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The Music of Sound

Tarkovsky's Musical Aesthetic in the Context of the Sonic Arts

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In his book *Sculpting in Time*, Andrei Tarkovsky distills the essence of his perspective on cinematic sound into the following statement:[1]

> Above all, I feel that the sounds of this world are so beautiful in themselves that if only we could learn to listen to them properly, cinema would have no need of music at all.

This aesthetic is directly reflected in Tarkovsky's oeuvre, such as in the extremely sparse use of film music in the traditional sense in his films *Solaris* (1972), *Stalker* (1979), and *The Sacrifice* (1986). Without additional context, Tarkovsky's statement could therefore be understood to stand in contradiction to this special issue's premise that music forms "an intricate component" of Russian cinema that is "weaved into" the very fabric of its films. The following account of a conversation with Tarkovsky by his musical collaborator Eduard Artemyev seems to further support such an argument.[2]

> He [Tarkovsky] said: "[…] I do not need an ordinary film music. I cannot stand it, and I do my utmost in order to escape it …" […] In short, he told me at length and eloquently how he didn't need film music – all these overtures, main themes, lyric songs… "Only ambience, only organisation of sounds and noises […]."

These words could be interpreted as a rejection of the use of music in film altogether. In contrast to such a reading, however, I will argue that Tarkovsky's vision of an "organisation of sounds and noises" exhibits remarkable parallels to larger developments in musical aesthetics of his time. In the form of fixated and sometimes manipulated everyday sounds, music is literally woven into Tarkovsky's films and "available to the ear that wishes to perceive it".[3] As such, the clinking glasses in *The Sacrifice* and Stalker, the singing shower in *Mirror* (1975), or the ubiquitous sounds of dripping water in his films reflect a plurality of concurrently developing musical practices.

To what degree Tarkovsky himself was aware of these parallels is a question that his

own writing provides only few hints on, even though it does include detailed reflections on cinema's relation to literature, theater, and also music. While he evidently discusses the latter from a perspective of tender passion, he does not reflect in much detail on concurrent developments in experimental or electronic music – perhaps due to boundaries between disciplines (film; music), geographic-political contexts (East; West), and professional roles (director; composer; sound designer). Looking beyond Tarkovsky's oeuvre, it appears to me that more often than not, aesthetic discourses in music and film follow separate trajectories with surprisingly little overlap.[4] For example, Tarkovsky's text has, to my knowledge, not been widely discussed in the field of electroacoustic music composition – even though its notion of *sculpting in time* seems particularly relevant in such a context.

The purpose of this article, then, is not primarily an analysis of Tarkovsky's cinematic oeuvre from an aural perspective; other authors have devoted themselves to this task.[5] Rather, its goal is to reveal parallels between Tarkovsky's aesthetic and a variety of musical practices that in the late twentieth century have begun to be referred to as the *sonic arts*.[6] My hope is to thereby make a humble contribution towards a more coherent theoretical consideration of the temporal and fixed-media arts.

Aestheticized sonic experience and its communication

Two main concerns emerge out of Tarkovsky's statement presented at the beginning of this article:

1. an appreciation of the beauty of "the sounds of this world", and
2. a need to "learn to listen to them properly" as a precondition for such appreciation.

It is these two themes, specifically, which relate in a surprisingly direct manner to many developments in the music of Tarkovsky's time. As we shall see, musicians and sound artists throughout the twentieth and early twenty-first century have sought to explore the beauty of everyday sounds and developed artistic strategies for conveying that beauty to their audiences – to show and sometimes indeed 'teach' them how "to listen to them properly". From their perspective, Tarkovsky's premise could perhaps be paraphrased in the following way: 'If only we could learn to listen to the world in the right way, its sounds could become all the music that cinema will ever need.'

