How do we listen?

Article · April 2019

CITATION
1

READS
518

1 author:

Permagnus Lindborg
City University of Hong Kong
83 PUBLICATIONS **319** CITATIONS

SEE PROFILE

How do we listen?

PerMagnus Lindborg
Department of Composition, College of Music, Seoul National University
Permagnus [at] snu.ac.kr
http://permagnus.org

Situations of listening

> As I close my door and walk down the stairs, the motor-driven lock mechanism heralds a sequence of percussive metallic clicks, in counterpoint with my creaking shoes and, through their door, laughter from the neighbor's child. I'm in a space with stone floor and concrete walls. I stop, hold my breath, and wait for the reverberation tails of all three sounds to fade out. Silence is relative, and my attention is seamlessly drawn sounds from the outside: cars, birds, rustling leaves. I'm late.

In what ways do we listen to the soundscape? How do our concurrent activities, moods, and abilities determine the listening mode? What is it that allows us to experience arbitrary sounds in an everyday environment as elements in a musical composition?

> I am running through the rainforest along one of my favorite tracks that circles the hill: one hour outdoors activating muscles, bones, and ligaments. A heightened awareness of my heart: when running, I pay it due attention and gratitude. Suddenly I realize that for some time there has been music in my mind's ear – a motive, an ostinato, a chord sequence – and that I have had no awareness whatsoever of the forest sounds, or my footsteps, or breathing. Yet in the instant this observation emerges, the music evaporates, and all that I hear is exactly forest, footsteps, and breathing. The music remains as a trace in memory: a mental notation.

Why do ways of listening sometimes feel categorically different? Are there multiple parallel processing streams in our mind that compete for attention, as it were, knocking on the door to our executive control room? Or is what we call 'conscience' an emergent property, a mental scheme in temporary equilibrium: froth bouncing on streams of multiple parallel processes?

> The concert hall ushers didn't let me enter carrying a small backpack and sent me back to the ticket desk. I managed to return just in time for the performance to start. Sliding into the seat, I exchange a few words with my colleague about the theme printed in the leaflet. Lights go down: I switch off the phone and make myself comfortable in the chair. Two musicians enter the stage; the audience greets them with an applause that expresses recognition, expectation, and encouragement. We are in this together. Please tell us your story. They smile, inhale simultaneously, and attack in unison: pianissimo, an extremely high note – no, a tight minor second. Inexorably they bring on a crescendo to forte… Tartini on rampage… wild beating on everyone's eardrums. The audience writhes in awe.

The reader might recognize or recall similar situations of listening. There is an infinite range of such stories, yet it might be possible to describe the range of listening modes with a fairly small number of concepts. Occasionally consciously and most often not, we sense, perceive, and inquire the relations between three entities: the soundscape – the perceived acoustic environment; its constituent elements – the observed, implied, or imagined sources that produce the sounds we perceive; and ourselves. We have an innate capacity to evaluate sounds in terms of usefulness and danger. Listening is what mediates between the perceiving organism and its environment.

The first situation was about sounds and soundscape. We learn about our surroundings by dissecting its elements and identifying their respective sources. Some objects and other beings might be useful for us, and others harmful. Just as smelling helps us distinguish between edible and toxic plants, listening is ultimately a tool for survival. Sounds from sources far away do not normally attract our attention. As biological creatures, we have learned that faint sounds with low pitch, slow attacks, and low timbral complexity, such as a traffic drone, are generally harmless. By contrast, sharp attacks and high pitch, such as a locking mechanism, signal danger even if the sounds are faint. The second vignette was about the internal process of sonic imagination. The principle of homeostasis explains an innate tendency to adapt our attitude towards the surroundings so as to maximize our chances of utilizing objects and beings to our benefit. Some soundscapes are dense in signals about danger, pleasure, friends and foes. Most often these are essential, but occasionally our survival instinct is suspended and the soundscape is largely ignored, or even replaced by something entirely different, such as an imagined melody. This might only happen to us if the environment is known and considered safe. The third story described the transition from an ordinary environment to a highly focused and music-specific situation with expectancy and attention to sonic detail at the fore.

