In this paper, we investigate the role affect plays in electronic music listening. By referring to a listening experiment conducted over the course of three years, we explore the relation between affect and diegetic affordances (i.e., those of the spatiotemporal universes created by electronic music). We will compare existing perspectives on affect with the psychologist James Gibson’s model of affordances in the context of an electronic music practice. We will conclude that both the sounds themselves and the diegetic affordances of these sounds may elicit affective reactions, and that further study into the relation between diegesis, affordance, and affect may contribute to a better understanding of what we hear in electronic music.

1. INTRODUCTION

In contemporary music studies, affect seems to play an increasingly important role. This concept allows the articulation of the way music has an impact on listeners and artists alike. In this paper, we explore how affect “works” in electronic music, and how it is intrinsically related to affordances of an electronic music experience. More specifically, we will discuss the role diegetic affordances may evoke affects with listeners.

Listeners of electronic music may derive diegeses (i.e., spatiotemporal universes referred to by narratives) from the poetic trace left by the composer. In semantic consistence with these diegeses, listeners populate the landscapes of their imaginations with appropriate objects, situated in various configurations based on cognitive or perceptual cues. As they do so, they experience this environment with implied affordances true to the objects of their imagination, and affects attached to these diegetic possibilities.

First, we will outline a listening experiment, the results of which will be used to further our discussion. We will then define affects and affordances, and how these can be applied in the articulation of musical experience. We will explore the similarities between these two concepts to construct a framework designed to facilitate artistic experiences. In doing so, we will suggest that the diegetic affordances of electronic music may evoke affective responses with listeners. Finally, based on the listener feedback gained from the experiment, we will demonstrate how this framework can be useful when discussing features of electronic music that are corporeally relevant for the listener.

2. OVERVIEW OF THE EXPERIMENT

Between May 2012 and July 2014, 60 participants from 13 different nationalities took part in a listening experiment that investigates the cognition of electronic music. 23 participants were female while 37 were male. The average age of the participants was 28.78. Ages ranged from 21 to 61. 22 participants identified themselves as having no musical background. Amongst the remaining 38 participants were musicians, music hobbyists, composers, and students of sound engineering and sonic arts.

The experiment aimed to explore how fixed works of electronic music operate on perceptual, cognitive and affective levels. The design of the experiment was aimed at extracting both contextual and in-the-moment impressions while offering a natural listening experience. The design involved: 1) an initial listening section, where the participants were asked to listen to each complete work of electronic music without any instructions pertaining to the experiment; 2) a general-impressions task, where the participants were allowed to reflect upon their experience without any form or time constraints; 3) a real-time input exercise, where the participants were acquainted with a real-time computer-based system and they were asked to submit descriptors in real time while hearing an audio material; and 4) a real-time free association task, where the participants listened to the same piece they heard earlier while at the same time generating anything they might feel, imagine or think as they listen to the piece.

Five complete pieces of electronic music, in 44.1 kHz, 16-bit WAV format, were used in the experiments. Four of these pieces, namely Birdfish, Element Von, Christmas 2013, and Digest, were composed by the first author of this paper. The fifth piece was Curtis Roads’ 2009 piece Touché pas. Said pieces utilize a wide range of forms, techniques (e.g. live performance, micromontaging, algorithmic generation), tools (e.g. audio programming environments and instruments) and materials (i.e. synthesized and recorded sounds). The results of this experiment, including a categorical analysis of the real-time descriptors and a disconnect analysis of the general impressions, have been offered in previous literature [1, 2]. The current paper relies primarily on a semantic analysis of the general impressions and the real-time descriptors. The general impressions were provided in one or a combination of various forms, including list of words, list of sentences, prose and drawings. The vast majority of the descriptors submitted in the real-time free association task were single words or two-word noun phrases. A participant’s prior experience with electronic music did not significantly impact the descriptors submitted (e.g. representationality versus abstractness) or the number of the descriptors submitted by that participant.

In his introduction to Deleuze and Guattari’s A Thousand Plateaus, the philosopher Brian Massumi describes a relation including hearing.

3. AFFECT IN MUSIC

3.1 Interpretations of Affect

The affective appraisal of music comprises successive stages that utilize different but interconnected perceptual resources. A particular component of this spectrum is the experience of affect, which has been studied within a variety of domains ranging from virtual reality [4] and painting [5] to politics [6] and sports [7]. This concept is not only adopted by a large array of disciplines but also subjected to a variety of interpretations. On the far end of the spectrum, Lim et al. [8] and Shouse [9] point to uses of affect as a synonym for emotion. While this approach begs the question of why affect would need to be demarcated as a separate concept, it nevertheless provides an insight regarding the context within which the concept is situated.

