditional music, which is often based on a simple regular pulse and declamation around a single tone.⁶

At various places in this article I will touch on the spiritual aspect of music. It is not my goal to convince the reader how to listen to certain music, or to consider it to be (or not to be) spiritual. My aim is to show the reasons why I perceive it this way. I do not see the spiritual dimension of music either in itself or in the subject it is attached to. I see it rather in the relationship that arises and takes place between music and me during perception.⁷ In my opinion, one of the most striking features of this relationship lies in the ability of music actively to influence and transform perception. For me, spiritual music is the catalyst of transformation of our perception as well as of our view of the world and ourselves. We could understand this transformation literally, or more broadly, applying the term *metanoia*, which is used, in a different context, in the Eastern Christian tradition. The view of life as a constant effort for transformation is essentially biblical. Speaking in the words of the prophet Isaiah, “I shall lead the blind by a road they do not know, by paths they do not know I shall conduct them. I shall turn the darkness into light before them and the quagmires into solid ground.”⁸

How, specifically, can music change our perceptual scale in spatial perception? I will give a few well-known examples that can simply guide us to the basics of the problem. Then I would like to deal with more contemporary compositions, and also to look at our topic from other angles.

Distance

One of the amazing features of European music, as it has evolved over the centuries, is its ability to create the impression of proximity or remoteness.⁹ A nearby sound source is

⁵ Jonathan D. Kramer, *The Time of Music* (New York: Schirmer Books, 1988), 24.

⁶ Idem

⁷ “Spirituality should not, in my opinion, be situated in the object (music); instead, I see it primarily as a rupture in our relation with the object, a break in our perception. Or, to be more precise, spirituality is neither subjective nor objective: it takes place in the space between subject and object; it comes into being in relations, relations stripped off from ordinary structures.” Marcel Cobussen, *Thresholds: Rethinking Spirituality Through Music* (London: Routledge, 2008), 21f.

⁸ Is 42:16. All Biblical quotations are from: *The New Jerusalem Bible* [online] (Garden City, N.Y.: Doubleday, 1990), [cit. 2018-11-10], retrieved from: <https://www.seraphim.my/bible/jb/jb-ot%20content.htm>.

⁹ Salvatore Sciarrino, *Le figure della musica: da Beethoven a oggi* (Milano: Ricordi, 1998), 67.

always stronger, clearer and less reverberant than the same source, but remote. Logically, it will be weaker, colour-modified (degraded especially in the higher harmonic components of the spectrum), and with a much longer reverberation.

Since the depth of the concert stage (when considering the distance from the listener in the middle of the hall) is usually not such as to have a significant effect on the impression of different distances of sound sources, and thus to allow us to hear more complicated spatial relationships, it is obvious that, for the impression of distance of various sources on the stage, the position of instruments is not the most important factor. In addition, the classical arrangement of the symphonic orchestra counts, to a certain extent, with various distances when placing the most forceful instruments mainly at the back.¹⁰ However, in order to achieve this effect, dynamics associated with colour are much more important – let us recall the dynamic “inventions” of the 18th-century Mannheim School! In this context, we can see, for example, the use of a mute (whether on stringed or brass instruments), as having an effect which is, above all, spatial.¹¹

We know, of course, examples of compositions that require the placement of instruments outside the concert hall in order to achieve a significant distance. One of them, which, in addition, works really ingeniously with the space inside the music itself, is Mahler’s Symphony no. 3 (1893-96).¹² I am referring to the well-known passage in the third movement in which the post horn, located behind the stage, begins to play. After the invasion of six horns in *fortissimo* in bar 219, the orchestra is gradually reduced to the drone of the triple division of first violins at the lowest possible dynamics, which is repeated twice more (*sempre ppp*) by the composer. This is where the post horn enters.¹³ The tempo is suddenly slowed down by a ratio of 3:2. Although violins are located on stage, the impression of their spatial distancing, achieved by dynamics and timbral changes (by means of a division into three voices and the use of a mute), creates a very clear connection with the truly distant and visually absent post horn. The orchestra seems to disappear from the stage at that moment. Let us continue, however, in our considerations. We know, from experience, that the speed of a moving object (e.g., a car; here, perhaps a rider on horseback) in our vicinity seems to be subjectively faster than the speed of the same moving object in a great distance. We can only speculate about how *transmodal linking*¹⁴ of our perception is influenced by the slower tempo of the distant hidden post horn coming after the faster tempo of the

¹⁰ Viz., Antonín Špelda, *Akustické základy orchestrace* (Praha: Panton, 1967), 170nn. Cf. also the historical development of the arrangement of the orchestra in connection with the creation of concert halls and the transformation of their architecture. Fabian Kolb, “Klangwelten für den großen Saal: Raumkonzepte, spatiale Klangorganisation und Strategien der Verräumlichung in der symphonischen Musik des 19. Jahrhunderts”, in: Martha Brech – Ralph Paland (eds.), *Kompositionen für hörbaren Raum* (Bielefeld: transcript Verlag, 2015), 67–88.

¹¹ Slavomír Hořinka, „Hudba v prostoru, prostor v hudbě“, op. cit., 40.

¹² Gustav Mahler, *Symphonie Nr. 3 in sechs Sätzen für grosses Orchester, Altsolo, Knabenchor und Frauenchor* [score, online] (Wien: Universal Edition, 1974/1906), [cit. 2017-10-17], retrieved from: http://imslp.eu/files/imglnks/euimg/b/b7/IMSLP100612-PMLP57638-Mahler_-_Symphony_no_3.pdf.

¹³ Ibid., 154.

¹⁴ Interconnection between senses. Viz., Denis Smalley, “Space-Form and the Acousmatic Image” [online], *Organised Sound*, 12/1 (2007), 35-58, [cit. 2017-10-17] retrieved from: <https://doi.org/10.1017/S1355771807001665>.

trumpet that performs the same motif on the stage just before. The marking in the score, *Etwas zurückhaltend*, is, I think, quite telling.¹⁵

Magnitude

Another common phenomenon is transmodal linking between a small/large creature or object and a high/deep sound. Even very small children are already aware of this connection, as it is evident from their depiction of various real or imaginary situations.¹⁶

It is no coincidence that Richard Strauss, in his somewhat swaggering symphonic poem *Ein Heldenleben* (1899),¹⁷ entrusts the theme of the hero (i.e. himself) to the horns, cellos and contrabasses,¹⁸ while the theme of his opponents is dominated by the flute, piccolo, oboe and E flat clarinet.¹⁹ Let us also notice how the theme of the hero expands into an elegant and constantly growing melodic arc, while his opponents' clumsy hovering leads to the triviality of a single tone.

