Enactive Listening: Perceptual reflections on soundscape composition

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The aim of this article is to gain insight into how the perceptual act of everyday listening may influence, shape or inform the compositional process, specifically in regard to soundscape composition and its relation to the environment. I place listening within the wider context of enactive perception, and emphasise the embodied and multisensory nature of cognition in the formation of an understanding of our world. Acknowledging music as a sociocultural activity, I utilise musical narrativity to frame the discussion on affordances for a listener's enactive perception. With a particular focus on soundscape composition, I discuss the affordances for a listener offered by divergent compositional processes, contextualised within the wider electroacoustic domain and its sociohistorical context. Moreover, I argue that by explicitly incorporating listening as part of the compositional process, soundscape composition moderates the affordances for a listener by aligning various narrative modes.

1. INTRODUCTION

To begin with an anecdote, a now well-established composer once told me about her interview as part of the application process for a PhD in composition. As part of the application guidelines, this university allowed only paper copies of scores and would not allow for the review of recordings, including for pieces containing a significant electroacoustic component. Sitting across from the committee, she picked up her score, looked at it puzzled and started vigorously banging it on the table, intermittently holding it up to her ears. When the committee, clearly disturbed by her behaviour, finally asked her what was wrong, she replied 'I think mine is broken? I don't hear a thing!' Needless to say, she was not accepted to the programme, but the anecdote illustrates a crucial aspect of music: it emanates from the perception of sound, or in other words, comes forth from our ability to listen.

But how do we make sense of our experience of listening to music? And how might this relate to the compositional processes involved in its creation? This article aims to examine these questions specifically in regard to soundscape composition and the affordances for the listener that emerge from incorporating listening as an integral part of the composition process. With soundscape composition's origins in acoustic ecology (Westerkamp 2002), I aim to gain insight into how the perception of sound influences, shapes and informs the process of soundscape composition. Following Andean's (2016) conception of narrativity in acousmatic music, I will utilise a lens of narrative modes to frame the experience of listening in music. Subsequently, I will contextualise listening within the embodied mind and enactive perception to emphasise the multisensory nature of perception (Noë 2004, 2008; Varela, Thompson and Rosch [1991] 2017) and bridge the connection between musical listening and everyday listening (Kendall 2010). I will discuss the possible affordances for an embodied and enactive perception in the various modes of narrativity, and elaborate on how the compositional processes involved in soundscape composition may support the enactive perception of a listener in the engagement with a narrative. The argument will be situated within the wider context of electroacoustic music, and illustrated by a discussion of the compositional process of *Chalice Well* (Truax 2014) and *Beneath the Forest Floor* (Westerkamp 2010), as well as a brief autobiographical report on the soundscape composition *Silence is Immanent* (2019). These works were chosen specifically based on available insight into the compositional processes involved in their creation (shared both in published form and in person).

2. THE ROLE OF LISTENING

Referring back to the opening anecdote, a distinction should perhaps be made between composition specifically and music more generally. The act of composing is indeed part of music, but the two are not necessarily the same or interchangeable. As noted earlier, music emanates from our ability to listen, though the act of composing may move beyond listening and venture into extramusical ideas, concepts or creative strategies that do not inform the listening to music per se (see, e.g., Kim-Cohen 2009). Examples

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include the documented use of J. S. Bach's family name B–A–C–H as a sequence of notes (Tatlow 2016);[1] Stravinsky's use of ideas rooted in numerology (Gauldin and Benson 1985); and Peter Maxwell Davies's incorporation of Magic Squares in his pre-compositional process (Jones 1998). While these extra-musical aspects are by no means irrelevant, their utility is connected to the creative and conceptual aspects of music. But a composition requires the actualisation in its auditory perceptual form in order to provide us the eventual *experience* of music. It is here that we listen and perceive, and build our conception of music. In other words, where music emanates from the perception of sound, composition is indicative of this perceptual act.

Soundscape composition and its relationship to environmental sounds provide an interesting perspective on this distinction. As soundscape composition has found its origins within the development of acoustic ecology, rooted in the field of communication studies and the World Soundscape Project initiated by R. Murray Schafer (Truax 2012), it has maintained a strong connection to the role of listening as a fundamental aspect of the compositional process. While Drever (2002) described soundscape composition in terms of the convergence of ethnography and acousmatic music, this account proposes a rather narrow interpretation of soundscape composition as phonographic or representational, yet does not take into consideration the possible imagined or abstracted soundscapes this genre of composition explores. In an attempt to locate the essence of soundscape composition, Hildegard Westerkamp suggests the following in exploring its boundaries:

> [O]nce we have accepted the acoustic ecology arena as the basis from which soundscape composition emerges, one could perhaps say that its essence is the artistic, sonic transmission of meanings about place, time, environment and listening perception. (Westerkamp 2002: 2)

This reifies the term *soundscape* as delineating the sonic environment with 'emphasis on the way it is perceived and understood by the individual, or by a society' (Truax 1999). Accordingly, the soundscape in a composition is not limited to a representational concept of an environment but is indicative of the act of listening within such an environment. Acoustic ecology thus focuses the essence of a soundscape on the situated listening and the perception of the environment. In soundscape composition, it is the everyday listening that offers a doorway into a listener's perception of music and the compositional processes that can both reflect and support this listening: a connecting thread to explore from the experience of music to the process of composing.