The beauty of the sounding world

The aesthetic experience of their sounding environment has of course inspired music makers throughout the ages. This is reflected in the following quote by the twentieth-century French composer Olivier Messiaen, which echoes Tarkovsky's statement from the beginning of this article:[7]

> For me, the true, the only music has always existed in the sounds of nature: The harmony of the wind in the trees, the rhythm of the waves of the ocean, the timbre of the raindrops, the breaking branches, the impact of stones, the different animal cries are for me the real music […].

The somewhat transfigured ruralism that speaks from this observation has a long tradition in Western music.[8] Examples include the thunderstorm in Antonio Vivaldi's *Le quattro stagioni* (1725), or the ubiquitous imitations of bird song that can be traced from Clément Janequin's *Le chant des oyseaulx* (1537) to Ludwig van Beethoven's Pastorale (1808) and, of course, Messiaen's own works, such as his *Catalogue d'oiseaux* (1959).[9]

From the baroque to the romantic era, however, such examples are generally concerned with a "symbolic representation of *extra-musical sound*",[10] perhaps due to the high degree of formalization of harmonic and contrapuntal rules in Western musical culture at that time – a musical code that composers naturally submitted their interpretations of everyday sounds to.[11] Interestingly the first three minutes of Tarkovsky's first feature film, *Ivan's Childhood* (1962) include a good example of this compositional approach, when composer Vyacheslav Ovchinnikov lets the orchestra adopt and thematically develop a previously heard 'actual' (that is, a recorded) cuckoo's call, with the clear purpose of dramatizing the contrast between a transfigured dream scene and the harsher reality that follows.

In the twentieth century, however, Western music exhibits an increased interest in an aestheticized perception of everyday sounds *as they are*. In some but by no means all respects this development can be interpreted as a response to concurrent developments in sound recording and transmission technology, which arguably redefined – in a reproducible and transformable sense – what a sound 'is'. Olivier Messiaen, for example, could already rely not only on staff paper but also on his tape recorder to transcribe the song of birds. While Messiaen himself deemed it "ridiculous and futile to slavishly copy nature",[12] his transcriptions are – at least to our modern ears – certainly more literal than Janequin's. As is often the case in twentieth-century music, Messiaen's observation of nature *informed* (rather than just merely conformed with) his compositional ruleset.

Tarkovsky's oeuvre also offers an example of the use of bird song that is perhaps closer in spirit to such a more "objective"[13] approach to music composition. The recurring sound of a flight of swallows in *The Sacrifice* supports the film's 'poetic logic'[14] in a very different fashion than the aforementioned cuckoo's call in *Ivan's Childhood*. This time, the sound of birds is not being thematically developed by musical instruments. Instead, it simply reappears (as a recorded sound) at irregular and unpredictable intervals, much as it would in everyday life. The swallows do not tell us anything *per se* – other than that there is a world beyond the interiors of the house that is shown in the picture frame. Although they do occasionally seem to accentuate dramatic developments in the dialog, this dramatization appears as coincidental as it would in everyday life. What sound contributes to here is not theater but a more "direct

observation of life",[15] which Tarkovsky regarded as the constituting principle of cinema as an art form.

Sound as material: Extending the musical vocabulary towards everyday sounds

The previous two examples of bird sounds in Tarkovsky's first and last feature film, respectively, frame not only the development of Tarkovsky's approach to cinematic sound throughout his career. They also reflect an increased interest in everyday sounds in twentieth-century music at large. This process was driven by a general desire to extend the basic vocabulary of music, which historically coincides with a Debussian emphasis on timbre as a compositional parameter and a Schoenbergian exhaustion of harmony. Following a five-century long retreat from the sounds of everyday life,[16] the history of twentieth-century Western art music can indeed be read in terms of a desire to extend the language of music towards an ever-increasing variety of sounds. The origins of this "liberation of sound"[17] are often traced back to Luigi Russolo's 1913 manifesto *The Art of Noises*.[18]

> Musical sound is too limited in its variety of timbres. The most complicated orchestras can be reduced to four or five classes of instruments different in timbres of sound: bowed instruments, metal winds, wood winds, and percussion. Thus, modern music flounders within this tiny circle, vainly striving to create new varieties of timbre. We must break out of this limited circle of sounds and conquer the infinite variety of noise-sounds.