The size of the space

Music can also influence the subjective perception of the space in which it sounds. Already Handel in the *Messiah* (1742) works intentionally with the space within the musical structure. In the "Glory to God", the chorus from Part I²⁰ is prescribed to the trumpets *da lontano e un poco piano* while others should play obviously *forte*. If it is performed in transparent acoustics, the impression of a much larger space is achieved.²¹

Claude Debussy opens *Prélude à l'après-midi d'un faune* (1894)²² with the solo flute playing C5 sharp. In terms of colour, this tone (compared to others) is extremely fragile, as if distant. Our spatial perception is focused on a single point. The smooth melodic line, located in the area of the first harmonic, oscillates between the higher (light) and the lower (dark) part of the register. With the transition to the lower position, the noise elements

are slightly enhanced, as if the flute were leaning towards us. During the crescendo at the end of the phrase, the flute approaches almost realistically. The last tone is enriched with a chord played by oboes, clarinets and French horn. Suddenly, the space begins to open, enlarge, or, one might say, resonate. There comes a quickly ascending and descending glissando of the first harp in the middle and higher register, at the end of which the silent chord of muted low strings enters. Its entry is masked by an arpeggio of the same chord in the second harp, and the pair of horns in the middle register shortly dies away.²³ We find (consciously or unconsciously) that the tones of the flute's melodic line were anticipating the resonance of the chord corresponding to the harmonics proportions to the fundamental of the low B flat in the double basses. The distribution of events in time resembles the resonance of sound²⁴ in large acoustics, which makes our subjective impression of the space size diametrically larger than at the beginning.²⁵

Position in the median plane

Another type of transmodal linking is the interconnection between the height and depth of the spectral space with the impression of position or movement in the median plane.²⁶ Denis Smalley speaks about *transmodal perception*.²⁷ It is evident that these are not mere analogies. For instance, we know from Second World War testimonies that some German air bombs were designed in such a way that the flow of air through them would produce the penetrating tone of a whistle. The inhabitants of London and other British cities knew very well the meaning of the gradually declining sound coming from somewhere in the sky.²⁸ If the tone did not change (but was higher than the actual sound of a bomb), they knew they were in the trajectory of a falling bomb and the chances of survival were scant.²⁹

A wonderful example of such transmodal linking is the beginning of *De profundis* (1724) by Jan Dismas Zelenka.³⁰ We are attracted instantly, certainly, by the extraordinary colour of three solo singers in the bass register, together with three trombones and two oboes (Fig. 1). The ingeniously constructed bass seems to fall to the bottom, from which it rebounds and falls again. In conjunction with the text of the Psalm "From the depths

¹⁵ Slavomír Hořinka, "Hudba v prostoru, prostor v hudbě", op. cit., 40.

¹⁶ Frank Henriksen Ekeberg, *Space in Electroacoustic Music: Composition, Performance and Perception of Musical Space*, Dissertation (London: City University, 2002), 30.

¹⁷ Richard Strauss, *Ein Heldenleben: Tondichtung für großes Orchester: Op. 40* [score, online]. Leipzig: Leuckart Universal Edition, c1899. [cit. 2018-10-18]. retrieved from: [http://ks.petruccimusiclibrary.org/files/imglnks/usimg/3/3e/IMSLP19168-PMLP04982-Strauss_-_Ein_Heldenleben,_Op._40_\(orch._score\).pdf](http://ks.petruccimusiclibrary.org/files/imglnks/usimg/3/3e/IMSLP19168-PMLP04982-Strauss_-_Ein_Heldenleben,_Op._40_(orch._score).pdf)

¹⁸ *Ibid.*, 179.

¹⁹ *Ibid.*, 199.

²⁰ Georg Friedrich Händel, *The Messiah: oratorio in three parts = Der Messias: Oratorium in drei Teilen* [score] (Kassel: Bärenreiter, 1996), 70.

²¹ Dorothea Baumann, *Music and Space: A Systematic and Historical Investigation into the Impact of Architectural Acoustics on Performance Practice Followed by a Study of Handel's Messiah* (Bern: Peter Lang, 2011), 271ff.

²² Claude Debussy, *Prélude à l'après-midi d'un faune* [score, online] (Paris: E. Fromont, 1895, Mineola: Dover Publications, 1983 [reprint]), [cit. 2017-10-17], retrieved from: [http://imslp.nl/imglnks/usimg/4/40/IMSLP14736-Debussy_-_Prélude_à_l'après-midi_d'un_faune_\(orch._score\).pdf](http://imslp.nl/imglnks/usimg/4/40/IMSLP14736-Debussy_-_Prélude_à_l'après-midi_d'un_faune_(orch._score).pdf)

²³ *Ibid.*, 1f.

²⁴ Cf. The concept of resonance in work of Messiaen. Olivier Messiaen. *Technique de mon langage musical: texte avec exemples musicaux*, (Paris: A. Leduc, 2010/1944).

²⁵ Slavomír Hořinka, "Hudba v prostoru, prostor v hudbě", op. cit., 98.

²⁶ Cf. *gravitation in spectral space*. Denis Smalley, "Space-Form and the Acousmatic Image", op. cit., 39f.

²⁷ *Ibid.*, 45f.

²⁸ The closer the source of the sound is to the ground, the more slowly it changes its position towards us, and thus the audible tone of the tone gradually approaches its true frequency. *Viz., Doppler effect*.

²⁹ *Viz., Doppler effect*.

³⁰ Jan Dismas Zelenka, *De profundis in D* (Stuttgart: Carus-Verlag, 2018/1980). Reprinted with the kind permission of the publisher.

I all to you, Yahweh,”³¹ the analogy is obvious. Let us note how the author uses the pair of violins. Their occasional double stops emerging from unison develop in a way that reminds us of a distant echo of a loud sound impulse, or, if we like, an unvoiced bang of the base line colliding against the bottom of an abyss.

From my own work, I would like to mention the violin concerto *The Words of the Cross* (2010, rev. 2015).³² In the end, there appears a slowly ascending glissando, more than one minute long, of a chord in strings, followed by a smoothly connecting glissando between three trombones.³³ From the context of the composition, I think, it is likely that the listener will understand this place as a stylized expression of the ascension of the Lord.³⁴ It is not without interest that the final passage was compared to the take-off of an aircraft by performers.

Foreground/background

One of the fundamental archetypes of perception is the hierarchy of several simultaneously sounding events.³⁵ A focus of hearing on what our perceptions evaluate as essential, and the relegation of the less important to the background³⁶ is intrinsic not only to us but also to a number of other creatures. It is no coincidence that both music and speech involve a wide neural network of the whole brain. Many areas take part, but each dominates another hemisphere.³⁷ The foreground and background of our perception is not necessarily dependent on the distance of sound sources from us, as rather on their volume and subjective significance or importance, that is, how they capture (even unknowingly) our attention.³⁸ When distinguishing between the foreground and background, what we focus on intentionally can also play a significant role.³⁹

A beautiful example of a work with foreground and background is the beginning of Steve Reich's *Music for 18 Musicians* (1974-76).⁴⁰ The author lets individual instruments or groups emerge from a homogeneous, regularly flowing stream nearer to the fore and

³¹ Ps 130 (129).

³² Slavomír Hořinka, *Slova Kríže: koncert pro housle a orchestr* [score, online] (Praha, 2015), [cit. 2018-11-20], retrieved from: https://issuu.com/slavorhor/docs/slova_krize_rev2016_05_26.

³³ *Ibid.*, 28–32.

³⁴ “As he said this he was lifted up while they looked on, and a cloud took him from their sight.” Acts 1,9.