[1]According to the German pitch classes B♭–A–C–B♮.

2.1. Narrativity as making sense of a listening experience

Having established the principle of listening as a central aspect of soundscape composition, we may ask the question: then how exactly do we listen? As proposed by Andean (2016), a possible framework for contextualising the listening experience is that of *narrativity*. Andean claims that 'music is an inherently narrative art form' (2016: 192). While he refers specifically to acousmatic music, Andean's argument for a multiplicity of listening perspectives and narrativity extends beyond this specific genre, further substantiated by his discussion on 'universal' modes of narrativity (ibid.: 193). Moreover, as both acousmatic music and soundscape composition often utilise recorded real-world sonic materials, we may assert that the consequent real-world associations of these sounds also become similarly evocative of narrative (Andean 2010). The narrative framework thus provides us with a way of understanding music, and in particular, a means for making sense of a listening experience.

We should perhaps first characterise what it is we mean by narrativity, both in general and specifically with regard to music. The literature often speaks of two models of narrativity, namely the *descendant model* and the *sibling model* (Almén 2003). The descendant model indicates a direct relation to narrativity in literature, where the musical narrativity is a transposition of the literary storytelling model. The descendant model would be most suitable for a discussion on programmatic music and 'requires one to negotiate the tenuous bond between program and musical syntax' (ibid.: 3). For our current discussion, however, it would be more appropriate to look at the sibling model of narrativity. This model recognises the differences between the literary and musical narrative – stemming from their distinctive media – but attempts to look for the common underpinnings between the manifestations of the two: narrativity as a way of understanding the experience of music as making sense of a sequence of events. This definition acknowledges that both the literary and the musical experiences find their essential elements in their temporal aspects. In other words, both music and language provide an experience in time. This perspective is well illustrated by Giannoukakis's description of transmedial narrative as a narrative that 'does not presuppose the use of multiple media, but is rather intended to indicate elements of narrative that remain invariant during the actualisation of narrative in different media' (Giannoukakis 2016: 261).

This viewpoint is further illustrated by Andean's definition of narrativity in music as 'our experience of a temporal development, and of a succession of events' (Andean 2016: 192). He continues by suggesting that narrativity in music comprises a multitude of *narrative*

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lenses, where the listener is conceptualised not as a passive receiver of the narrative of a given work, but as an actively engaged audience proactively eliciting the narrative. Ten narrative modes are proposed as a starting point for gaining insight into our engagement with music – namely, the material, formal, structural, mimetic, embodied, parametric, spatial, studio, textual and extramusical. Consequently, it is the listener who is equipped with a variety of narrative lenses, from which to choose, shift or combine towards a final narrative interpretation of the work. While these modes were proposed in the context of acousmatic music, I would propose that their utility for contextualising the temporal experience of music may extend as a framework for discussion across multiple musical traditions, as elaborated later.

2.2. Towards an enactive and predictive perception of soundscape

Having established narrativity as a way of understanding music, we may ask: what could inform the various narratives resulting from our listening experience? Or to put it in Gibson's (1966, [1979] 1986) terms, what are the perceptual affordances of the sonic materials that could shape the formation of a narrative? While it is well known that listening is not the same as hearing, we should additionally recognise that the experience of sound is not limited to listening alone. As stated by Smalley in relation to acousmatic music, 'Although [it] may be received via a single sensory mode, this does not mean that the other senses lie dormant; in fact they spill over into sonic experience' (Smalley 2007: 39).

This distinction receives particular attention when looking at R. Murray Schafer's monograph *The Soundscape* (Schafer 1993). Schafer points to the action-oriented body in the development of perception by stating that 'the only way we can comprehend extrahuman sounds is in relationship to sensing and producing sounds of our own. To know the world by experience is the first desideratum' (ibid.: 207). In his development of the concepts of soundscape and acoustic ecology, the action-oriented aspect of perception has led to proposals such as *ear cleaning* as specific exercises for the training of listening, the *listening walk* as 'simply a walk with a concentration on listening', and a *soundwalk* as the practice of 'exploration of the soundscape of a given area using a score as a guide' (Schafer 1993: 213). While both soundwalking and the listening walk have a focus on listening, they constitute a full body participation and naturally situate listening in an embodied experience.