This paper reviews theories for modes of listening, in particular Paul Vickers' 'Aesthetic Perspective Space' (Vickers/ Hogg 2006; further discussed in Vickers 2013, Vickers 2017), and Kai Tuuri's taxonomy for modes of listening

(Tuuri et al. 2007, Tuuri/ Eerola 2012). It attempts a comparison between models, and sketches a way of testing experimentally two aspects of these models of listening, in the context of electroacoustic music and sonification.

Sonification and electroacoustic music

> Sonification renders data in sound to allow a human listener to detect and comprehend patterns and structures in that data, whilst a musician renders a musical score so as to make it audible and thus make perceptible the music's structure and even give clues as to the composer's and the musician's emotional states. We could go as far as to claim that a piano is a sophisticated auditory display machine… (Vickers 2006: 1-2; see also Kramer 1994)

Sonification is to music as visualization is to visual art: a strategy for explaining. Sound design is to composition as graphic design is to visual imagination: a method for making. It might be advantageous, in some cases, to listen to sonification as a form of electroacoustic music. This would allow us to apply analytical methods from contemporary musicology and through them, extract more meaning from auditory display, so as to be in a position to create more convincing and effective sonifications.

The Aesthetic Perspective Space (Vickers/ Hogg 2006) proposes an analytical tool that bridges auditory display and electroacoustic music. According to Vickers, it permits a kind of "typecasting" (Vickers 2017) of the activities of sonification and composition. Having a unified analysis method for a range of sonic artefacts from the fields of electroacoustic music (e.g. concert and multimedia compositions) and sonification (e.g. software earcons and system monitoring designs) facilitates interrogation of aesthetic and effectiveness. Vickers underlines that the principles of the former are applicable onto the latter. His primary concern lies with the design of auditory displays and the effectiveness of sonification for the discovery of meaning in data, and more generally for communication. He urges practitioners in the field of sonification to carefully study the principles of electroacoustic music composition, arguing that music and auditory display share important attributes: "it is at these intersections that dialogue and interrogation may take place.". However, he does not equate one with the other, noting that there are "artefacts present in each of music and sonification that are not present in the other… one such is the intellectual content of compositions." (Vickers 2006: 6).

Seeking to polarize, we might say that sonification is utilitarian, purpose-oriented, and aspires to serve science and communication, while electroacoustic music composition is hedonistic, pleasure-oriented, and aspires to serve art and experience (see Lindborg 2015 for a discussion). The opposition between the two archetypes (i.e. generalized concepts of sonic artefacts) is obviously a construction for the sake of facilitating analysis of real-life examples. There are manifold aspects not covered by the single dimension. Notwithstanding the conflation of multiple aspects, a polarization might help us understand how the conceptual extremes are connected.

In the Aesthetic Perspective Space (Figure 1), a continuous line connects two extremes poles, labelled 'Ars Informatica' and 'Ars Musica'. It spans the primary (horizontal) dimension of a conceptual space, reflecting the intention that a listener applies towards an auditory object: whether the intention tends towards information-extraction or towards artfulness-experience. The secondary (vertical) dimension maps to the opposition between what the listener perceives as abstract, or as concrete. This characterization of the sonic source material is labelled 'indexicality'. Vickers (2017) leans on Simon Emmerson's *Language Grid*, a framework that affords an analysis of electroacoustic music along two continuous dimensions: one describing the composer's perceptual attitude to the musical material, from 'Aural' to 'Mimetic', and the other describing the composer's action on the material, from 'Phonographic to 'Constructed' (Emmerson 1986; Fischman 2007; also Emmerson 2013-14). Emmerson defines 'mimetic' as "the imitation not only of nature but also of aspects of human culture not usually associated directly with musical material". (Emmerson 1986: 17). Within the context of auditory display, Vickers identifies sonification as a form of 'mimetic discourse', where 'indexical' is exactly the same as 'mimetical'. We might this speak of listening to 'concrete mimesis' in a situation where a sound object unequivocally denotes a physical source that is present in the environment, and listening to 'abstract mimesis' when a sound object associates with a non-present source or concept through metaphor. The association might be more or less graspable, hypothetical, or private.