³⁵ Cf. *synecdoche effect* in: Jean-François Augoyard – Henry Torgue, *Sonic Experience: A Guide to Everyday Sounds* (Montreal: McGill-Queens University Press, 2011), 123–129.

³⁶ Conf. *figure-ground phenomenon* in Gestalt. In: Kurt Koffka, *Principles of Gestalt Psychology*; (New York: Harcourt Brace, 1936), 170–210.

³⁷ Dean Falk, “Hominid Brain Evolution and the Origins of Music” in: Nils Lennart Wallin – Björn Merker – Steven Brown (eds.), *The Origins of Music* (Cambridge: MIT Press, 2005), 197f.

³⁸ Cf. “Speculations about Schemas and Perception” in: Bob Snyder, *Music and Memory: An Introduction* (London: MIT Press, 2001), 103f.

³⁹ Cf. *cocktail party effect*. Colin E. Cherry, “Some Experiments on the Recognition of Speech, with One and with Two Ears” [online], *The Journal of the Acoustical Society of America*, 25/5 (1953), [cit. 2017-10-19], retrieved from: <http://dx.doi.org/10.1121/1.1907229>.

⁴⁰ Steve Reich, *Music for 18 musicians: for ensemble* [score] (Milwaukee: Boosey & Hawkes, 2015/2000).

then immerses them once again.⁴¹ Reich speaks of two time-varying layers: “Rhythmically there are two basically different kinds of time occurring simultaneously.”⁴² One of them is a regular, dynamically constant continuum of pianos and percussion, which is, as it were, lifted out of eternity. The other layer is a dynamic arch of women's voices and wind instruments which emerges from this continuum. The length of these phrases is determined by the breath of the performers. The fluidity of the gesture is supported by the regular pulse of all the instruments involved. On the one hand, on account of its discontinuity, the pulse minimizes any unwanted “seams” in the juxtaposition of the instruments' colours; on the other hand, the non-hierarchical structure of pulses in time creates a sense of continuity. The resulting impression is similar to a situation when we find ourselves in the environment of a complex soundscape, and we consciously focus our attention on the individual sound sources in it.⁴³

Acoustic ecology

On account of the fundamental changes in the soundscape of our planet after the onset of industrialization, our way of listening has gradually changed. We have moved a vast array of delicate, especially organic sounds (which used to be natural part of everyday life in the vicinity of our homes) to the background of our perception. Sometimes I feel that the soundscape has become two-dimensional and we inhabit only its uniform foreground,⁴⁴ without being able to realize its natural depth. Barry Truax even talks about the fact that the sonic environment we have created lures us to the habit of “non-listening”.⁴⁵

Increased levels of noise have been linked to human settlements since time immemorial, and it is clear that people were aware of the negative side of this fact.⁴⁶ For example, in ancient Rome there was a ban on driving chariots at night, because they made noise on cobbled streets.⁴⁷ But it is not necessary only to perceive non-periodic sounds as disturbing. Let us recall William Hogarth's engraving *The Enraged Musician* (1741), where we see various sound sources which do not allow the violinist to practice (Fig. 2). Goethe hated the barking of dogs, and Schopenhauer complained about the behaviour of coachmen who, in his opinion, lashed their whips too often.⁴⁸

⁴¹ *Ibid.*, 1.

⁴² *Ibid.*, [foreword].

⁴³ Slavomír Hořinka, “Hudba v prostoru, prostor v hudbě”, op. cit., 24.

⁴⁴ “It is a simplification, but one which is suggestive: hi-fi soundscapes are varied and uniquely local; lo-fi soundscapes are uniform and about the same everywhere.” Barry Truax. “Soundscape Composition As Global Music: Electroacoustic Music As Soundscape”, *Organised Sound*, 13/2 (2008), 104, [cit. 2017-10-20], retrieved from: <https://doi.org/10.1017/S1355771808000149>.

⁴⁵ “[...] the lo-fi soundscape seems to create a common habit of non-listening.” *Idem.*

⁴⁶ “An inability to stay quiet is one of the most conspicuous failings of mankind.” (Walter Bagehot)

⁴⁷ Lisa Goines – Louis Hagler, “Noise Pollution: A Modern Plague” [online], *Southern Medical Journal*, 100/3 (2007), 287–294, [cit. 2017-10-28], retrieved from: http://www.greencarintegrity.org/Noise_Pollution_A_Modern_Plague.pdf.

⁴⁸ Emily Ann Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933* (Cambridge: MIT Press, 2008), 116.

I am afraid that we are irretrievably losing formerly common opportunities to develop our ability to distinguish fine sound stimuli. In 1961, Samuel Rosen visited one of the quietest areas of southern Sudan, and observed the capabilities of the Mabaan tribe to distinguish subtle sounds. He found that 53 per cent of the residents were able to distinguish the sounds that only 2 per cent of the New Yorkers could hear.⁴⁹ Since then, acoustic smog has been constantly increasing.

It would be naïve to think that such a transformation of the sound environment would not affect the composer's creative process.⁵⁰ "Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating."⁵¹

Silence

I believe that these facts may be one of the reasons why some contemporary composers focus on the quietest sounds that are normally under the level of our distinctive ability. If our senses are subjected for some time to partial deprivation (e.g., in a dark or silent environment), our perception becomes more sensitive to gentle stimuli. Sounds that we would normally perceive as being in the background are at the forefront of our attention.

Salvatore Sciarrino focuses on work with the most subtle sounds the instruments are capable of. From his considerable number of works, I would like to concentrate on the composition *Introduzione all'oscuro* (1981).⁵² In terms of volume, the composition sometimes moves to the very limit of audibility. I would call Sciarrino's compositional strategy (not only in this piece) work with a differently articulated silence.⁵³ To experience an absolute "silence" does not mean to hear no sound at all, but rather, because of the absence of external sound sources, to hear oneself, either in a spiritual or a literal sense.⁵⁴

Sciarrino states that the essential source of material for this composition is the imitation of several sounds of the human body.⁵⁵ In addition to breathing, it is mainly the heartbeat

⁴⁹ George Prochnik, *In Pursuit of Silence: Listening for Meaning in a World of Noise* [e-book] (Doubleday: Random House, 2010).

⁵⁰ Let us recall the fascination with this sound transformation among the futurists, the beginnings of wider popularity of jazz, Varèse's American compositions, or today's *noise scene* and the broad usage of drones in contemporary music. Viz., the chapter "The Art of Noises: The Celebration and Control of Mechanical Sound in Music", in: Karin Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century* (Massachusetts: The MIT Press, 2008), 137–158.

⁵¹ John Cage, "The Future of Music: Credo" in: John Cage. *Silence: Lectures and Writings, 50th Anniversary Edition* (Middleton: Wesleyan Univ. Press, 2013), 3. Cf. also *sharawadji effect*. J. F. Augoyard – H. Torgue. *Sonic Experience: a Guide to Everyday Sounds*, op. cit., 117–123.

⁵² Salvatore Sciarrino, *Introduzione all'oscuro: per 12 strumenti* [score] (Milano: Ricordi, 1981).

⁵³ "There's no such thing as silence [...] it is the aspect of sound that can be either expressed by sound or by its absence." Richard Kostelanetz, *Conversing with Cage* (New York: Routledge, 2003), 65 [...] 51.