The use of affect in philosophy dates back to Spinoza’s Ethics. Spinoza identifies affect as an aspect of the body by which “the body’s power of acting is increased or diminished” [10]. In his introduction to Deleuze and Guattari’s A Thousand Plateaus, the philosopher Brian Massumi offers a related description of affect as a “prepersonal interpretant” referring to the passage from one experiential state of the body to another” [11]. Emotion on the other hand is personal according to Massumi: “Emotion is qualified intensity, the conventional, consensual point of insertion of intensity into semantically and semiotically formed progressions, into narrativizable action-reaction circuits, into function and meaning” [12].

Based on Massumi’s interpretation, we have previously proposed the concept of a sonic stroke [13]. A sonic stroke is an acoustic phenomenon that induces musical affect upon impacting the listener’s body. A consequence of this impact is emotion, which emerges once the affect is recollected upon (i.e. a sonic stroke is registered as a musical gesture).

3.2 Affect and Mechanisms of Music Perception

Music, despite lacking immediate survival value, activates brain mechanisms associated with pleasure and reward. The combined sensory and cognitive experience of a musical piece influences the listener’s affective state [14]. Accordingly, existing research points to a mixture of cultural and physiological determinants of music appreciation [15, 16]. Brown et al. delineate musical universals, such as loudness, acceleration and high-registered sound patterns, which invoke affective experience independent of cultural origin [17]. Juslin and Västfjäll emphasize the need to investigate the mechanisms underlying the affective appraisal of music [18]. They argue that the evocation of emotions in music is based on processes that are not exclusive to music: They enumerate several neural mechanisms that contribute to this phenomenon. Out of these, the brain stem reflex deals with the low-level structural and cross-cultural characteristics of Gellhorn’s musical primitives that are hard-wired and are connected with the early stages of auditory processing. Sounds that are sudden, loud, dissonant, or those that feature fast temporal patterns signal the brain’s alertness to potentially important events and induce arousal. This arousals reflects the impact of auditory sensations in the form of “music as sound in the most basic sense” [18].

Due to its attachment to the early stages of auditory processing, brain stem reflex is highly correlated with human physiology and the so-called universals (i.e. the low-level structural properties) of musical experience. A functional coherence between affect and the brain stem reflex is highlighted by their intrinsic relation on the spectrotemporal and dynamic properties of musical sound. While affect represents the corporeal content of the affective appraisal of music, it cannot be dissociated from an ensuing emotion. This is mainly due to the aforementioned interplay between the mechanisms underlying music cognition.

The musicologist Marc Leman points to seminal neuroscientific studies, such as those by Antonio Damasio, Marc Jeanrot and William Police from the Cartesian view of “mind and matter” as separate entities; it is understood that the so-called subjective world of mental representations stems from the embodied interactions with the physical environmental [19].

4. AFFORDANCES

An approach to perception that is commonly facilitated in musical research [20, 21, 22] is the model of affordances developed by the psychologist James Gibson. Gibson’s studies on perception stemmed from his experiments in aviation during the World War II. Focusing mainly on an active observer’s perception of its environment, Gibson postulated that the invariant features of visual space represent pivotal information for perception. Invariants are features of an object that persist as the point of observation changes [23]. While most items in Gibson’s taxonomy of invariants are submitted to variation, his concept of affordances has been applied to other modalities of perception including hearing.

A set of invariants in an environment, by virtue of their invariant features, afford action possibilities relative to the perceiving organism. For instance, a terrestrial surface, given that it is flat, rigid and sufficiently extended, affords for a human being the possibility to walk on it [23]. His main motivation to propose this seemingly straightforward idea is to refute the prevailing models of perception, which assume that the mind actively constructs the world, and therefore the perceiver must extract a meaning out of sensory stimuli by imposing mental structures upon disorganized information. Gibson suggests that there are certain kinds of structured information that are available prior to perception in the form of invariants. The nature of these invariants is relative to the complexity of the perceiving animal [24]. In other words, an object will have different affordances...
In their article Percept, Affect, and Concept, Deleuze and Guattari elegantly describe “how the plane of the material realm, composed of invariants and inversions based on the composition of the sensations themselves to the point of being part of them or indiscernible from them” [27]. Affect, as we would like to term it, and interpret it, is not something attached to these diegetic possibilities. As Gibson explains:

The beholder [of a film] gets perception, knowledge, imagination, and pleasure at second hand. He even gets rewarded and punished at second hand. A very intense empathy is aroused in the film viewer, an awareness of being in the place and situation depicted. But this awareness is dual: the beholder is helpless to intervene. He can only find out nothing for himself. He feels himself moving around and looking around in a certain fashion, attending now to this and now to that, but at the will of the film maker. He has visual kinesthesis and visual self-awareness, but it is passive, not active. [23]

Accordingly, the listener of electronic music experiences passive aural kinesthesis. An inexperienced participant, who listened to Digense, narrated a highly visual story of her general impressions:

Glass/metal ping pong balls are constantly being dropped on the floor as we walk through an empty saloon with bare feet; we leave this room and go out in a jungle, moving through the grass softly, passing through cascading rooms; we arrive in another saloon.

While many of the objects in her narrative also appear in descriptions provided by other participants, details like “walking with bare feet” and “moving stealthily” are indicative of imaginative virtual affordance experience of the diegetic environments of her imagination.

6. THE AFFORDANCES OF IMAGINED SOUND SOURCES IN ELECTRONIC MUSIC

The concept of diegetic affordances can be useful when dealing with audio-visual objects belonging to the so-called diegetic mode. In this mode, the concept of diegetic affordances to the listener. The narratologist Gérard Genette defines diegesis as “the spatiateemporal universe to which the narration refers. Therefore, the term diegetic terminology, a term that we assign to a work, is always a derivative of ‘diegetic’” (translated in [31]). And it is precisely such an imagined spatiateemporal universe, in this case created as a result of listening to electronic music, that we describe as consisting of diegetic affordances that are evocative of affects [30].

Gibson describes a behavior for surrogate objects in the visual domain, such as clicking, that is similar to the diegetic action possibilities introduced above [23]. While these objects also specify invariants, they instigate indirect awareness and provide “information about...” [24]. The contributions of the image of the object to the possible experience will nevertheless remain virtual for the listener since the imagined object is an external representation: “[t]he perception or imagination is vicarious, an awareness at second hand” [23].

Affects are semantically processed, fed back into the established context and experienced as the result of diegetic affinities to relate to a horizon of social elements, and that higher mental functions “are fed back into the realm of intensity and recursive causality” [12]. Affects, anchored in physical reality, are therefore both pre- and post-personal. This dual take on affect is also apparent in Freud’s interpretation of the concept: unconscious affects persist in immediate awareness to conscious thoughts and they are practically inseparable from cognition [26].

 semantic consistency with these diegeses, listeners populate the landscapes of their imaginations with appropriate objects. Among these an instigating affection or affective or perceptual cues. As do they, so also experience this environment with implied affordances true to the objects of their scene, and interpret itself attached to these diegetic possibilities. As Gibson explains:

When watching a horror movie for instance, the viewers are aware that they are in a theatre. But once the movie starts, the artificial nature of the situation is revealed as the audience is made aware that they are watching a film, and that the characters within the movie are not real. The thrill of the horror movie comes from the combination of suspense and fear that the audience feels, as they are made to believe that the characters are real. This is known as the “illusion of reality”.

However, such landscapes and surfaces will only afford so-called diegetic action possibilities to the listener. The narratologist Gérard Genette defines diegesis as “the spatiatemporal universe to which the narration refers. Therefore, the term diegetic terminology, a term that we assign to a work, is always a derivative of ‘diegetic’” (translated in [31]). And it is precisely such an imagined spatiatemporal universe, in this case created as a result of listening to electronic music, that we describe as consisting of diegetic affordances that are evocative of affects [30].