More generally, and stemming from a biological perspective, Varela et al. ([1991] 2017) have attempted to draw attention to the embodied nature of our perception with their conceptualisation of the *embodied mind*. In particular, they propose a model whereby cognition is not described in terms of a mind accumulating representations of an external world (cf. Fodor 1981), but of a mind that *creates* a dependent world of significances by means of its biological nature and embodied actions. It is the sensorimotor skills that construct a perceiver-dependent world through the actions the body performs in its environment. This generative aspect of cognition is referred to as the *enaction* in perception, emphasising how the mind brings forth a world of understanding in perception through the actions it performs with the body.

Enactive cognition thus points towards the 'activity of exploring the environment drawing on an understanding of the ways in which one's movements affect one's sensory relations to things' (Noë 2008: 663). For example, consider the ambiguity in our perception when we observe the roundness of a plate (Noë 2004). While our perspective of the plate often only allows us to observe a (geometric) oval, our ability to move and sense with our body has provided the mind with a knowledge and understanding of the roundness of a plate through which we enactively perceive the plate. In this context it is no wonder that a person's early attempts at drawing a table with a plate often results in a skewed image of the plate – meaning, the oval projection of perspective has been entwined with a mental projection of the roundness of a plate.

A similar, though somewhat distinctive, perceptual entanglement may arise when people make their first soundscape recording, often resulting in a surprise when discovering that a particular sound – so clearly identifiable in the original environment – becomes almost inaudible and masked by the level of background sounds in the recording. O'Callaghan refers to the perceptual awareness of recorded sounds as mediated awareness, and points towards the lack of 'accurate perspectival information about, for example, egocentric location' (O'Callaghan 2007: 361). The novice soundscape recordist remains unaware of the embodied action-abilities in the development of perspectival content – the moving of the head, the focused listening, and the enacted understanding of the observed soundscape – and is consequently unable to observe from the technological perspective of the microphone.

In a related though alternative account, Clark (2013, 2016) provides a concept of *predictive perception* that highlights how we actively shape our perception through a generative model of our environment, while minimising the prediction error in determining the probable causes of our sensory signals. Our perception is thus not positioned in the passive processing of our sensory inputs (cf. SanMiguel, Widmann, Bendixen, Trujillo-Barreto and Schröger 2013; Bendixen,

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SanMiguel and Schröger 2012), but as an active model mediating between the hearing and the listening of a multisensory embodied mind; the *hearing* here signifying the auditory sense of the ear, and the *listening* representing that which is made available to our awareness – whether remaining subliminal or present to our conscious experience. Though the terms *enactive* and *predictive perception* represent slightly different 'flavours' of cognition, here I shall use them somewhat interchangeably in stressing particular perspectives on the topics at hand.

2.3. But why does it matter?

Recognising the natural fit with Murray Schafer's original description of the soundscape in terms of its acoustic ecology, I would like to recontextualise the perceptual act of listening in the formation of narrative by means of an enactive and predictive perception. While this situates the listener as a sensorimotor mind, it also bridges the connection between musical listening and everyday listening (Kendall 2010). Kendall asserts that 'the experience of meaning in electroacoustic art is in essential harmony with that in everyday life' (ibid.: 73). However, this essential harmony with our enactive mind also indicates a number of perceptual challenges to the act of listening.

To illustrate such a challenge, I would like to describe a recent experience with the Vancouver Soundwalk Collective.[2] Following a soundwalk[3] with the composer Hildegard Westerkamp, she noted that at a certain point she was struck by a penetrating cold from a slight wind, inhibiting her attention to the listening – an experience shared by a number of the other soundwalkers, including myself. This sparked a debate about how active listening is not a mere state of perceptual attention, but the result of what is afforded to us by our multisensory perception, itself embodied. When *any* of the other senses require action, our perception no longer affords us the ability to actively listen, and shifts our attention to whichever sense it deems more urgent, momentarily allowing us little control over which senses will shape our world through our experience.

An additional challenge to perception was indicated by Murray Schafer when discussing the training of the ear for the acoustic designer: 'When one travels, new sounds snap at the consciousness … It enables a person to become detached from the functioning environment in order to perceive it as an object of curiosity and aesthetic enjoyment' (Schafer 1993: 211–12). As we depart from our familiar soundscapes, we lose our ability to predictively enact our sonic environment, encouraging a shift in our perception towards the development of new perceptual schemas. In other words, we experience listening more discriminately when our sensory environment can no longer be anticipated by our predictive perception. However, while this distinction has become a cornerstone in the preparation of the acoustic designer or soundscape composer, the more discriminate listening may not always be advantageous for the everyday mind.

In regard to the sensorimotor everyday mind, it should perhaps be noted that the enactive body as part of an audience to music – at least in more traditional forms of concert music – is not the active and moving entity that is implied by the idea of an embodied mind. The audience does not usually physically explore the concert hall in an attempt to enact its environment. For better or for worse, the audience is seated and does not 'move'. Nonetheless, the body still brings with it the gathering of knowledge and understanding in its enactive and predictive perception, which utilises this embodied and multisensory awareness when actively engaging in listening. Acknowledging the sociocultural context of music, perception still enacts its past experiences when shaping a narrative to any given work of music, even when the physical body is in fact inactive.