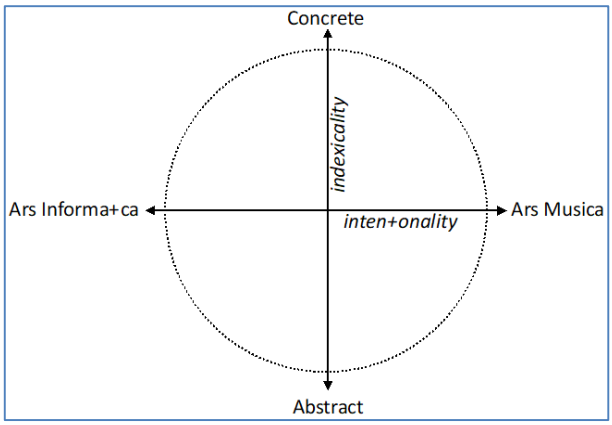

Figure 1. The outline of the Aesthetic Perspective Space, as a circumplex spanned by dimensions of listener intentionality and perceived sonic indexicality. After Vickers/ Hogg (2006).

Modes of listening

Turning the attention to Tuuri's taxonomy of listening modes, we will revise the approaches taken by musicologists building on the seminal work by Pierre Schaeffer. In *Traité des objets musicaux,* Schaeffer devised several toolkits for the analysis of sound. His journey of aural discovery and taxonomy was entirely enabled by access to technologies of recording and reproduction: first gramophone, then tape. With the *modes d'écoute* (listening modes, Schaeffer 1966: 112 ff.), Schaeffer made two dichotomizations pertinent the act of listening: firstly, whether abstract or concrete, and secondly, whether subjective or objective. He made explicit an inherent hierarchy by numbering them, as follows:

1. *écouter* (listen): objective/concrete *Causal* listening, taking sound as evidence;
2. *ouïr* (perceive): subjective/concrete *Neutral* listening, experiencing sound as raw material;
3. *entendre* (hear): subjective/abstract *Reduced* listening, attending to sonic qualities;
4. *comprendre* (comprehend): objective/abstract *Semantic* listening, attributing meaning to sound in context.

The first is the baseline, 'everyday-ish' mode. In *Causal* listening, we take sound as the evidence of action, or, to use a term from semiotics, the index of an event that is caused by physical objects in the present environmental context. By contrast, the third mode, *Reduced* listening, is when the perceiver focuses on the qualities of the sound in itself. Schaeffer described it as an 'unnatural' form of listening, a state of mind that can only be achieved through a high degree of dedicated attention and suitable training. By default, perceivers attribute a specific physical source to any sonic stimulus, and it is only through dedicated practice that people can de-learn this innate mental mechanism (cf. Schaeffer 1966: 95). Through applying *Reduced* listening, the 'sound object' becomes a phenomenological object. Thereafter, in the fourth mode, *Semantic* listening, meaning might be attributed. When shared, the sound object is no longer private, no longer merely a "laboratory specimen", but rather a "nonabstractable point of reference, related to a whole of greater magnitude than itself" (Schafer 1994: 274).

Michel Chion applied Schaeffer's scheme to analyzing the role of sound in cinema (Chion/ Gorbman 2009). The film 'soundtrack' traditionally consists of three quite different kinds of sound, that are designed by different techniques and teams of workers: Dialogue (produced by actors on location or with automated dialogue replacement, ADR); Effects (produced by Foley artists and sound designers); and Music (produced by studio musicians and engineers). To identify the corresponding and suitable listening modes for the three kinds of sound, Chion dropped the 'passive reception' mode (*ouïr*), and focused on the 'big three' (Tuuri 2012), namely the *Causal*, *Reduced*, and *Semantic* listening modes. Note that this tripartite division might be paralleled by the basic model of brain processing, which considers three levels: sensation, perception, and cognition (e.g. Mesulam 1998).

Chion's conception of *Causal* listening corresponds exactly to Schaeffer's first mode (*écouter*). Perhaps due to innate ecological listening principles, we spontaneously attribute auditory phenomena to causal actions (Chion 2009: 471). Because his preoccupation lies with film, and the power of sound to contribute to the filmic diegesis, both in physical and psychological terms, the *Causal* mode takes on a greater importance for Chion than what it did for Schaeffer. In *Reduced* listening, the subject deliberately separates the perception of the sonic phenomenon from any knowledge of its direct physical source. Only this specific attitude (which is quite Zen-like) allows the listener to fully perceive and appreciate the internal structure and qualities of the sonic object. Chion writes that "reduced listening has the enormous advantage of opening up our ears and sharpening our power of listening.…The emotional, physical, and aesthetic value of a sound is linked not only to the causal explanation we attribute to it but also to its own qualities of timbre and texture, to its own personal vibration." (Chion 2012: 52). Its application is not limited to electroacoustic music, as the reduced listening mode may also be willfully activated in other acoustic situations, such as when we strive to learn the details of pronunciation of a spoken language that is new to us. Semantic listening is defined by Chion (and Schaeffer) as a mode of perceiving sounds as signs with acquired meaning. He suggested that we may engage this mode of listening both at a conscious level, such as when selecting a rhyme for a poem, and at a pre-attentive level, such as when perceiving the meaning of a spoken language that we know.