⁵⁴ Cf. "John Cage, a visit to the anechoic chamber" [online], *YouTube.com*. (2013), [cit. 2017-03-24], retrieved from: <https://youtu.be/jS9ZOIFB-kI>. It is clear that Cage did not hear his nervous system (as he claims), but most likely he experienced a temporary tinnitus. Cf. Denise A. Tucker et al., "The effect of silence on tinnitus perception" [online], *Otolaryngology-Head and Neck Surgery*, 132/1 (2005), 20–24, [cit. 2018-03-24], retrieved from: <https://doi.org/10.1016/j.otohns.2005.08.016>.

⁵⁵ "Dans *Introduzione all'Oscuro*, l'imitation, le transfert de certains sons physiologiques est évident: une sorte d'objectivation, une dramatisation muette de la pulsation cardiaque et de la respiration." Salvatore Sciarrino, "Introduzione all'oscuro: Nota

transformed into the strokes of the tongue on the reed. By focusing on the fine sonic details of instrumental timbres, the author forces us to abnormally sensitive listening. In other words, he leads us to change the listening scale. As we accept it, we enter into intimacy with the sound (silence) of his composition, and we find ourselves inside (our own) body. We feel that the source of the sound is within ourselves.

Microscopic vision

In the previous text, we have noticed the fact that we can, under certain circumstances, intentionally target our perception on selected sound sources, and thus bring them to the forefront of our attention. I would compare this to changing the aperture of the camera lens. The dynamics of one or another layer can help very much in this process, which we could compare analogically to the change of the focal length of the lens. I think it is also possible to look at this process in reverse as a subjective approach to the sound source. From a very small, or minimal, distance, we are often able to perceive very subtle sound details. In a similar way to microscopic vision, we can also increase the "scale" of this magnification/zoom-in by amplification.

Jonathan Harvey's composition *Speakings* (2008)⁵⁶ for symphony orchestra and electronics uses a similar compositional strategy to Sciarrino's, but in a more dynamic form. The material of the piece is based on sounds of speech.

"It is as if the orchestra is learning to speak, like a baby with its mother, or like the first man, or like listening to a highly expressive language we don't understand. The rhythms and emotional tones of speech are formed by semantics, but even more they are formed by feelings – in that respect they approach song."⁵⁷

There are various theories about the origins of music. Dean Falk is convinced that the common genesis of music and language is to be found more than two million years ago in non-verbal sound communication between parents and infants. As a result of the upright posture, smaller and smaller infants were born, becoming increasingly dependent on their mothers after birth.⁵⁸ The consequence of the development of so-called *motherese* was the establishment of strong emotional attachment and social ties, which ultimately proved to be a fundamental evolutionary advantage.⁵⁹

dell'autore" [online], [cit. 2017-10-19], retrieved from: http://www.salvatoresciarrino.eu/Data/Catalogo/Introduzione_all_oscuro.htm#dummy.

⁵⁶ Jonathan Harvey, *Speakings: for orchestra and electronics* (2008) [score] (London: Faber Music, 2008).

⁵⁷ Jonathan Harvey, "Speakings: Programme Notes" [online], [cit. 2017-10-17], retrieved from: <http://www.fabermusic.com/repertoire/speakings-5282>. Cf. also Diana Deutsch, "Speech to Song Illusion" [online], <http://deutsch.ucsd.edu>, [cit. 2018-03-21], retrieved from: <http://deutsch.ucsd.edu/psychology/pages.php?i=212>.

⁵⁸ Viz., Dean Falk, *Finding our tongues: mothers, infants, and the origins of language* (New York: Basic Books, 2009).

⁵⁹ Laurel J. Trainor – Erin E. Hannon, "Musical Development", in: Diana Deutsch (ed.), *The Psychology of Music: Third Edition*, (Academic Press, 2013), 424.

In many places during the first movement of Harvey's composition, the orchestra perfectly resynthesizes the emerging and forming speech sounds. When listening to a recording without the score, we cannot even distinguish between live instruments and electronics. Personally, my impression is as though a huge symphonic apparatus were hiding inside a child's mouth. The author achieves the impression of maximum possible zooming to the sound. We have a feeling that we are within its source.

Reassessment

The two preceding examples show us a creative strategy based on the change of the scale of perception in the measure of *gestural space*.⁶⁰ From a different point of view, we could talk about directing the listener's attention to the details of the *event*.⁶¹ Let us examine the reassessment of our listening scale in a broader context.

One of the oldest texts describing the importance of our aural perception scale may be found in the first Book of Kings:

"[... Elijah] walked for forty days and forty nights until he reached Horeb, the mountain of God. There he went into the cave and spent the night in it. [...] Then he was told, 'Go out and stand on the mountain before Yahweh.' Then Yahweh himself went by. There came a mighty wind, so strong it tore the mountains and shattered the rocks before Yahweh. But Yahweh was not in the wind. After the wind came an earthquake. But Yahweh was not in the earthquake. After the earthquake came a fire. But Yahweh was not in the fire. And after the fire there came the sound of a gentle breeze. And when Elijah heard this, he covered his face with his cloak and went out and stood at the entrance of the cave."⁶²

Elijah had to change his listening attitude radically in order to hear God's voice. For the fact that the voice of God could be in something as small as "the sound of a gentle breeze" was, in the religious context of the 6th century BC, something unimaginable. The above-mentioned pericope became the inspiration for the composition by Michal Nejtěk *Descent into the depth of silence* (1999)⁶³ for violin, cello and piano. The author introduces very subtle sounds and rustling at the beginning of the piece, which are then literally overwhelmed by dynamically explosive music (Fig. 3). It consists of intentional, endlessly repetitive banalities, such as the stepping-up glissando of a sixth in violin and cello, finishing with a piano cluster, or the slowed-down trill of a wide second, modulated by a gradual press and release of the sustaining pedal sounding incessantly in the piano. The music then suddenly falls silent in comparison with the previous course, becoming discontinuous. But our listening scale changes rather slowly. Our attention struggles and

grabs the indicated melodic phrases or harmonies. At the end of the ninth minute, only the rustling of horsehair on the strings remains, which we will probably associate with the introduction, but now we hear it with different ears indeed. While at the beginning it had an introductory function, at the end it constitutes the culmination of a process of gradual diving; a process that I would compare to a diver reaching the bottom instead of a conventional "climbing to the peak". At the very end of *Descent into the Depth of Silence*, Nejtěk exposes a fragile motif in the high register of the piano which resembles a fragment of a gospel melody. In the context of the whole composition, this simple tune is a moment of real epiphany.