3. COMPOSING ENACTED NARRATIVES

In the previous section, I have explored the ideas of an enactive perception informing the narrative of our listening experience. I will here contextualise the various narrative modes in relation to the various musical and compositional processes, and how these could shape affordances for narrativity. More specifically, I will discuss how soundscape composition utilises environmental listening as a foundation for its compositional process to align these narrative affordances.

3.1. Narrative modes for listening

Following the earlier discussion on narrativity, Andean (2016) proposed ten narrative modes for gaining insight into our engagement with music – the formal, structural, material, mimetic, embodied, parametric, spatial, studio, textual and extramusical. While these modes were originally presented in relation to acousmatic music, particularly the first five modes seem to have utility in the larger scope of electroacoustic music. The *formal* and *structural* narratives observe the larger-scale form and smaller-scale structure in an attempt to focus on the syntactical

[2]The Vancouver Soundwalk Collective (VSC) is a community of listeners that explores acoustic locales in and around Vancouver, Canada. See also www.facebook.com/vancouversoundwalkcollective/ (16 May 2020).

[3]The soundwalk took place in the evening of 25 February 2019, in Vancouver. The walk was between Hadden Park and Kitsilano Beach as part of a VSC meeting.

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aspects of both – addressing the functionality of elements as the music unfolds over time, such as the narrative rooted in functional harmony or a climactic build-up; the *material* narrative signifies the use of real-world sounds that in their recognisability are directly evocative of a potential source, such as the narrative that emerges from a sequence of bird sounds; and the *mimetic* as well as the *embodied* narratives pertain to the embodied experience of a listener – whether in the literal sense (e.g., recognising the 'bouncingness' of a sound), or in the evocative sense of actively engaging with a suggested action. The mimetic and embodied narratives may also be viewed in line with Wishart's (1996) *imposed* or *intrinsic morphology* of sound – relating to the implied energy input to a sound and its potential imagined source – though extended to include all situated senses and evocative of an entire embodied experience.

While these modes were originally proposed in relation to the narratives elicited by a listener, particularly these first five modes create a noteworthy intersection with the musical syntax, discourse and mimesis of Emmerson's (1986) 'language of electroacoustic music', discussed in relation to a composer's intent.[4] Observing this intersection, I will frame the discussion of the affordances for listening stemming from the composition process, by focusing narrativity on these three overarching modes – namely the *formal-structural*, *material* and *mimetic-embodied* narratives.

Recognising a listener to be able to readily move in between the different modes of narrativity (Andean 2016), I would like to explore how an enactive concept of perception provides both challenges and affordances for the various narrative modes. And, more specifically, how soundscape composition moderates the affordances for the listener's enactive perception by aligning the various narrative modes.

3.2. Enactive narrativity in electroacoustic music

With its origins in communication and the development of acoustic ecology, soundscape composition has placed itself as coming from a tradition of listening, including such practices as ear cleaning and soundwalking to inform the compositional process. It not only acknowledges the recorded sound as a self-reflexive narrative, 'narrating both self through site and site through self' (Anderson and Rennie 2016: 223), but also encourages the compositional process to situate itself within the narratives afforded to the listener. However, in order to gain insight into the affordances for narrativity in soundscape composition, I would first like to make some general observations on electroacoustic music in which soundscape composition is situated, as well as the sociohistorical contexts in which the electroacoustic music traditions have developed their compositional processes.

For the purpose of this article, 'electroacoustic music' will be held to mean music that utilises electricity and loudspeakers as its medium for sonic production, but the discussion will be restricted to those forms of music lacking a potentially relevant visual dimension to the musical experience (such as may be the case in live electronic music). Considering our embodied multisensory perception, this presents us with a medium focused on the auditory dimension, though we should stress that this also equally confronts us with an exclusion of the other senses. Most significantly, it excludes a physical presence of the sound source (e.g., an instrument and performer) beyond the presence of a loudspeaker, or what Trevor Wishart refers to as 'the virtual space created by the loudspeaker' (1996: 146) – a loudspeaker affords no expectation regarding the sounding object, at least not beyond its ability to produce sound.

Electroacoustic music has been developed following a number of traditions – primarily electronic music, acousmatic music and soundscape composition – each presenting its unique set of affordances for enactive and predictive perception, stemming from the reconfiguration of sensorial input provided by the medium. While these traditions are still often distinguished by a range from synthetic source material to real-world and environmental sounds, we should also discuss those distinctions between these traditions that are rooted in their syntax, as proposed by Emmerson (1986). Accordingly, electronic music is characterised by containing an *abstract syntax*, whereas acousmatic music may be best described as containing a syntax *abstracted from the materials*. Soundscape composition – having now established itself as its own tradition – extends Emmerson's view with the *representational* and *environmental contextualisation* of sound in the compositional process, rooted in the listener's experience (Truax 1984). While the topic of discussion will be the perceptual implications of these traditions, it should be noted that these distinctions do not represent discrete and separate musical entities, but rather form a continuous line along which we may contextualise a given electroacoustic work.