The definition above of the 'big three' listening modes is rather loose, and most of the important observations made by Schaeffer and Chion is not sufficiently explained with such weak scaffolding. Seeking a more detailed framework for analysis, we turn to recent theories of music perception.

Music emotion

The field of music emotion research focuses on how affective responses are activated by music. David Huron (2002; further developed in Huron 2006) identified six psychological systems: reflexive (physiological), denotative (identifying sources), connotative (identifying properties), associative (arbitrarily acquired links), empathetic (understanding the other), and critical (self-monitoring).

Working from a slightly different perspective, Patrick Juslin and Daniel Västfjäll (2008; see also Juslin 2013) advanced an eight-component model (BRECVEMA) for music-induced emotion: brain stem reflex (reflexive), rhythmic entrainment (also reflexive, specifically for periodic sounds such as heart beat), evaluative conditioning (stimulus valence acquired through exposure), emotional contagion (pre-motor internal mimicking), visual imagery (crossmodal association and prediction), episodic memory (nostalgic recollection of a lived experience), musical expectancy (anticipation of specific features), and aesthetic judgement.

In the revised taxonomy of listening (Tuuri/ Eerola 2012), Tuuri directs the spotlight onto the connotative and denotative systems of auditory-evoked meaning-making. Connotative listening is pre-attentive, generating early associations between auditory sensation and previously experienced mental imagery and feelings. (Tuuri speculates that some aspects of connotative listening can become available to conscious attention through the technique of reduced listening.) As in the ecological approach to perception, these associations depend on perceptually invariant features of the sound, that is, statistically salient inputs yield emergent perceptual patterns. Tuuri then considers the perspective of embodied perception, which posits that meaning is created in two ways, through the organism's active corporeal and imaginative processes. In the first case, concepts emerge from the internal imitation of auditory sensation; simply put, when stimulated by sound, the brain's motor centers perform a 'mute production' to imitate the sound. In the second case, image schemes, formed over time by perceptual invariants, themselves produce concepts; that is the brain internally concocts thoughts through approximation and metaphor. As Tuuri writes, "action-relevant mental images arise upon emerging resonances of action-relevant values between… patterns of sensation and well-structured patterns of recurrent experiences" (145).

Importantly, both neuro-corporeal imitation and mental imagery are constrained by the environment within which the listening organism dwells, in terms both of natural and cultural (as in social) experiences. The central argument of enactive perception is that "perceiving is a way of acting… What we perceive is determined by what we do (or what we know how to do)" (Noë 2004). Despite largely focusing on vision, Alva Noé suggests that perception is more like touching than viewing, as touch is a more explicitly active way to engage with the environment. Touching is to embodied visual perception what vocalizing is to auditory perception: *homo faber* preceded *homo sapiens.*

This perspective leads Tuuri to formulate three components of connotative listening, each explained as a specific 'coupling' between sound and another phenomenon *X* through action (Godøy 2003). Action-sound-*X* couplings are schematically structured experiences that enable associations and projections of meaningful action-relevant mental images connecting our body with the environment. The first kind, action-sound-object couplings, emerge from experiences of manipulating objects. This would include a range of actions, from learning to pick up a ringing phone, to mastering a musical instrument. The second, action-sound-intersubjective couplings, are established through encounters with other human beings and interacting with them. This would include learning the semantic difference between sounds of laughter and crying, which might be acoustically close; the so-called 'mirror neurons' support a basic mechanism for empathy. The third kind, action-sound-habit couplings, refer to connotations that emerge from exposure to sound in social and cultural ecologies.