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Table 1. A comparison of the definitions of affordance and affect

<table>
<thead>
<tr>
<th>Affordance</th>
<th>Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-personal, structured information available in the (material) environment</td>
<td>Pre-personal intensity</td>
</tr>
<tr>
<td>Precodes cognitive processes</td>
<td>Unspecified intensity</td>
</tr>
<tr>
<td>Action possibility</td>
<td>Affective potentiality</td>
</tr>
<tr>
<td>Relative to the observer’s form</td>
<td>A phenomenal form</td>
</tr>
</tbody>
</table>

This table shows that these two concepts, by their definitions, are not the same. Both represent capacities, one pertaining to the perceived object and the other to the perceiver. If a link is therefore to be formed between the two, an affordance can be characterized as inductive of affect. While Massumi characterizes emotion as a sociolinguistic fixing of the experiential quality that is affect, he later underplays the one-way succession of affects and post-personal. This dual take on affect is also apparent in Freud’s interpretation of the concept: unconscious affects persist in immediate awareness to conscious thoughts and they are practically inseparable from cognition [26].

for different perceivers: a stone, on account of its physical characteristics, affords the action possibility of throwing for a human-being, while at the same time affording the action possibility of climbing for an ant. A very intense empathy is aroused in the film viewer, an awareness of being in the place and situation depicted. But this awareness is dual: the beholder is helpless to intervene. He can only find out nothing for himself. He feels himself moving around and looking around in a certain fashion, attending now to this and now to that, but at the will of the film maker. He has visual kinesthesis and visual self-awareness, but it is passive, not active. [23]
searchers concluded that, in the absence of frequency information, temporal cues can be sufficient to identify environmental sounds with at least 50% accuracy. Articulation of a so-called physical causality through the temporal configuration of sound elements is apparent in most of the pieces we used in our experiment, and in particular in gestures that bridge consecutive sections of a piece (e.g. 0.33° to 0.39° in Christmas 2013 and 1.27° to 1.30° in Dégexe).

In Birdfish, short-tailed reverberation and low frequency rumbles were utilized to establish the sense of a large but enclosed environment. These were reflected in the real-time descriptors with such entries as “cave”, “dungeon” and “big spaceship”. Similar cues in Christmas 2013 prompted listeners to submit “open sea”, “open space” and “sky” as descriptors. The spectral and reverberant attributes of the sound specify environments in various spatial proportions with the listener. This information implies, for instance, the affordance of locomotion (in which several cases manifested itself as that of “flying”).

In Element Yon, which inhabits a strictly abstract sound world, the frequency and damping characteristics of certain gestures instigated such descriptors as “metal balls getting bigger and smaller”, “high tone falls and hits the ground”. Here, distinctly perceptual qualities are situated with the listener. Another similar example is observed in the responses to gestures with high frequency content in Birdfish, which listeners characterized with such descriptors as “ice”, “glass”, “metal”, “blade” and “knife”. These descriptors imply both a metaphorical association and an affordance structure between high frequencies and a perceived sense of sharpness.

Many descriptors submitted by the participants of the experiment denoted living creatures. However, a portion of these source descriptors were augmented by featural descriptors to form such noun phrases as “tiny organisms”, “baby bird”, “little furry animal”, “huge ant” and “huge animal”. Here, featural descriptors signify the proportions of the organisms. In these cases, featural information available in the sounds afforded the listeners a spatial hierarchy between the imagined creatures and themselves. The linguist John Ohala points to the cross-species association of high pitch vocalizations with small creatures, and low pitch vocalizations with large ones [35]. He further delineates that the size of an animal, as implied by the fundamental frequency of its vocalizations, is also an indicator of its threatening intent. Based on Ohala’s deductions, the spatial extent of an organism communicated in its vocalization characteristics, which would possess a survival value in a natural environment, is an affordance of threat. Featural descriptors can therefore be viewed as indicative of affect.

Glimpse pitch variations in intonation are expressive of not only meaning [36] but also personality and emotion [37]. Furthermore, this is true not only of humans but also of vocalizing animals in general [38]. The gestures consisting of rapid frequency modulations of monophonic lines in Element Yon were therefore suggestive of an organic origin, as evidenced in descriptors such as “I guess he is trying to tell us something”, “communication”, “conversation”, “crying”, “scream”.

7. CONCLUSIONS

Music listening is a complex activity in which affect plays a crucial role. As our discussion of listening to electronic music has revealed, both the sounds themselves and the diotic affor- dances of these sounds may elicit affective reactions. It is the latter kind of affective reaction, in particular, that has a decisive influence on the manner in which electronic music may be interpreted by listeners. In the experiment results, we observed that diotic affordances guide the listeners to higher-level semantic associations, which we inherently infer their affective interpretation of a piece. As a consequence, we believe that further study into the relationship between diosis, affordance, and affect may contribute to a better understanding of what we hear in electronic music.

8. REFERENCES