Time as a zoom lens of space

In Nejtěk's piece, we can see how important time is for the change of listening scale. Gérard Grisey, following Stockhausen,⁶⁴ considers musical time as a lens with variable focal length. The more the musical structure is expanded over time, the more we focus our attention on microstructure - *microphonic structure of sound*.⁶⁵ On the contrary, the more the musical structure is compressed in time, the more our attention moves to its macrostructure - the *macrophonic event*.⁶⁶ Grisey speaks of a proximity scale based on a rule that he defines: "The acuity of auditory perception is inversely proportional to that of temporal perception."⁶⁷

How does this change in the depth of field look, i.e., is it a subjective approach to, or retreat from the sound source? For instance, in *Modulations* (1976–77)⁶⁸ for orchestra, one may find a convenient passage illustrating this process. In No. 37,⁶⁹ the orchestra is divided into four ensembles consisting of five instruments. The ensembles enter sequentially with seven-tone phrases. These phrases have a structure that resembles the spectral course of a natural sound source.⁷⁰ The basis is always the lowest line. The higher the line is, the faster its course is, that is to say, it starts later and ends earlier. Although the musical structure in the score is very clear, its progression is so fast (time-compressed) that we perceive it as an essentially random heterophony of twenty separate voices. In the following course, gradual deceleration (time expansion) of phrases occurs. One bar before No. 38,⁷¹ we realize that the expansion of lines is greater the faster they are, and thus rhythmical unison gradually comes about. In the following

⁶⁴ Karlheinz Stockhausen, "How Time Passes", in: *Musical Craftsmanship* (Universal Edition, 1975/1959).

⁶⁵ Gérard Grisey, "Tempus ex Machina: A composer's reflections on musical time" [online], *Contemporary Music Review*, 2/1 (1987), 259, [cit. 2017-10-19], retrieved from: <http://dx.doi.org/10.1080/07494468708567060>.

⁶⁶ *Idem*.

⁶⁷ *Idem*.

⁶⁸ Gérard Grisey, *Modulations: pour 33 musiciens* [score] (San Giuliano Milanese: Ricordi, 1978).

⁶⁹ *Ibid.*, 41.

⁷⁰ The shape of the gesture resembles an envelope of brass sound amplitude.

⁷¹ Gérard Grisey, *Modulations: pour 33 musiciens*, op. cit., 44.

⁶⁰ Denis Smalley, "Space-Form and the Acousmatic Image", op. cit., 41f.

⁶¹ Cf. Simon Emmerson, "Aural landscape: Musical space" [online], *Organised Sound*, 3/2 (1998), 138, [cit. 2017-10-25], retrieved from: <https://dx.doi.org/10.1017/S1355771898002064>.

⁶² 1 K 19,8b.11–13a.

⁶³ Michal Nejtěk, *Sestup na hlubinu ticha* [score] (Praha, 1999), [author's archive].

section, twenty random voices turn into a polyphony of four homophonic layers, which, at the conclusion, come to be the only layer.⁷² Our perceptions gradually reveal their harmonic and timbral qualities and the relationships between them. We enter into the resonating sound.⁷³

Multistability

The relationship between the unit and the whole, its reassessment and transformation, are one of the leading elements of the hierarchical structuring during an active and focused perception of music. Pauline Oliveros talks about two opposing, but mutually complementary principles: *mindfulness* and *awareness*, relating to the *focus* on detail and *global attention to the whole field*.⁷⁴ Another view may be the principle of multistability in Gestalt (Fig. 4).

For example, Michal Nejtěk, who has already been mentioned, finds his inspiration often in Raymond Carver's poetry, whose style is characterized by describing seemingly trivial situations in a way that sometimes resembles the connecting of words or sentences that appear almost unrelated. Carver's language has a specific rhythm, sometimes intensified by repetition.⁷⁵ What is behind the banal words, that is, the depth and intensity of the author's relation to the subject, the reader can realize only while persisting in reading and maybe even later. Likewise, in *Ultramarine (Songs In The Distance)* (2018) for orchestra,⁷⁶ Nejtěk works with repetitive, seemingly primitive motifs or basic musical elements, which he situates, in the course of the composition, in new unexpected connections. To illustrate, I would mention the element of two falling or rising semitones, at a certain point filled with a quartertone step, permuted or interlaced with a whole tone. This element is transformed from the exposed melodic line through the timbre layer in the high-pitched area, the rising chord sequence in the lower register, the granularly frayed layer played *col legno* in strings and a jazz-like *tutti* riff, to the totally unexpected context of hinting at a Tristan-like harmony.

Lacrimosa

Change in meaning, relationship, hierarchical status, preview. These are truly biblical experiences. We read in the prophet Isaiah: "[...] for my thoughts are not your thoughts,

⁷² Ibid., 49.

⁷³ Slavomír Hořinka, "Hudba v prostoru, prostor v hudbě", op. cit., 51f.

⁷⁴ Pauline Oliveros, *Deep Listening – A Composer's Sound Practice* (New York: iUniverse, 2005), xxi(ff).

⁷⁵ E.g. poems *The Car* or *In the Lobby of the Hotel del Mayo* from *Ultramarine*. Raymond Carver, *Ultramarine* (New York: Vintage Books, 1987).

⁷⁶ Michal Nejtěk, *Ultramarine (Songs In The Distance)* [score] (Praha, 2018), [author's archive].

my ways not your ways - it is Yahweh who speaks. Yes, the heavens are as high above earth as my ways are above your ways, my thoughts above your thoughts."⁷⁷ In a fascinating way, this continual transformation of our thinking is described by Franz Werfel in his novel *Jeremiah: Hear the Voice*.⁷⁸ The reality seems to be clear to the Israelites; they think they know precisely what God is telling them through events, but Jeremiah always says the opposite: when they want to wage war, he preaches peace; while they live in excess he describes the most terrible images of suffering; when they are in distress, he asks for the slaves to be set free.

A similar reassessment can take place at a variety of levels. In *Lacrimosa* (2010) for Baroque violin, koto, tam-tam and strings,⁷⁹ I create a musical space where the sound of the Far East meets the Western music tradition. I was inspired by the words of one of the Desert Fathers: "Let our eyes shed tears before we leave to a place where tears will burn our bodies..."⁸⁰ which I have linked to a part of the *Dies irae* sequence, the "Lacrimosa". I see weeping as a gift without which there would be no real joy. The moment of lamentation rips our heart apart, but at the same time it also opens it.

The composition is divided into short sections, a kind of "timbre tears", where time is subjectively stopped. These tears, as it were, fill a well, on whose very bottom a passage from the "Et incarnatus est" by J. D. Zelenka can glitter. The compositional strategy is based on seeming contraries that appear to be either unity, or the opposite of themselves. Whether in timelessness experienced in short sections, instrumentation, or in a view of what is familiar and what foreign, local and global. All of the material for the piece comes from Zelenka's quotation, located at the very heart of the composition. It is re-orchestrated so that it merges organically with both the chosen instrumentation and its surroundings.⁸¹ The exotic suddenly sounds intimately familiar (e.g. koto as theorbo), and it is, paradoxically, Zelenka's music which gives the impression of being exotic in the context of the whole composition.

Trust in the Heart

To conclude this section, I would like to point out, in relation to Sciarrino's composition, the opposite case, when it is possible to change the scale of listening. It is a situation in which our attention is overloaded, overwhelmed by expressive sound stimuli. In this case, our perception will simply eliminate (mostly spontaneously) some of the components of

⁷⁷ Is 55: 8-9.

⁷⁸ Franz Werfel, *Jeremiáš: Slyšte Hlas*, transl. by Bohumil Černík (Praha: Lidová demokracie, 1967).