Processes of denotative listening happen immediately after the connotative action-sound couplings, and as a function of their output. Denotative listening is available to conscious control ('mode' indicates that it is something we are able to will). At this level, Tuuri defines largely the same mechanisms that Schaeffer and others had identified, but importantly, he refrains from any hierarchical arrangement, and places them on a spectrum between 'more source-oriented' and 'more context-oriented'. Thus, causal and empathetic listening are understood as more source-oriented, the latter being constrained by the socio-cultural environment. Functional listening answer questions about the purpose of a sound, and semantic listening attends to the meaning of sound by producing context-dependent metaphors. See Figure 2 for an illustration.

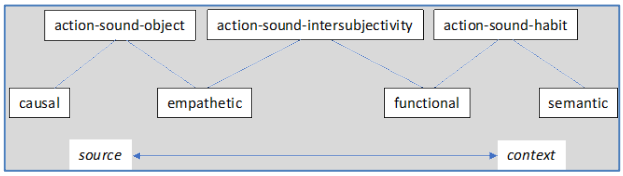

Figure 2. Associations between connotative (upper) and denotative (lower) listening modes. After Tuuri/ Eerola (2012).

Comparing models

This brief review cannot do justice to the complexity and details in the theories discussed so far. With Table 1, an attempt has been made to give an overview of the central concepts, and to suggest – in a deliberately simplistic fashion – their relationships. The table must be read 'squinting the eyes': please note that the layout does not suggest that concepts placed on the same row and level should be equated. They belong to distinct theories and are therefore well-defined only within their original framework. Despite being approximate, construing links between the

psychological mechanisms might nevertheless facilitate observations, and further hypotheses.

What are we to make of all these intricate systems of psychological listening mechanisms that interact as we are going about our everyday activities of so many kinds? Electroacoustic music, as an art form, is perfectly attuned to describing, through concrete example and abstract metaphor, the interplay between inner mental imagination and external acoustic environment. Sonification aims to convey through the medium of sound essential information about internal and external processes that allow for interpretation and meaning creation/extraction. Can we build evidence for the theoretical predictions that the theories produce? Can we determine which listening mode, or perhaps listening attitude, that people favor when presented with sound or a soundscape? Should we measure physiological or brain activity, e.g. with MRI or EEG, or can we administer a self-report questionnaire? If we give test subjects a task at the same time, does it make the selection of listening mode more precise? What if the task is medium-centric, such as "explain your listening strategy as you determine whether this sonification signals danger or not"? Or if it is a distractive task that diverts attention away from what is being measured?

Schaeffer (1966)	**Chion (2012)**	**Truax (2002)**	**Huron (2002)**	**Tuuri et al. (2007)**	**Tuuri/ Eerola (2012)**	**Juslin/ Väs tfjäll (2008)**
ouïr	—	background listening	reflexive	pre-attentive	reflexive	brain stem reflex
					kinaesthetic	rhythmic entrainment
écouter	causal		connotative		connotative (three action-sound couplings)	evaluative conditioning
comprendre	semantic	listening-in-readiness	denotative	source-oriented	denotative (causal, empathetic, functional, semantic)	
			empathetic			emotional contagion
			associative	context-oriented		visual imagery
						episodic memory
entendre	reduced	listening-in-search		quality-oriented	reduced	musical expectancy
—	—		critical	(context-oriented)	critical	aesthetic judgement

Table 1. Overview of listening modes in different theories and frameworks.

Drafts for two listening tests

Considering the Aesthetic Perspective Space, we might ask if it can correctly predict how people perceive sonic artefacts, on the one hand in terms of 'music-ness' or 'informatic-ness', and on the other, for their level of 'concrete-ness' or abstraction. When judging this, should they have access exclusively to the sound itself? Or should they additionally be presented with aphonic information, such as a text describing the production techniques involved, or the creative intentions? Vickers and Hogg (2006) had populated the Aesthetic Perspective Space with two handfuls of examples: some specific, some generic (referring to a composer/designer, or a style). In subsequent papers, Vickers (2013, 2017) included weblinks for most of the examples. It is not clear whether the distribution of these examples in the circumplex had been tested experimentally, or whether it is hypothetical. It might be feasible to conduct a listening test to explore how people interpret these pieces and sonifications; whether the median locations are close to those proposed by Vickers, and to what degree they agree (e.g. measure variance). Furthermore, a qualitative analysis of interviews (as in Lindborg/ Friberg 2015) with the test subjects might yield their evaluation strategies, and through that, a glimpse into their employment of listening modes.