Even though this musical vision of Italian futurism has primarily been discussed in terms of its celebration of the industrial and urban sounds of modernity – echoed by several musical compositions from the 1920s inspired by the sound of locomotives and other machinery[19] – it is worth noting that Russolo, too, described the sonic diversity that he sought primarily in terms of the sounds of nature.[20]

Sound as object: "Musique concrète" and reduced listening

Russolo proposed a classification of sounds into six groups that – with the exception of sounds made by humans or animals – grouped sounds primarily according to their *sonic* qualities, regardless of their origin. This constitutes a rarely noted pre-echo of *musique concrète*, which four decades later yielded the perhaps ultimate manifestation of sound as material. Pioneered by Pierre Schaeffer and Pierre Henry at the Paris *Studio d'essai* in the 1950s, it represents an art form entirely based on the premise of recorded sound as malleable source material.[21] Beyond his more widely known early experiments with closed record grooves and cut bell attacks, Schaeffer developed an entire music theory that is based on a literal objectification of sound.[22] This sound object (*objet sonore*) reveals itself to the listener through a process that Schaeffer refers to as *reduced listening* (*l'écoute réduite*), a listening mode in which a deliberate

effort is made to perceive sound "for its own sake […] independently of its origin or its meaning".[23]

In Tarkovsky's work, a similar idea is reflected in a monologue in which the *Stalker*, played by Alexander Kaidanovsky, reflects on music's ability to get "through to our heart" in the form of "sheer sound, devoid of… any associations".[24] It is exactly these associations, which sound can carry either as an index of the source that produces it or as a sign in a language (in a generalized sense), that Schaeffer's reduced listening mode seeks to undo.

Sound as music: Organizing the former into the latter

Simultaneously with the development of artistic practices that expanded the idea of sound as material, a more pronounced distinction between sound on the one hand and music on the other developed. This is reflected in the early-twentieth-century conception of music as 'organized sound', which Tarkovsky himself mentions in the second quote on page 1 of this article, and which continues to exert a lasting influence on contemporary music making. Edgard Varèse reportedly coined the term as early as 1924,[25] and in one of its earliest appearances in writing notably discusses it in the context of film.[26]

Varèse's conception of organized sound reinforced the 'liberation of sound' as musical material and laid out a vision in which it was now sound 'itself' rather than abstracted notes that the composer 'organized' into music, with an immediacy comparable to how a sculptor shapes a piece of marble.[27] This conception of music is exemplified in Varèse's orchestral pieces such as *Ionisation* (1931), and even today it continues to meet a form of resistance that is perhaps best summarized in the stereotypical question 'But is it music?'. Early on, experimental musicians started to address this question as a problem of nomenclature. John Cage laconically suggested with regards to his own work that "[y]ou don't have to call it music if the term shocks you"[28] and proposed an alternative:[29]

> If this word "music" is sacred and reserved for eighteenth- and nineteenth-century instruments, we can substitute a more meaningful term: organization of sound.

Here the idea of 'music *as* organized sound' clearly gives way to a notion of 'organized sound *rather than* music'. It proved to represent merely one of many efforts to come to terms with the increasingly manifold practices that engaged artistically with sound. An impressive plurality of terms – such as the *sonic arts* – has since been proposed to either expand the meaning of the term 'music' to include such practices, or to distinguish them from 'music' altogether.[30] What perhaps unites them is that they emphasize the artistic autonomy of sound (*all* sound!) as an artistic medium.

Sound as organism

Ironically it could be argued that the Varèsian 'liberation of sound' simultaneously gave way to its reduction to mere 'material' in the first place – somewhat of a setback perhaps from historical conceptions of sound as a voice representing the divine.[31] While I do not wish to attribute too much significance to the fact that a literal translation of the quote at the beginning of this article reveals that Tarkovsky actually spoke of "the world that sounds" rather than "the sounds of the world", it does appear to me that he regarded sound less as a material to be mined than as a process that unfolds in the listener's environment and also within their 'inner ear'.