⁷⁹ Slavomír Hořinka, *Lacrimosa: for baroque violin, koto, tam-tam and strings* [score, online] (Praha, 2014), [cit. 2018-11-20], retrieved from: https://issuu.com/slavoHOR/docs/lacrimosa_2014_12_08.

⁸⁰ Jiří Pavlík, *Apoftihmata: výroky a příběhy pouštních otců I* (Praha: Benediktinské arciepatství sv. Vojtěcha a sv. Markéty, 2000), 55.

⁸¹ Slavomír Hořinka, *Lacrimosa: for baroque violin, koto, tam-tam and strings*, op. cit., 21-25.

the perceived sound complex.⁸² This fact is the basis of the composing strategy of my solo piano piece *Trust in the Heart* (2016-18).⁸³ My inspiration came from my experience in the French village of Taizé.⁸⁴

I stood directly below a relatively low bell tower with five great bells during their ringing (Fig. 5). The sound pressure was, for me, at the threshold of pain. I experienced the sound literally as haptic. I suddenly realized that my attention jumped in a completely uncontrolled way between the various cuts of the rich sound spectrum of the bells, focusing on the beat of the waves or wandering between the chosen frequencies. In fact, I began to perceive this sound complex linearly. When composing, I analysed the spectrum of the individual bells, dividing it into four different, dynamically distinct layers (registers). The polyrhythm of these harmonies (spectra) serves as a kind of chaconne, in which I always allow only some of the tones to sound. The result is a process of continuous absorbing of the listener, through the stylization of my own listening experience, into the gradually emerging sound complex.⁸⁵

At the beginning, I oblige the listener to focus on subtle reverberations produced by silently depressed strings.⁸⁶ In the development, I gradually overwhelm the listener with sound, trying to absorb him into the resonance of the whole instrument,⁸⁷ while at the end, impulses become more and more sparse, and at one moment, the musical time bends seamlessly into the inner space of the performer, measured by his own breath.⁸⁸

Human beings are creatures that focus on amassing, accumulation, growth, or reaching a variety of peaks in many areas of their lives. It is undisputed that, for example, gradations in music usually seem to be subjectively shorter than the declining of the tension of the same length. On the other hand (and many life situations can serve as evidence), it is necessary to renounce and deny for the sake of transformation and inner growth of man. In my opinion, it is precisely reductionist tendencies in music that have the greatest potential to transform our perception, together with various spatial strategies (whether outside or inside the space of music). Certainly one could mention many names from Arvo Pärt to Hans Abrahamsen in this regard. Here I would like to draw the reader's attention to the personality of Morton Feldman, whose music and listening to it is, for me, indeed a transcendental experience. It was typical of Feldman that, when he wanted to improve

his composition, he began to delete notes instead of adding more.⁸⁹ In this context, one cannot fail to remember a typical koan of Jesus in the Gospel of Matthew: "For anyone who wants to save his life will lose it; but anyone who loses his life for my sake will find it."⁹⁰



Figure 1: *De profundis* (1724) by Jan Dismas Zelenka.

⁸² In case we do not focus on some sound source consciously.

⁸³ Slavomír Hořinka, *Trust in the Heart: for piano* [score, online] (Praha, 2018), [cit. 2018-11-20], retrieved from: https://issuu.com/slavohor/docs/trust_in_heart_2018_03_06.

⁸⁴ The Communauté de Taizé is an international ecumenical community founded in 1940 by Roger Schütz in the village of Taizé in the heart of Burgundy, near Cluny.

⁸⁵ Slavomír Hořinka, "Hudba v prostoru, prostor v hudbě", op. cit., 52.

⁸⁶ Slavomír Hořinka, *Trust in the Heart: for piano*, op. cit., 4.

⁸⁷ Ibid., 12ff.

⁸⁸ Ibid., 18ff.

⁸⁹ Morton Feldman – B. H. Friedman, *Give My Regards to Eighth Street: Collected Writings of Morton Feldman* (Boston, Mass: Exact Change, 2001), 113.

⁹⁰ Matthew 16: 25.



Figure 2: William Hogarth, *The Enraged Musician* (1741)



Figure 3: Michal Nejtek, *Descent into the depth of silence* (1999)

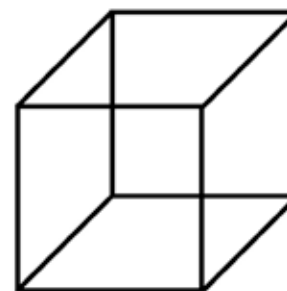


Figure 4: Multistability in Gestalt



Figure 5: Taizé bell tower.

Bibliography

- Augoyard Jean-François – Torgue Henry, *Sonic Experience: a Guide to Everyday Sounds* (Montreal: McGill-Queens university Press, 2011).
- Bates Enda, *The Composition and Performance of Spatial Music* [online], Dissertation (Dublin: Trinity College, 2009), [cit. 2017-10-20], retrieved from: <http://www.endabates.net/Enda%20Bates%20-%20The%20Composition%20and%20Performance%20of%20Spatial%20Music.pdf>.
- Baumann Dorothea, *Music and Space: A Systematic and Historical Investigation into the Impact of Architectural Acoustics on Performance Practice Followed by a Study of Handel's Messiah* (Bern: Peter Lang, 2011).
- Bijsterveld, Karin, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century* (Massachusetts: The MIT Press, 2008).
- Blauert Jens, "Sound Localization in the Median Plane" [online], *Acustica*, 22 (1969), 205–213, [cit. 2018-03-14], retrieved from: <https://www.researchgate.net/publication/263716618>.
- Brech Martha – Paland Ralph (eds.), *Kompositionen für hörbaren Raum: Die frühe elektroakustische Musik und ihre Kontexte = Compositions for Audible Space: The Early Electroacoustic Music and its Contexts* (Bielefeld: transcript Verlag, 2015).
- Bunch James Denis, *A Polyphony of the Mind: Intertextuality in the Music of Salvatore Sciarrino* (Urbana: University of Illinois at Urbana-Champaign, 2016).
- Cage John, *Silence: Lectures and Writings, 50th Anniversary Edition* (Middletown: Wesleyan univ. Press, 2013).
- Carver Raymond, *Ultramarine* (New York: Vintage Books, 1987).
- Cobussen Marcel, *Thresholds: Rethinking Spirituality Through Music* (London: Routledge, 2008).
- Darwin C. J. – Hukin R. W., "Effects of reverberation on spatial, prosodic, and vocal-tract size cues to selective attention" [online], *The Journal of the Acoustical Society of America*, 108/1 (2000), 335–342, [cit. 2017-10-19], retrieved from: <http://dx.doi.org/10.1121/1.429468>.
- Deutsch Diana, "Psychology and Music", in: Bornstein Marc H. (ed.), *Psychology and Its Allied Disciplines*, 3/3 (Hillsdale: Erlbaum, 1984), 155–194.
- Deutsch Diana (ed.), *The Psychology of Music: Third Edition* (Academic Press, 2013).
- Deutsch Diana, "Speech to Song Illusion" [online], <http://deutsch.ucsd.edu>, [cit. 2018-03-21], retrieved from: <http://deutsch.ucsd.edu/psychology/pages.php?i=212>.
- Ekeberg Frank Henriksen, *Space in Electroacoustic Music: Composition, Performance and Perception of Musical Space*, Dissertation (London: City University, 2002).
- Emmerson Simon, "Aural landscape: Musical space" [online], *Organised Sound*, 3/2 (1998), 135–140, [cit. 2017-10-25], retrieved from: <https://dx.doi.org/10.1017/S1355771898002064>.
- Falk Dean, *Finding our tongues: mothers, infants, and the origins of language* (New York: Basic Books, 2009).