3.2.1. Challenges to a formal-structural narrative of novel syntax

Having established a division of the various types of electroacoustic music in the syntactical, we begin with an observation of the *formal-structural narrative* in the

[4]The intersection of Emmerson and Andean, however fruitful for our discussion, does prove rather incompatible in their specific use of the words and the concepts they describe, especially regarding the use of the words *mimesis* and *mimetic*. For this article I will follow Andean's use in line with our discussion on narrativity.

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various traditions. The most traditional form of musical narrative lies in its heritage within the Western classical tradition of instrumental music – a long-standing tradition that has developed a well-described and useful syntax of elements, such as functional harmony and its 'storytelling' devices by means of musical form. Consequently, it is precisely here that the pervasiveness of tradition in our social and cultural experiences offers us an abundant gathering of knowledge to enact in our perception. However, whether the syntax of electroacoustic music is abstract, abstracted from the material, or environmentally contextualised, the most important quality to be noted is that *all* contain some form of formal-structural dimension as part of their tradition.

It is interesting to note that the breaking of traditions in contemporary, experimental and electroacoustic music may greatly challenge a listener in the absence of a sociocultural tradition to enact. For example, in the case of serialism, the composers stripped the formal-structural musical narrative of its historically established syntax in functional harmony. While this may have occurred in a continuous progression of historical development, and the composers had by no means deprived the music of syntax, for the listener the novel syntax became contextualised in its absence of the expected. That is, the listener's predictive perception could no longer successfully enact its prior experience with functional harmony when presented with a redefined syntax. Accordingly, this act significantly undermined the affordances for the listener's enactive perception of music, rooted in its consequent limited experiential knowledge and understanding. In order to enact gathered knowledge and understanding in our predictive perception, we need to acquire new experiences on which we may base our enaction, in order to make sense of a novel syntax. The act of redefining a formal-structural narrative may thus additionally provide literal meaning to the proverbial 'acquired taste', simply due to our enactive perception requiring new experiences in order to enact a novel environment.

As such, these relatively novel traditions (generally) lack the sociohistorical context that is useful to the sense-making abilities of our enactive perception. It could be reasonably asserted that the novel medium of electroacoustic music indeed constitutes a reconceptualisation of the syntactical schemas for the compositional processes – it would be naïve to assume that instrumental music's syntax tradition would seamlessly transfer to any new medium. These novel syntaxes may offer little historical context for listeners to enact in their perception. Consequently, the syntax of electroacoustic music only remains useful as a vehicle for the formal-structural narrative to those who have built a sufficient knowledge-base of experience with the medium. Only the initiated few who have equipped their predictive perception with enough prior experience are able to enact and perceive the affordances of the music's formal-structural narrative – an issue, one might argue, haunting all forms of experimental and innovative forms of music and art. We should thus reiterate that the challenge for the enactive and predictive perception of a listener in regard to a formal-structural narrative lies not in the various strategies for developing a syntax, but in the very fact that they have syntaxes unique to each tradition.

3.2.2. Abstract or evocative material narrative

Following the enactive challenges to a formal-structural narrative, we continue our discussion towards the *material narrative*. Andean (2016) claimed that it is the material narrative mode that differentiates itself most clearly between the electroacoustic and the instrumental. We here also find a greater distinction between the affordances stemming from the compositional processes in the different traditions and how they treat the sonic material, where electronic music perhaps presents the greatest challenge to our enactive perception. While the electronic music tradition often utilises synthesised sound sources, it most significantly considers the sound as a (mere) instrument; the sound offers the raw sonic material to the composer to be organised into music, akin to the compositional process utilised by the traditional instrumental composer.

We should, however, acknowledge that the sonic context of traditional instruments comes with a wealth of affordances for our enactive perception that culturally and historically contextualise the material narrative. For example, if we take a closer look at a trumpet, even before it has produced any sound, it by itself already engages a wealth of experience, presented to us by our knowledge of its musical sound and its musical history. Our multisensory experience is presented with affordances to make sense of what constitutes the instrument, its 'brass-ness', 'bell-shaped-ness', 'pipe-ness' or 'wind-ness' in its acoustic and instrumental qualities. Consequently, when listening to a trumpet within a new context, our knowledge and understanding of the instrument still afford a wealth of experience to enact.