The core point in Tuuri's taxonomy of listening modes is the connection that he makes between mechanisms for connotative and denotative listening. Per definition, the former is pre-attentive and the latter reflects the listener's consciously chosen attitude towards the sound object. This theoretical framework thus predicts someone's tendency to choose a specific listening mode, given the result of subconscious perceptual processing that immediately precedes it. We can assume that causal listening is activated when the subject is tasked to attend to individual sources (and where the soundscape as a whole is a distractor), and that semantic listening is activated through tasks attuned to the whole context (and where individual sounds act as distractors). The framework predicts that the preceding connotative process conditions the choice

of denotative listening mode, and this is testable. For example, a dominant action-sound-object coupling facilitates causal listening, while a dominant action-sound-habit coupling facilitates semantic listening. A listening test could be designed by preparing priming stimuli of two kinds that correspond to those denotative mechanisms. Imagine that subjects are asked to apply a specific connotative listening mode throughout a block of forced-choice responses. Before each trial, they are exposed to a priming sound that activates one of the connotative mechanisms. The hypothesis is that response speed and success rate depend on whether the primer facilitates the requested listening mode or not. Stimuli and primers for testing the link between action-sound-object connotative processing and causal listening might be prepared from recordings of sport events, for example tennis: the subject is tasked to estimate the success of a hit (requiring a source-oriented coupling), while being distracted by crowd jeering (engaging a context-oriented coupling). Likewise, stimuli and primers for testing the link between action-sound-habit connotative processing might be created from recordings of soundscapes with differing degree of pleasantness, and the distractor is a single sound source within the soundscape (of the opposite valence). A starting point might be offered by previous research on the relation between individual sound sources and the whole acoustic environment (e.g. Lindborg 2016).

Future work will refine the experimental design outlined here, aiming to conduct listening tests that could shed light on Tuuri's and Vickers' theoretical work. It might also be feasible to design experiments that address specific cases where the theoretical predications can be falsified.

References

Chion, Michel. (2012). The three listening modes. *The Sound Studies Reader*: 48-53.

Chion, Michel/ Gorbman, Claudia. (2009). *Film, a sound art*. Columbia University Press.

Emerson, Simon. (2013-14). Wandering uneasily in a familiar landscape. http://www.orema.dmu.ac.uk/eorema/wandering-uneasily-familiar-landscape

Emmerson, Simon. (1986). The relation of language to materials. In *The language of electroacoustic* music: 17-39. Palgrave Macmillan, London.

Fischman, Rajmil. (2007). "Mimetic Space: a conceptual framework for the discussion, analysis and creation of mimetic discourse and structure." Conference of the Electroacoustic Music Studies Network, De Montfort/Leicester, UK.

Godøy, Rolf Inge. (2003). Motor-mimetic music cognition. *Leonardo 36/* 4: 317-319.

Huron, David. (2006). *Sweet anticipation: Music and the psychology of expectation*. MIT press.

Huron, David. (2002). A six-component theory of auditory-evoked emotion. In *Proceedings of the 7th International Conference on Music Perception and Cognition*: 673-676.

Juslin, Patrik. (2013). "From everyday emotions to aesthetic emotions: towards a unified theory of musical emotions". *Physics of life reviews 10/* 3: 235-266.

Juslin, Patrik/ Västfjäll, Daniel. (2008). Emotional responses to music: The need to consider underlying mechanisms. *Behavioral and brain sciences* 31/ 5: 559-575.

Kramer, Gregory. (1994). "An Introduction to Auditory Display." In *Auditory Display*, Kramer (ed.) vol. 13 of Santa Fe Institute. *Studies in the Sciences of Complexity Proceedings*: 1–78. Addison-Wesley, Reading, MA.

Lindborg, PerMagnus. (2016.). "A taxonomy of sound sources in restaurants." *Applied Acoustics* 110C.

Lindborg, PerMagnus. (2015). *Sound perception and design in multimodal environments* (Doctoral dissertation, KTH Royal Institute of Technology).

Lindborg, PerMagnus/ Friberg, Anders. (2015) "Colour Association with Music Is Mediated by Emotion: Evidence from an Experiment Using a CIE Lab Interface and Interviews". *PLoS ONE* 10/ 12: e0144013.