On many levels this reflects a Cageian perspective on sound that prioritizes process over object. The composers of the New York School were less concerned with the control of sound as malleable source material than with its observation as an autonomously unfolding process, to which the author often retained a 'healthy' distance. The contrast between these two approaches is perhaps encapsulated in Morton Feldman's response to Karlheinz Stockhausen's inquiry regarding Feldman's 'secret' as a composer.[32]

> I have no secret but if I could say anything to you, I advise you to leave the sounds alone; don't push them; because they're very much like human beings – if you push them, they push you back. So if I have a secret it would be, "don't push the sounds".

A very similar analogy can be found in Tarkovsky's writing:[33]

> Works of art are, as it were, formed by organic process; whether good or bad they are living organisms with their own circulatory system which must not be disturbed.

Similar references to the artwork as an "organism" or "living structure" can be found throughout Tarkovsky's writing.[34] They have also been suggested by composers and sound artists such as Francisco López, who put forward the idea of 'sonic creatures' – of sound itself as a living organism.[35] It is also reflected in the explicitly ecological perspective on sound that the *World Soundscape Project* pioneered in their study of acoustic ecology,[36] and which has since been extensively explored by sound artists.[37]

Learning to listen 'properly'

From Tarkovsky's quote at the beginning of this article speaks not only a belief that the sounds of this world are beautiful, but also that such beauty does not necessarily or automatically reveal itself to the ear. Rather, one needs to first learn to listen 'properly' to the world in order to appreciate its sonic beauty. Claude Debussy already voiced a similar sentiment with regards to the composer's work.[38]

> We combine, we construct… we do not hear around us the countless sounds of nature, we do not sufficiently appreciate this immensely varied music which nature offers us in such abundance… And there, according to me, is the new way forward. But… I have scarcely glimpsed it, since what remains to be done is immense!

This remaining work was eventually picked up by other twentieth-century musicians. The very *raison d'être* of Schaeffer's reduced listening mode, for example, was to identify everyday sound objects that were 'suitable' for musical purposes.[39] The fact that he constructed a whole new *solfège des objets musicaux* around this idea affirms the importance that he – as well as other twentieth-century composers – attributed to making the aesthetics of everyday sound more widely accessible.[40] An audience that over centuries had come to generalize certain musical codes to 'music itself' needed to be re-educated to listen to new musical codes with an unbiased ear.

Occasionally this perceived need to teach audiences 'how to listen properly' adopted an explicitly didactic approach, such as in the *ear cleaning* exercises proposed by Canadian composer R. Murray Schafer. This cleansing process is to be understood metaphorically. Ear cleaning exercises often establish a primacy of listening over soundmaking, for example by deliberately refraining from *making* any sound oneself for the duration of a day.[41] Schafer saw such exercises as a vehicle "to improve the sonological competence of total societies", with the goal of achieving "an aural culture" in which "the problem of noise pollution would disappear".[42] Originally, however, he conceived of ear cleaning in the explicitly pedagogical context of an experimental music education.[43] The ear was to be 'cleaned' not only from the cacophony of the modern urban soundscape, but also from any cultural preconceptions that might otherwise hinder an active engagement with experimental music practices.