- Feldman Morton – Friedman B. H., *Give My Regards to Eighth Street: Collected Writings of Morton Feldman* (Boston, Mass: Exact Change, 2001).
- Goines Lisa – Hagler Louis, “Noise Pollution: A Modern Plague” [online], *Southern Medical Journal*, 100/3 (2007), 287–294, [cit. 2017-10-28], retrieved from: http://www.greenarintegrty.org/Noise_Pollution_A_Modern_Plague.pdf.
- Grisey Gérard, “Tempus ex Machina: A composer’s reflections on musical time”, *Contemporary Music Review*, 2/1 (1987), 239–275, [cit. 2017-10-19], retrieved from: <http://dx.doi.org/10.1080/07494468708567060>.
- Harvey Jonathan, “Speakings: Programme Notes” [online], [cit. 2017-10-17], retrieved from: <http://www.fabermusic.com/repertoire/speakings-5282>.
- Hořinka Slavomír, “Barva zvuku a hierarchie v tektonice”, in: *Orchestrace jako otevřený proces: sborník studií. 1. díl* (Praha: Triga, 2009), 9–52.
- Hořinka Slavomír, *Barva zvuku a její úloha ve výstavbě hudební skladby*, Dissertation (Praha: Triga, 2008).
- Hořinka Slavomír, “Hudba v prostoru, prostor v hudbě”, in: Rataj Michal – Hořinka Slavomír – Trojan, Jan – Dvořák Tomáš. *Zvukoprostor – Prostorozvuk* (Praha: Nakladatelství AMU, 2018), 20–141.
- Hořinka Slavomír, “Interspace: Vzdálenost jako kompoziční strategie” [online], *Musicologica Brunensia* [cit. 6. 9. 2018], 53/1 (2018), 35–50, retrieved from: <http://hdl.handle.net/11222.digilib/138327>.
- Cherry Colin E. “Some Experiments on the Recognition of Speech, with One and with Two Ears” [online], *The Journal of the Acoustical Society of America*, 25/5 (1953), 975–979, [cit. 2017-10-19], retrieved from: <http://dx.doi.org/10.1121/1.1907229>.
- Kendall Gary S., “A 3-D Sound Primer: Directional Hearing and Stereo Reproduction” [online], *Computer Music Journal*, 19/4 (1995), 23–46, [cit. 2018-03-14], retrieved from: www.jstor.org/stable/3680989.
- Koffka Kurt, *Principles of Gestalt Psychology* (New York: Harcourt Brace, 1936).
- Kostelanetz Richard, *Conversing with Cage* (New York: Routledge, 2003).
- Kramer Jonathan D., *The Time of Music* (New York: Schirmer Books, 1988).
- Krause Bernie L., “The Niche Hypothesis: How Animals Taught Us to Dance and Sing” [online], *Whole Earth Review*, 57/winter (1987), [cit. 2018-03-22], retrieved from: <http://fall2010compositions.pbworks.com/f/kraus+niche+hypothesis.pdf>.
- Leibovich Nizan, *Empty spaces: temporal structures and timbral transformations in Gérard Grisey’s Modulations and Release for 12 musicians, an original composition*, Dissertation (University of Pittsburgh, 2017).
- Matoušek Vlastislav, *Rytmus a čas v etnické hudbě* (Praha: Togga, 2003).
- Meyer Jürgen, *Akustik und musikalische Aufführungspraxis: leitfaden für Akustiker, Tonmeister, Musiker, Instrumentenbauer und Architekten* (Frankfurt am Main: Verlag des Musikinstrument, 1972).
- Meyer Jürgen, “Directivity of the Bowed Stringed Instruments and Its Effect on Orchestral Sound in Concert Halls” [online], *The Journal of the Acoustical Society of America*, 51/6B (1994/1972), 1994–2009, [cit. 2018-03-28], retrieved from: <https://doi.org/10.1121/1.1913060>.
- Miller James D., “Effects of Noise on People” [online], *Journal of the Acoustical Society of America*, 56/3 (1974), 729–764, [cit. 20.10.2017-10-20], retrieved from: <http://dx.doi.org/10.1121/1.1903322>.
- Mrkvička Luboš, *Barva a souzvuk*. Dissertation (Praha: Triga, HAMU, 2008).
- Nechvatal Joseph, *Immersion Into Noise* [online] (Open Humanities Press, 2011), [cit. 2018-03-22], retrieved from: https://monoskop.org/images/3/32/Nechvatal_Joseph_Immersion_Into_Noise.pdf.
- Oplištilová Iva, *Hudební čas - jeho odklon od času fyzikálního*, Dissertation (Praha: HAMU, 2013).
- Oliveros Pauline, *Deep Listening – A Composer’s Sound Practice* (New York: iUniverse, 2005).
- Pálka Tomáš, *Prostor a tektonika v hudební kompozici*, Dissertation (Praha: Triga, HAMU, 2008).
- Pavlík Jiří, *Apothegmata: výroky a příběhy pouštních otců I* (Praha: Benediktinské arcidiecéze sv. Vojtěcha a sv. Markéty, 2000).
- Prochnik George, *In Pursuit of Silence: Listening for Meaning in a World of Noise* [e-book] (Doubleday: Random House, 2010).
- Risinger Karel, *Hierarchie hudebních celků v novodobé evropské hudbě* (Praha: Panton, 1969).
- Rudy Paul, “Timbral praxis: when a tree falls in the forest is it music?”, *Organised Sound*, 12/1 (2007), 5–13, [cit. 2017-12-20], retrieved from: <https://doi.org/10.1017/S1355771807001641>.
- Russolo Luigi, *The Art of Noises* (New York: Pendragon Press, 1986).
- Sciarrino Salvatore, *Introduzione all’oscuro: Nota dell’autore* [online], [cit. 2017-10-17], retrieved from: http://www.salvatoresciarrino.eu/Data/Catalogo/Introduzione_all_oscuro.html#dummy.
- Sciarrino Salvatore, *Le figure della musica: da Beethoven a oggi* (Milano: Ricordi, 1998).
- Schafer Raymond Murray, “I Have Never Seen a Sound”, *Canadian Acoustics – Acoustique Canadienne*, 37/3 (2009), 11-15.
- Schafer Raymond Murray, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Vermont Rochester: Destiny Books, 1994).
- Smalley Denis, “Space-Form and the Acousmatic Image” [online], *Organised Sound*, 12/1 (2007), 35-58, [cit. 2017-10-17], retrieved from: <https://doi.org/10.1017/S1355771807001665>.
- Smalley Denis, “Spectromorphology: explaining sound-shapes” [online], *Organised Sound*, 2/2 (1997), 107–126, [cit. 2017-10-17], retrieved from: <https://doi.org/10.1017/S1355771897009059>.
- Stockhausen Karlheinz, “How Time Passes”, in: *Musical Craftsmanship* (Universal Edition, 1975/1959), 10–40.
- Stockhausen Karlheinz, “Musik im Raum”, *Die Reihe 5 (“Berichte–Analyse”)*, 1957, 59–73.
- Syrový Václav, *Hudební akustika* (Praha: Akademie múzických umění, 2013).