Mesulam, Marsel. (1998). "From sensation to cognition". *Brain*, 121 : 1013–1052.

Noë, Alva. (2004). *Action in perception*. MIT press.

Schaeffer, Pierre. (1966). *Traité des objets musicaux*. Édition Seuil.

Schafer, R. Murray. (1977/1994). *The Soundscape: Our Sonic Environment and the Tuning of the World*. Destiny Books, USA.

Tuuri, Kai/ Eerola, Tuomas. (2012). "Formulating a Revised Taxonomy for Modes of Listening". *J. New Music Research* 41/ 2: 137-152.

Tuuri, Kai/ Mustonen, Manne-Sakari/ Pirhonen, Antti. (2007). "Same sound–different meanings: A novel scheme for modes of listening." *Proceedings of Audio Mostly*: 13-18.

Vickers, Paul. (2017). Sonification and music, music and sonification. In Cobussen, M., Meelberg, V., and Truax, B., editors, *The Routledge Companion to Sounding Art:* 135–144. Routledge, Oxford.

Vickers, Paul. (2013). Ways of listening and modes of being: Electroacoustic auditory display. arXiv preprint arXiv:1311.5880. Also at http://journal.sonicstudies.org/vol02/nr01/a04

Vickers, Paul/ Bennett, Hogg. (2006). "Sonification abstraite/sonification concrete: An '*Æ*sthetic perspective space' for classifying auditory displays in the ars musica domain." *Proc. ICAD*: 210-216. London, UK.

[Abstract in Korean | 국문 요약]
우리는 어떻게 듣는가?

퍼마그너스 린드보르그

우리는 소리풍경을 어떠한 방식으로 듣는가? 어떻게 우리는 동시에 일어나는 행위와 분위기, 능력들로 청취의 양태를 결정하는가? 우리로 하여금 일상의 환경 속 임의의 소리를 음악 작품의 요소로 여기게 하는 것은 무엇인가? … 독자는 유사한 청취 상황을 인지하거나 회상할 수 있을 것이다. 이러한 이야기는 무한대로 많은 영역의 것이겠지만, 꽤 작은 개수의 개념으로 듣는 양태들에 대해 설명하는 것이 가능할 수도 있다. 대부분은 그렇지 않겠지만 때때로 의식적으로 우리는 다음의 세 가지 실체를 느끼고 감지하고 이에 대해 의문을 가진다. 인지된 음향적 환경으로서의 소리풍경, 우리가 듣는 소리로 인해 관찰되고 암시되거나 상상하게 된 원천 정보가 되는 소리의 구성 요소들, 그리고 우리 자신이 그것이다. 누구나 유용함과 위험성에 관련하여 소리를 판단하는 타고난 능력을 갖는다. 듣기란 인지하는 생물체와 그 환경 사이를 연결하는 것이다. … 이 글은 청취 양태에 대한 이론들, 특히 폴 비커스의 '미학적 투시도적 공간'을 살펴본다. 이는 전자음악과 소리화의 맥락에서 두가지 관점의 청취 모델을 비교하고 그들을 실험하는 방법을 보여준다.

Emille, the Journal of the Korean Electro-Acoustic Music Society Volume 16

한국전자음악협회 학술지 에밀레 제16권

본 학술지는 한국문화예술위원회의 지원으로 제작되었습니다.
아울러 서울대학교 예술과학센터의 협력에 감사드립니다.

The publication of this journal is sponsored by the Arts Council Korea,
with the cooperation of the Center for Arts and Technologies at Seoul National University,

Imprint 출판 정보

Editor in Chief 편집장
Lee, Donoung 이돈응
Professor of Composition at Seoul National University 서울대학교 음악대학 작곡과 교수 (작곡, 컴퓨터음악)

Executive Board 운영 위원
Cho, Jinok 조진옥
Jun, Hyunsuk 전현석
Kim, Jonghyun 김종현
Kim, Taehi 김태희
Nam, Sangbong 남상봉
Rhee, Suzin 이수진
Oh, Yemin 오예민

Editor 편집인
Cho, Youngmi 조영미
Lecturer of *EAM* & *MTh* at Suwon University, Cheonnam University etc. 수원대학교 및 전남대학교 시간강사 (컴퓨터음악, 음악이론)