Artistic strategies for aestheticizing everyday sounds

Apart from such explicitly didactic efforts, however, twentieth and early twenty-first century musicians and sound artists have developed a surprisingly varied array of techniques that aim to achieve similar goals exclusively by artistic means.[44] What many of their efforts share with Tarkovsky's work is a belief that to take in the world aesthetically – to perceive its beauty in the first place – requires, above all, a willingness to perceive. "The basic element of cinema, running through it from its tiniest cells, is observation," Tarkovsky remarks.[45] At the example of a scene from *Mirror*, he illustrates how the actor's dramatization of life in theater gives way to its more immediate observation in cinema. While shooting a scene in which the heroine sits on a fence, waiting for the uncertain arrival of her husband, Tarkovsky deliberately did not let actress Margarita Terekhova in on the plot, so that she would not unconsciously respond to her knowledge of the scene's outcome.[46]

Such a "direct observation of life" can be regarded as "the key to poetry" not only in

cinema.[47] Many sonic artworks, in a similar fashion, aestheticize sound without dramatizing it in the context of a performance on musical instruments. Some instead frame everyday listening in public spaces by minimalistic architectural or graphical interventions. In Peter Ablinger's *Listening Piece in Four Parts* (2001), rows of chairs set up in an urban parking lot, a desert wind farm, or on an ocean beach remain the sole reference to the concert hall and otherwise stand by themselves as an invitation to remain and listen. In Akio Suzuki's *oto-date* (1996), stencil markers on the pavement simultaneously resemble the shape of feet (as a suggestion to stand in this place) as well as a pair of ears (as an encouragement to listen).[48] The *Sonic Meditations* by Pauline Oliveros achieve a similar goal by simple textual instructions.[49]

Attempts to harness such a poetry of observation among twentieth-century audiences have, however, not been without friction in either film or music. Tarkovsky repeatedly points to the difficulties that his audiences had with giving themselves over to the poetic logic of raw observation, instead latching onto symbolism and trying to identify hidden meanings in his films that, often to their surprise, were never consciously placed there by its author.[50] A similar discourse unfolds around twentieth-century experimental music practices. John Cage responded to the frustration that audiences expressed about their inability to decipher a composition's 'meaning'.[51]

> People expect to be listening more than listening. And so sometimes they speak of […] the meaning of sound. […] I don't want a sound to pretend that it's a bucket, or that it's a president, or that it's in love with another sound – I just want it to be a sound.

Musicians and sound artists have since devised countless artistic techniques whose goal is to sensitize listeners to their own auditory perception.[52] They have long moved their audiences out of the concert-hall setting that Cage's famous silent piece *4'33"* (1952) still relied on. Starting in the 1960s, artists began to lead their audiences on *soundwalks* in which participants often deliberately refrain from talking, with the goal of getting them to "*LISTEN*", as the single-word score read that Max Neuhaus rubber-stamped on his audience's hands at the beginning of such encounters.[53] Popularized by artists such as Hildegard Westerkamp in the 1970s and 1980s, soundwalking has since yielded an impressive range of artistic forms and techniques[54] – from solo walks mediated by textual or graphical scores (sometimes handed out separately, sometimes located *in situ*) to group experiences – and has also been proposed as a method for urban sound design.[55]

Although the above techniques do not necessarily have a direct equivalent in cinematic (albeit perhaps other visual) art forms, they clearly share Tarkovsky's aesthetic concern with a direct observation of life. Other sonic artworks achieve this in a more mediated fashion that relies on modern sound technologies, and three such strategies are also employed across Tarkovsky's cinematic oeuvre: sound recording, sound synthesis, and sound transformation.

Observation through recording

Even though Tarkovsk'y claim that "[c]inema was the first art form to come into being as a result of a technological invention"[56] is debatable, it is certainly true that the aesthetic influence of sound and image fixation and reproduction technologies cannot be underestimated.[57] The sonic arts of recent decades have experienced a surge of musical practices centered around the art of *field recording*. Artists such as Chris Watson,[58] Bernie Krause,[59] Francisco López,[60] and Peter Cusack[61] capture sonic environments that are either not accessible or aesthetically overlooked by the average music listener, similarly to the great lengths to which Owe Svensson went to record the sound effects for Tarkovsky's *The Sacrifice*.[62] The recording of everyday sound, however, does not merely represent a method for gathering compositional raw material or collecting 'exotic sounds'. It also becomes a way for the recordist to sensitize their own listening.[63] The resulting documents then become the way in which these artists share their aestheticized sonic experience of the world with their audiences, sometimes with only minimal editing. For example, Luc Ferrari's piece *Presque Rien №1: Le lever du jour au bord de la mer* (1970) is based on a simple day-long recording of a beach side, which remains largely unedited other than being condensed into twenty minutes by means of selective editing. In other works, the technological mediation of the listening process is itself thematized in a self-reflective fashion, such as in Hildegard Westerkamp's *Kits Beach Soundwalk* (1989).