Contrastingly, the synthesised and abstract sounds in electronic music do not *intrinsically* offer such knowledge to be enacted in our perception, except for those familiar with the sonic material of the genre; for example, the hearing of a sine tone evokes no referential understanding of the source of its origin unless one is familiar with oscillators. Accordingly, this presents a significant challenge to the sound's affordances for a material narrative rooted in the listener's multisensory experience. To build on our instrumental example, even if we were presented with

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an imaginary instrument – for instance, a garden hose with a funnel attached to one end – and we had never heard this instrument before, our multisensory experience would still be able to enact a predictive understanding of its 'pipe-ness', 'wind-ness' and 'bell-shaped-ness'. Moreover, the acting body of the performer may also present us with a knowledge and understanding of engagement with an instrument beyond the sonic: the breath-blow actions, the expressive movements of the performer and so forth (see also Jensenius, Wanderley, Godøy and Leman 2010; Gritten and King 2011). Accordingly, it is interesting to note how an unfamiliar and imaginary instrument likely offers greater affordances to the formation of a material narrative than the synthesised and abstract sounds in electronic music, where the material may offer a mere vehicle for the support of the formal-structural narrative.

In acousmatic music, however, we may expect to find greater affordances for an enactive perception, considering that the compositional process places greater emphasis on real-world sounds. As recorded sounds become more closely tied to and evocative of recognisable sound sources, the music increases its aptitude for the formation of a material narrative (Andean 2016). While the underlying causal relationship of sound and source has been widely acknowledged in the literature, whether as 'imagined source' (Wishart 1996), 'causal networks' (Çamcı 2016), or 'source bonding' (Smalley 2007), it also provides an appropriate context for the affordances for an enactive perception. The idea of the causal relationship between sound and source, however, stands in stark contrast with the traditions out of which acousmatic music has formed – namely, Pierre Schaeffer's concept of *reduced listening* and his view of recorded sounds as *sound objects* (Schaeffer 1966). Schaeffer introduced the idea of reduced listening to refer to a way of listening in which a sound is detached from its real-world context and analysed for its purely sonic qualities as an abstracted sound object. Consequently, the abstraction of real-world sounds into sound objects in the compositional process could be regarded as parallel to the aforementioned abstraction of sound-as-instrument in electronic music.

The abstraction of real-world sounds does not however prevent the material narrative from being enacted by the listener, as also recognised by Andean (2016); above all, our everyday perception still brings forth its gathered knowledge and experience in listening to any musical piece. Accordingly, the material narrative may actually offer obscurity to the listener when the reduced listening applied in the compositional process does not explicitly address the material narrative inevitably present in the listening experience. Young referred to this obscurity in perception as 'acousmatic sounds becom[ing] partial objects – potentially evocative of their sources, yet at the same time introducing ambiguities, potentially impressionistic and requiring active imaginative input to effect reconstruction of a scene or resolve contradictions of context' (Young 2007: 27). This tension may be illustrated by the use of 'explosive sounds' in an acousmatic piece, not necessarily intended to convey 'violence'. While the *material* dimension may unavoidably be evocative of the ferocity of the event, the morphology of the sound may actually be indicative of a *formal-structural* dimension of the work in a climactic moment of the piece. The challenge to the listener becomes embedded in the duality between the formal-structural narrative of a given work and the unavoidably evoked material narrative of acousmatic music (Andean 2010).

3.2.3. *Morphology and a mimetic-embodied narrative*

The morphology of real-world sounds, evocative of both material and formal-structural narratives, additionally extends into the discussion of the mimetic-embodied narrative. Truax (2016) referred to the morphology of sound as recognising the implied energy input of a sound evocative of a *perceived gesture*. One could imagine sounds such as wind, breath or machines as evoking a perceived gesture associated with the corresponding imagined natural, human or mechanical source of energy. Godøy extends the idea, suggesting that

> there is a continuous process of mentally tracing sound in music perception … i.e. mentally tracing the onsets, contours, textures, envelopes, etc., by hands, fingers, arms, or other effectors, when we listen to, or merely imagine, music. This means … we actually recode musical sound into multimodal gestural-sonorous images based on biomechanical constraints (what we imagine our bodies can do), hence into images that also have visual (kinematic) and motor (effort, proprioceptive, etc.) components. (Godøy 2006: 149)

The perceived gesture here presents an extension to Schaeffer's sound object in Godøy's proposal for a *gestural-sonorous object* – the simulation of sound-producing action in our enactive perception. In bringing forth our knowledge and experience in listening, we also enact an imagined gesture that mimics the implied energy input of a sound – referred to as a *motor-mimetic* aspect in music cognition (Godøy 2003). Our perception viscerally enacts a gestural-sonorous image in its attempt to make sense of the listening. These mimetic-embodied narratives may subsequently be reflected in the compositional process through the composer's engagement with the sound. By actions such as mixing, processing or other compositional manipulations of sound, the composer may induce in the listener a motor-mimetic perception of the

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gestural-sonorous objects as an affordance for a mimetic-embodied narrative.

We have consequently arrived at a place where we concurrently recognise the potential nature of sound sources in the material narrative, engage in the formal-structural narrative of the progression of a work and enact the morphology of sounds as gestural-sonorous objects in a mimetic-embodied narrative. While it has indeed been argued that a listener may readily move between the different modes of narrativity (Andean 2016), I suggest that the latent cognitive divergence between the different narratives present in a work could either hinder or encourage a listener's ability to seamlessly shift between modes, and potentially disrupt or support an enactive and predictive perception in its sense-making simulation – a phenomenon that is inherently addressed in the compositional processes of soundscape compositions.