Editorial Board 편집 위원
Breitenfeld, Roland 롤란트 브라이텐펠트 (노광야)
Professor of Composition and *EAM* at Seoul National University 서울대학교 음악대학 작곡과 교수 (작곡, 컴퓨터음악)
Chang, Jaeho 장재호
Professor of Music Technology at Korea National University of Arts 한국예술종합학교 음악원 음악테크놀로지과 교수 (작곡, 컴퓨터음악)
Dudas, Richard 리차드 두다스
Professor of Composition and *EAM* at Hanyang University 한양대학교 음악대학 작곡과 교수 (작곡, 컴퓨터음악)
Kang, Joong Hoon 강중훈
Lecturer of Composition and Computer Music at Yonsei University etc. 연세대학교 음악대학 작곡과 시간강사 (작곡, 컴퓨터음악)
Kim, Bumki 김범기
Professor of Composition, Music Education at Gyeongsang National University 경상대학교 음악교육과 교수 (작곡)
Kim, Han Shin 김한신
Lecturer of Computer Music at Seoul Institute of the Arts 서울예술대학교 시간강사 (컴퓨터음악)
Kim, Heera 김희라
Professor of Composition at Kyung-Hee University 경희대학교 작곡과 교수
Kim, Jin-Ho 김진호
Professor of Composition, *EAM* and Musicology at Andong National University 국립안동대학교 교수 (작곡, 컴퓨터음악, 음악학)
Kim, Jun 김준
Professor of Musical Arts and Technology, Dongguk University 동국대학교 영상대학원 멀티미디어학과 교수 (컴퓨터음악)
Lee, Byung-moo 이병무
Professor of Computer Music at Korea National University of Arts 한국예술종합학교 음악원 작곡전공 교수 (작곡, 컴퓨터음악)
Lee, Gi Nyoung 이기녕
Professor of Composition at Dong-eui University 동의대학교 작곡과 교수
Nam, Unjung 남언정
Professor of *EAM* at Baekseok Arts University 백석예술대학교 음악학부 교수 (컴퓨터음악)
Park, Joo Won 박주원
Community College of Philadelphia 필라델피아 지역전문대학교
Park, Tae Hong 박태홍
Professor of Music Composition and Technology at New York University 뉴욕대학교 (컴퓨터음악)
Parks, Kevin 케빈 파크스 (박케빈)
Professor of Composition and *EAM* at the Catholic University of Daegu 대구가톨릭대학교 음악대학 작곡과 교수 (작곡, 컴퓨터음악)
Shin, Seongah 신성아
Professor of Composition at Keimyung University 계명대학교 음악공연예술대학 작곡과 교수 (작곡)

Advisory Board 자문 위원
Ahn, Doo-jin 안두진
Professor of Composition at Hanseo University 한서대학교 작곡과 교수 (실용음악)
Hwang, Sung Ho 황성호
Professor of Composition at Korea National University of Arts 한국예술종합학교 음악원 작곡과 교수 (작곡, 컴퓨터음악)
Moon, Seong-Joon 문성준
Professor of Composition at Chugye University for the arts 추계예술대학교 작곡과 교수 (작곡, 컴퓨터음악)
Lymn, Young-Mee 임영미
Lecturer of Electro-acoustic Music at Hanyang University etc. 한양대학교 강사 (컴퓨터음악)
Cho, Wonhyong 조원형
Researcher at the National Institute of the Korean Language 서울대학교 강사 (언어학)
Jung, Jae Eun 정재은
Researcher at the National Institute of the Korean Language 이화여자대학교 (작곡, 음악이론)

Cover design by Kim, Mi-Kyung 표지 도안: 김미경
Issued on 28 December, 2018 발행일: 2018년 12월 28일
Published by Lee, Donoung 발행인: 이돈응
Printed by Yesol Publishing http://www.yesolpress.com 발행처: 예솔출판사 [등록: 제2002-000080호(2002.3.21)]
Dongwoo 4F, 9-24 Yanghwaro6gil, Mapo-gu, Seoul 04044, ROK 서울시 마포구 양화로6길 9-24 동우빌딩4층 (04044)

ISSN no.: 2233-9302 국제 표준 정기 간행물 번호: 2233-9302
Price: 28,000 KRW 가격: 28,000원

Contents

차례