Špelda Antonín, *Akustické základy orchestrace* (Praha: Panton, 1967).

Tenney James, *Meta + Hodos: A Phenomenology of 20th-Century Musical Materials and an Approach to the Study of Form and META Meta + Hodos*, (Lebanon: Frog Peak Music, 2006).

The New Jerusalem Bible [online] (Garden City, N.Y.: Doubleday, 1990), [cit. 2018-11-10], retrieved from: <https://www.seraphim.my/bible/jb/jb-ot%20content.htm>.

Thompson Emily Ann, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933* (Cambridge: MIT Press, 2008).

Trojan Jan, *Akustická ekologie a soundscape v kontextu multimédií*, Dissertation (Praha: Triga, 2011).

Truax Barry, "Soundscape Composition As Global Music: Electroacoustic Music As Soundscape", *Organised Sound*, 13/2 (2008), 103–110, [cit. 2017-10-20], retrieved from: <https://doi.org/10.1017/S1355771808000149>.

Truax Barry, "The Inner and Outer Complexity of Music" [online], *Perspectives of New Music*, 32/1 (1994), 176-93, [cit. 2017-10-20], retrieved from: www.jstor.org/stable/833161.

Truax Barry, *Music, Soundscape and Acoustic Sustainability* [online], [cit. 2017-10-28], retrieved from: <https://www.sfu.ca/~truax/Sustainability.pdf>.

Tucker Denise A. et al., "The effect of silence on tinnitus perception" [online], *Otolaryngology–Head and Neck Surgery*, 132/1 (2005), 20–24, [cit. 2018-03-24], retrieved from: <https://doi.org/10.1016/j.otohns.2005.08.016>.

Voegelin Salomé, *Listening to Noise and Silence: Towards a Philosophy of Sound Art* (London / New York: Continuum, 2010).

Wallin Nils Lennart – Merker Björn – Brown Steven (eds.), *The Origins of Music* (Cambridge: MIT Press, 2005).

Wallin Nils Lennart, *Biomusicology: Neurophysiological, Neuropsychological, and Evolutionary Perspectives on the Origins and Purposes of Music* (Stuyvesant, NY: Pendragon Press, 1991).

Werfel Franz, *Jeremiáš: Slyšte Hlas*, transl. by Bohumil Černík (Praha: Lidová demokracie, 1967).

Wikimedia Commons: a collection of 45,730,777 freely usable media files to which anyone can contribute [online], [cit. 2018-03-26], retrieved from: <https://commons.wikimedia.org>.

Web pages dedicated to Salvatore Sciarrino [online], [cit. 2017-10-19], retrieved from: http://www.salvatoresciarrino.eu_

Yost William A. – Gourevitch, George (eds.), *Directional Hearing* (New York: Springer-Verlag, 2011).

Scores

Debussy Claude, *Prélude à l'après-midi d'un faune* [score, online] (Paris: E. Fromont, 1895, Mineola: Dover Publications, 1983 [reprint]), [cit. 2017-10-17], retrieved from:

[http://imslp.nl/imglnks/usimg/4/40/IMSLP14736-Debussy - Prélude à l'après-midi d'un faune \(orch. score\).pdf](http://imslp.nl/imglnks/usimg/4/40/IMSLP14736-Debussy_-_Prélude_à_l'après-midi_d'un_faune_(orch._score).pdf).

Grisey Gérard, *Modulations: pour 33 musiciens* [score] (San Giuliano Milanese: Ricordi, 1978).

Händel Georg Friedrich, *The Messiah: oratorio in three parts = Der Messias: Oratorium in drei Teilen* [score] (Kassel: Bärenreiter, 1996).

Harvey Jonathan, *Speakings: for orchestra and electronics (2008)* [score] (London: Faber Music, 2008).

Hořinka Slavomír, *Lacrimosa: for baroque violin, koto, tam-tam and strings* [score, online] (Praha, 2014), [cit. 2018-11-20], retrieved from: https://issuu.com/slavohor/docs/lacrimosa_2014_12_08.

Hořinka Slavomír, *Slova Kříže: koncert pro housle a orchestr* [score, online] (Praha, 2015), [cit. 2018-11-20], retrieved from: https://issuu.com/slavohor/docs/slova_krize_rev2016_05_26.

Hořinka Slavomír, *Trust in Heart: for piano* [score, online] (Praha, 2018), [cit. 2018-11-20], retrieved from: https://issuu.com/slavohor/docs/trust_in_heart_2018_03_06.

Mahler Gustav, *Symphonie Nr. 3 in sechs Sätzen für grosses Orchester, Altsolo, Knabenchor und Frauenchor* [score, online] (Wien: Universal Edition, 1974/1906), [cit. 2017-10-17], retrieved from: [http://imslp.eu/files/imglnks/euimg/b/b7/IMSLP100612-PMLP57638-Mahler - Symphony no 3.pdf](http://imslp.eu/files/imglnks/euimg/b/b7/IMSLP100612-PMLP57638-Mahler_-_Symphony_no_3.pdf).

Nejtek Michal, *Sestup na hlubinu ticha* [score] (Praha, 1999), [author's archive].

Nejtek Michal, *Ultramarine (Songs In The Distance)* [score] (Praha, 2018), [author's archive].

Reich Steve, *Music for 18 musicians: for ensemble* [score] (Milwaukee: Boosey & Hawkes, 2015/2000).

Sciarrino Salvatore, *Introduzione all'oscuro: per 12 strumenti* [score] (Milano: Ricordi, 1981).

Strauss Richard, *Ein Heldenleben: Tondichtung für grosses Orchester: Op. 40* [score, online] (Leipzig: Leuckart Universal Edition, c1899), [cit. 2018-10-18], retrieved from: [http://ks.petruccimusiclibrary.org/files/imglnks/usimg/3/3e/IMSLP19168-PMLP04982-Strauss - Ein Heldenleben, Op. 40 \(orch. score\).pdf](http://ks.petruccimusiclibrary.org/files/imglnks/usimg/3/3e/IMSLP19168-PMLP04982-Strauss_-_Ein_Heldenleben,_Op._40_(orch._score).pdf).

Zelenka Jan Dismas, *De profundis in d* [score] (Stuttgart: Carus-Verlag, 2018/1980).

Pictures

Alan De Smet, *Multistability* [online], [cit. 2018-11-20], retrieved from: <https://upload.wikimedia.org/wikipedia/commons/thumb/4/46/Multistability.svg/2000px-Multistability.svg.png>.

Bubeníček Jiří, *Taizé Bells*, 2010, [author's archive, Creative Commons license].

Hogarth William, "The Enraged Musician" [online], *Metropolitan Museum of Art*, [cit. 2017-11-05], retrieved from: https://commons.wikimedia.org/wiki/File%3AThe_Enraged_Musician_MET_DP827069.jpg.