3.3. The enactive soundscape composition

Relative to electronic or acousmatic music, I suggest that soundscape composition engages a somewhat different stance on the interrelation of the various narrative modes. Where electronic and acousmatic music engage with the synthetic or abstracted sound objects, soundscape composition regards these as sound images that are representational of real or imagined sources (Wishart 1996). It is the sound images that are organised by the compositional process into what could be referred to as acoustic landscapes or soundscapes, providing affordances for the various modes of narrativity. While the syntax and morphology remain indicative of a formal-structural narrative across the electroacoustic domain, it is in the material and mimetic-embodied narrative that the various traditions diverge in their affordances to an enactive listener.

With an emphasis on the creation of acoustic landscapes, soundscape composition invites a composer to act, enact and interact with sound images, as a means to guide the compositional process. The experience of the recorded sound becomes enacted in the composer's perception with a particular regard to its *environmental* context, and it is this knowledge and understanding of the listening that forms the basis for the narrative. While this indeed often entails a phonographic or representational component (Drever 2002) as well as a self-reflexive narrative of self and site (Anderson and Rennie 2016), soundscape composition defines itself in the perceptual experience of the environment in guiding the compositional processes.

The grounding of the compositional processes in the practice of listening, additionally addresses the virtuality of the electroacoustic medium through the explicit acknowledgement of a real or imagined sound source. In turn, the listener's perception is no longer challenged when enacting its embodied understanding of a sonic landscape – as in the case of acousmatic music – but encouraged to bring its embodied knowledge into the listening experience. This distinction elucidates how the listener is provided affordances through an environmental context to guide the perceptual experience of the sound event, rather than the need for a sociohistorical tradition. Situating the material listening back into embodied experience and enactive perception, soundscape composition explicitly extends the gamut of the material to include the mimetic-embodied narrative; in engaging with the material narrative, listeners bring forth their everyday perception through their embodied understanding and enacted experiences. This extension or merging of the material and the mimetic-embodied narrative does not necessarily imply a limitation on the available narrative modes, but could be thought of as a possible streamlining of movement between the various modes of narrativity.

3.3.1. Soundscape in action

Where an embodied understanding of the material and mimetic-embodied narratives could indeed be utilised in a literal or programmatic sense of music, the compositional process can still extend the sound image into the imagined or abstracted. As soundscape composition moves in the virtual space of the loudspeaker, we may still compose the sound images into impossible sonic landscapes or imagined abstract spaces. Barry Truax's piece *Chalice Well* (2009) particularly illustrates the enactive aspects of the compositional processes involved in the creation of an imagined space or impossible soundscape. In this piece, the composer extensively utilised convolution for the creation of an impossible sonic space, namely the imagined well. Conventionally, the convolution technique is used to simulate the reverberant field of a given space, transferring both frequency and temporal characteristics of a space onto a source sound by multiplying the spectrum of an impulse response of the space with that of the source sound. However, for *Chalice Well* the composer employs a hybrid approach in which both source and impulse response consist of various textured sounds (Truax 2012). Utilising the textured sounds as both the source as well as the imagined impulse response, the composer began to 'sense the type of imaginary soundscape the results were suggesting' (ibid.: 197). Having been aware of the theory and conventional use of the convolution technique, Truax extended the reverberant field utilised in the composition into the abstraction of an imagined space. The compositional process explicitly fostered the connection to perception by exploiting techniques evocative of how we enact space in listening.

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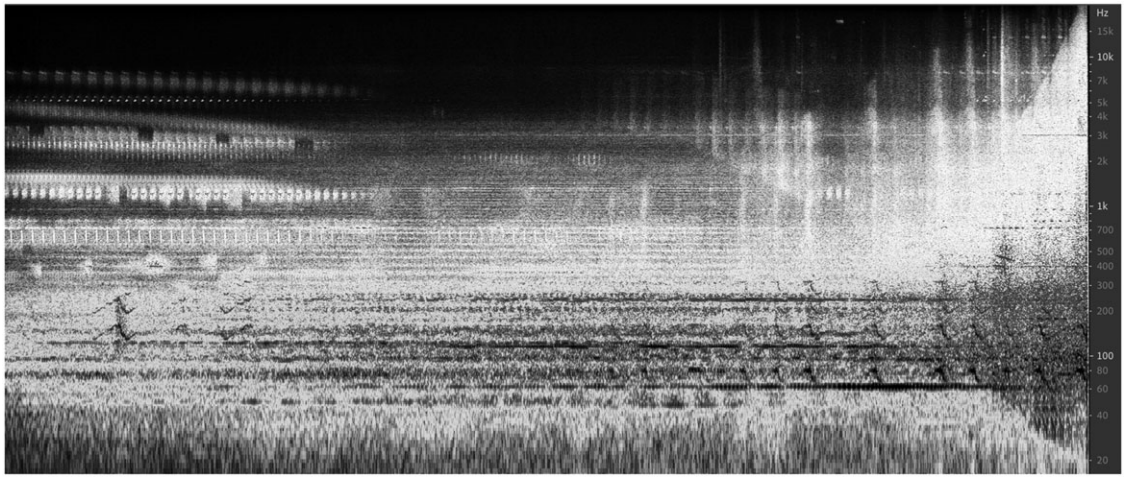

Figure 1. Spectrogram of the fourth movement of *Silence is Immanent* (2019).