Tarkovsky claims that cinema's ability to record and replay moving images brings it closer to life than theater.[64] Similar discourses can be observed under slightly different pretexts in the sonic arts, both with regards to the aestheticization of everyday sound experience as well as the central role of sound reproduction technologies in this context.[65] An example is the perceived lack of theatricality that is frequently reported by first-time listeners of *acousmatic music*[66] – music, that is, which is typically recorded onto a fixed medium from which it is then projected onto loudspeakers surrounding the audience, in the absence of any musicians on stage – or even of the stage itself.[67] Often, the composer controls this process from a mixing board in the auditorium's center, not only for the sake of optimizing their own listening position, but arguably also because the subtle tweaks of faders and knobs on a mixing desk simply do not offer the inherent theatricality of, say, a string quartet performance.[68] Ever since Karlheinz Stockhausen's *Gesang der Jünglinge* premiered in Cologne in 1956, bewildered listeners have wondered where to rest their gaze during acousmatic performances in which sound itself replaces musical instruments and performers alike. Scholarly debates have unfolded around the question whether such music is best received with eyes closed or open, with lights on or off, etc.[69] Chion's description of acousmatic music as a "cinema for the ears"[70] can also be read as but one attempt to give audiences "something to hold onto"[71] in that regard – in this particular case, their experience of more established cinematic art forms.

Decontextualization through synthesis

The electronic synthesis of sounds from scratch by means of oscillators, noise generators, and filters afforded twentieth-century musicians another opportunity for the aestheticization of sonic experience. Tarkovsky recognized these "enormously rich possibilities" of electronic music,[72] and it is certainly no coincidence that for his films *Solaris*, *Mirror*, and *Stalker*, he ended up working with Eduard Artemyev, a composer who at the time was already very versatile in this medium. A key ingredient that Artemyev contributed to the scores of these films were the sounds created by means of Evgeny Murzin's photoelectronic ANS synthesizer in *Solaris* and the EMS Synthi 100 in *Stalker*.

What electronic sound synthesis seems to originally have inspired in artists was foremost a sheer thirst for the unknown. By synthesizing previously unheard sounds by electronic means, a new world of sound could be created on a 'blank canvas' of music. In the early pieces for the Buchla synthesizer by Pauline Oliveros, for example, one can literally *hear* the composer searching for the music within this new (and at times hard to control) music machine.[73] Artemyev asserted that "a composer writing for synthesizer must overcome the instrument, discovering that which is not on the surface".[74] This desire to explore "a hitherto unknown world of sound"[75] is deeply embedded in electronic music's very founding myths. To post-war European artists, electronic sounds offered an opportunity to literally 'rebuild' music based on a process of artistic inquiry and experimentation, as exemplified in Karlheinz Stockhausen's *Studie I* (1953) and *Studie II* (1954).

Tarkovsky understood this "novel meaning"[76] of electronic sound when he referred to Stockhausen's *Gesang der Jünglinge* (1955–56), which Artemyev introduced to him, as "above human".[77] In *Solaris* electronically synthesized sounds signify that which is "disassociated from nature, and outside of human experience".[78] They identify, for example, the otherwise perfectly plausible character of Hari as non-human when she injures herself after Kris leaves her alone in his quarters. Synthesized sounds are also associated with the alien world of Solaris by being presented together with a view of the ocean on the planet's surface, as well as by way of contrast with Johann Sebastian Bach's chorale prelude *Ich ruf' zu dir, Herr Jesu Christ* (BWV Anh. II 73), which itself symbolizes the known world of planet Earth as a sonic equivalent to Pieter Bruegel's *Hunters in the Snow* (1565).[79] This contrast appears particularly pronounced when, shortly after Hari's injury, her and Kris pay a visit to Sartorius and then watch footage from Earth together.

It seems to me, however, that for Tarkovsky and twentieth-century electronic music composers alike, the exoticism of novel sound worlds was not a goal in itself. Rather, they employed sound synthesis, too, as a means for aestheticizing the everyday sounds of *this* world. This is reflected in Tarkovsky's suggestion that "[e]lectronic music must be purged of its 'chemical' origins, *so that as we listen we may catch in it the primary notes of the world*".[80] The unknown world of synthesized sounds facilitated Schaeffer's reduced listening mode in the sense that in order to appreciate sound in itself,

independently of its source and meaning, the creation of sounds that were devoid of such contexts to begin with could only be helpful. Akin to making one's first journey to a foreign country, listening to electronically synthesized sounds allowed listeners to sharpen their senses towards sound for its own sake – also beyond such listening experiences and in their everyday lives.

Alienation through transformation

A third key property of the electronic medium is its ability to not only record and synthesize, but also process and thereby transform sound. Sound transformation techniques that alter the pitch, duration, spectrum, or other qualities of sound constitute a defining element of electronic music composition.[81] They are often applied in a manner that echoes the classical music technique of developing larger compositional structures from variations of a simple musical theme. An example of a masterful artistic application of this technique in electroacoustic music is Trevor Wishart's piece *Imago* (2002), which its program notes describe as[82]

> […] a piece of magical sound metamorphosis in which the single "clink" of two whisky glasses [borrowed from Jonty Harrison's piece *et ainsi suite*…] gradually metamorphoses into a multitude of other sounds, eventually alluding to the sounds of birdsong, a junkyard gamelan, the ocean and the human voice, but never entirely abandoning its links to this minimal source.

Wishart's piece playfully oscillates between its departure point of everyday experience (two clinking glasses) towards a more imaginary and dream-like, yet nevertheless physically 'real' world that is created by the original sound's transformation into others.

All of Tarkovsky's three films that Eduard Artemyev contributed the music to include examples of sound transformation techniques. In *Solaris* the sounds of urban traffic on Earth are being transformed in an extended highway scene without dialog, providing somewhat of a prelude to the foreign world of Solaris that is introduced soon after. In *Mirror* it is Johann Sebastian Bach's *St. Matthew Passion* (BWV 244) that undergoes similar, albeit more subtle transformations. Like with sound synthesis, the purpose here, too, is to render sound alien.[83] The key difference, however, is that the transformation of sound allows the composer to create a more fluid contrast between the known and the alien. This is how the technique is used in Tarkovsky's film *Stalker*, in particular during the main characters' railcart journey into the mystical land of the 'Zone'.[84] While in *Solaris*, a clear boundary exists between the alien and the known world, which is sonically reflected in the contrast between concrete (recorded) and abstract (synthesized) sounds, the border to the alien world of the 'Zone' in *Stalker* is fluid. The Zone itself is visually indistinguishable from the regular world beyond its elastic border and primarily manifests itself sonically in the film. This process starts with the gradual transformation of the railcart journey's real-world

sounds into sounds that, while still recognizably resembling the originals that they derive from, clearly belong to an unknown world.[85]