Additionally, extending into the mimetic-embodied narrative, the actions of the composer (such as mixing and processing) may embed motor-mimetic aspects in the compositional process that shape these imagined sonic landscapes or spaces as gestural-sonorous objects. Yet, it is the acknowledgement and awareness of an enacted gesture, source, space or landscape guiding the compositional process that consequently provides affordances for the enactive perception of the listener. For instance, in *Beneath the Forest Floor* (1992), the composer Hildegard Westerkamp included 'a mysterious low, thumping sound … but she does not reveal the source to the listener, and instead plays on its ambiguity in the listener's imagination' (Truax 2012: 196). Accordingly, I suggest it is the gestural-sonorous object of the thumping sound that provides affordances to a listener to enact a mimetic-embodied narrative of the music.

3.3.2. Silence is immanent

To further illustrate the relevance of the compositional processes in relation to the affordances for narrative, I would like to briefly observe a compositional choice made during the creation of my work, *Silence is Immanent* (2019) – an eight-channel soundscape composition in four movements (Sound Example 1). For the creation of the final movement, I had layered a large amount of repeating urban sound events (such as car horns, buses and pedestrian lights), creating a virtual soundscape cacophony of urban noise. While this initial stage 'accurately' illustrated my conflict and discontent with the urban sonic soundscape, it was also aptly unpleasant, banal and most importantly, unaesthetic – the affordances for narrative lay solely in the material.

Engaging with the eventual narrative of the work, I reflected on recordings of a rainforest resultant of a prior listening walk. Particularly when utilising a spectrogram, providing additional visual reflection on the soundscape, I became familiar with Bernie Krause's *acoustic niche hypothesis* (ANH) in acoustic ecology (Krause 2008). ANH proposes that the different species in a particular habitat occupy sonic niches as channels for communication, avoiding the frequency range of the other species to ensure their own calls are not obscured in a dense sonic environment.

Applying this experience to the eventual narrative of the work, I applied narrow band-pass filters to each layer of the urban sound events in order to simulate acoustic 'niches' in the soundscape of the piece. This transformed the urban soundscape cacophony of car horns, buses and so on into an *imaginary* soundscape of birds, crickets and a surreal sonic forest. The imagined forest subsequently created affordances not only for a material narrative, but also for a mimetic-embodied narrative in the morphology of the simulated acoustic niches. Subsequently widening the band-pass filters, the final movement slowly evolves from an imagined surreal forest into an exaggerated real-world urban cacophony (see Figure 1), adding affordances for a formal-structural narrative that unify the material- and mimetic-embodied narrative. This example demonstrates how my enacted understanding of the urban and forest soundscapes guided the compositional actions towards the creation of the composed imaginary soundscape. As a composer in the process of creation, I engaged with the sound through listening, acting and re-listening, bringing forth a world of understanding through the actions undertaken with the sound. Moreover, it was the compositional actions rooted in environmental listening that embedded affordances to the listener for a seamless switching between the various modes of narrativity in support of the sense-making of the piece.

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4. IN CONCLUSION

In soundscape composition, with its origins in the field of acoustic ecology, the act of listening has found a deepened connection with the compositional process. Through practices such as soundwalking, ear cleaning, recording and sound processing, the composer's engagement with the sonic environment brings forth an enacted world of knowledge and experience in the compositional and creative process. By explicitly situating the compositional process within environmental listening, soundscape composition addresses the virtuality of the electroacoustic medium, and frees the listener to engage their everyday experiential knowledge and understanding in the enaction of a narrative. Accordingly, the embedding of enactive listening as an integral part of the compositional process moderates the affordances for the listener's enactive perception by aligning the various narrative modes. This distinction offers a more precise, yet inclusive interpretation of soundscape composition as utilising the soundscape not only in its creation, but also in a compositional process that is situated in the everyday listening to soundscape. It should be emphasised that the experience of sound is not limited to listening only, but constitutes an embodied conception and simulation of our world in an attempt to understand it. In acknowledging listening as the product of our enactive perception, we should be reminded that listening is not evocative of sound alone, but of a multisensory embodied experience. Accordingly, it is up to the composer to decide how to subsequently guide the narrative of a listener's enactive perception.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit https://doi.org/10.1017/S135577182200019X

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