However, this alien world – to paraphrase an observation by Hari's character in *Solaris* – is nothing external; it lies within ourselves. Stefan Smith, who has analyzed Tarkovsky's use of sound in *Stalker*, notes that the primary purpose of electronic sound transformation in the railcart scene is to draw the viewer into the inner state of the on-screen protagonists, who are shown in profile (with visible ears) throughout most of the scene.[86] The scene creates, by means of sound, an ultimately ambiguous transition between the objective reality of the physical world and the subjective reality of the characters' inner world – and it is the latter that Tarkovsky insisted he was primarily interested in.[87] The experience of this scene resembles the transitional state between dreaming and awakeness, or perhaps being under the influence of mind-altering substances. In this context it is interesting to note that in recent years, sound transformation techniques have been extended from fixed-media compositions towards interactive real-time experiences.[88] In these projects, a portable computing device transforms sounds recorded in real-time, such that the listener experiences a 're-mixed' version of their acoustic environment *in situ*. By far the strongest perceptual impression seems to be created by delay and echo effects, resulting in a warped experience of time not dissimilar to the scene in *Stalker*.[89]

Sculpting in time

The main theoretical premise of Tarkovsky's writing concerns the acknowledgment of time as an autonomous artistic medium. With regards to the Lumière brothers' first experiments with moving pictures, he notes:[90]

> For the first time in the history of the arts, in the history of culture, man found the means *to take an impression of time*.

Tarkovsky identifies this "possibility of printing on celluloid the actuality of time" as the "supreme idea of the cinema as an art".[91] In doing so, he aims to establish cinema's primacy as *the* temporal art form, arguing that "time becomes the very foundation of cinema: as sound is in music"[92] The following quote by Morton Feldman illustrates that by the mid-twentieth century, even composers of instrumental (and not just electronic) music thought differently about their art.[93]

> All we composers really have to work with is time and sound – and sometimes I'm not even sure about sound.

Tarkovsky does acknowledge that "in music too the problem of time is central", but he argues that the printing onto celluloid gives cinematic time a "material reality" that music, in the stereotypical ephemerality that he seems to attribute to it, lacks.[94] His statement ignores, however, that by the time it was formulated, musicians and sound artists had already devised a plurality of art forms that themselves relied on the

imprinting of time onto a fixed medium in the form of sound. The composition of acousmatic music, in particular, has in many ways as much in common with cinema as with 'traditional' instrumental music. Composing sounds on the timeline of a digital audio editor – often at levels of accuracy that are measured in milliseconds – is akin to the process of 'sculpting in time' that Tarkovsky deems the "essence of the director's work".[95] At the same time, recorded sound is as distinct from instrumental music performance as the moving image is from theater. In this sense, Tarkovsky's *Sculpting in Time* can also be considered an important text – albeit an unintended one – of acousmatic music theory.

At the same time, acousmatic music, despite being sometimes referred to as a "cinema for the ears",[96] is also quite distinct from the latter as an art form. The auteur cinema of Tarkovsky, for example, relies on actors[97] – acousmatic music doesn't. The creation of such films requires the collaboration of a large number of people with an extremely varied skill set, while many of even the most complex works of twentieth-century electronic music were assembled by small teams of usually one composer and often a single engineer. A cinema like Tarkovsky's therefore represents quite an expensive art form,[98] whereas even during the days of multi-track tape machines and large studios, electroacoustic music could be produced comparatively cheaply. As a result, the cinema of Tarkovsky's time was subjected to the forces of the market[99] in a way that acousmatic music as a 'niche art' never was.

Other genres of the sonic arts, even though they also emerged from a twentieth-century experimental music practice, are less inherently based on the fixation of time onto a medium. Sound installation and sound sculpture, for example, have perhaps less in common with cinema than with other visual art forms.[100] In an era in which the same digital data represents images and sounds alike, a consideration of different art forms in terms of their inherent spatiality or temporality can perhaps be at least as revealing as their categorization along the sensory modes through which we perceive them (e.g., visual art vs. music).

Whether spatial or temporal in nature, however, many of the works of music and the sonic arts that I have discussed in this article share with Tarkovsky's films an aesthetic interest in the sound world that surrounds us and unfolds within us. In this sense Tarkovsky literally "weaves"[101] everyday sound – recorded, synthesized, and transformed as sculpted time – into a music for his films.

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