Noise/music and representation systems

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The word 'noise' has taken on various meanings throughout the course of twentieth-century music. Technology has had direct influence on the presence of noise, as phenomenon and as concept, both through its newfound ubiquity in modernity and through its use directly in music production – in electroacoustics. The creative use of technologies has lead to new representation systems for music, and noise – considered as that outside of a given representation – was brought into meaning. This paper examines several moments in which a change in representation brought noise into musical consideration – leading to a 'noise music' for its time before simply becoming understood as music.

1. INTRODUCTION

The use of the term 'noise' and, further, noise as concept has existed explicitly as a subject of discussion in Western music since the beginning of the twentieth century. It has taken on varied (often confounded) meanings within the context of electroacoustic music and recently has come to signify something very particular. 'Electroacoustic' itself has come to mean everything from the specificity of a genre to any music whose sound is not possible without electricity and electronics. It is in this latter sense that I use the term and which sets the context for this discussion, as a musical contemplation of noise has been tied to both the use of technology in the direct production of music as well as the burgeoning industrial soundscape of Western cities at the turn of the century. Both of these conditions are inextricably linked to the development and existence of electroacoustic music, and so too is the notion of noise as musical outside, leading to the notion of noise as music itself. We'll consider the im/possibilities of such sonic states by way of a consideration of the various usages of 'noise' throughout experimental musics of the past century.

This is not to say that no one questioned the appropriateness or even musicality of a sound prior to modernity – clearly present from Beethoven raising discussion surrounding the subjective notion of dissonance and its place within music to the tail end of the consonance/dissonance dialectic in Stravinsky's *Rite of Spring*, premiered in 1913. However, this same year the question of what constitutes an acceptably musical sound began to look outward – away from the autonomous realm of instrumental music and towards the din of the growing industrial landscape. In 1913, the Italian Futurist Luigi Russolo wrote his *Art of Noises*, in which he proclaimed: 'In the 19th Century with the invention of machines, Noise was born. Today, Noise is triumphant and reigns sovereign over the sensibility of men . . .' (Russolo 1986: 24–5). For Russolo and other Futurists, the motion, speed and power of modern city life (and of warfare) rendered all previous forms of musical expression irrelevant, proclaiming that 'pure sound . . . no longer provokes emotion' (Russolo 1986: 24–5). Their solution was to incorporate the so-called noises of technological progress into the fabric of musical composition, most notably through the construction of intonarumori – or noise-intoners. The goal was an abstraction of the essential timbral attributes of the industrial soundscape, and yet was mimetic in that '. . . listeners were apparently compelled to understand this new music in terms of its direct resemblance to the actual noises of the modern world' (Thompson 2002: 137).

Regardless of whether this was heard as 'city' or whether it was enjoyed, this objectification of noise as industrial soundscape and further abstraction of noise through musical representation and mimesis effectively recuperated 'noise' back into a musical framework.

While Russolo's noise was quite fixed in its opposition to music, the noise of Henry Cowell was based in acoustics and existed within music: '. . . a noise exists in the very tone itself of all our musical instruments' (Cowell 2005: 23). He argued that this existence of noise in music rendered any music/noise binary irrelevant. Though they were present, these aspects of tone existed outside of the musical representation of the day, and so necessarily acted as background, periphery, residue against which pitch took on meaning. This hidden residue of instrumental tones began to be exposed by Varèse, whose compositions explored these latent timbres, shaping them into organised sounds. He did not live in a vacuum, however, and these works were inspired by his experience of the modern American city[1] – Russolo meets Cowell.

[1]See Thompson 2002 for an interesting discussion of this.

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2. SYMBOL TO SIGNAL

To what extent can we consider these sounds to function as 'noise'? The word finds common usage as something that is unwanted, but it has become something more – a thing that makes no sense in our ordering of the world. If we consider music as sound given order relative to a set of codes – as a carrier of meaning, communication, expression as defined by these codes – then is noise necessarily 'extra-musical'? Decades after the Futurists' noise manifesto and several years after Cowell celebrated noisy tones, John Cage would identify the noise/music dialectic as a new boundary by which we might structure our conception of 'music': 'Whereas in the past the point of disagreement has been between dissonance and consonance, it will be, in the immediate future, between noise and so-called musical sounds' (Cage 1961: 3–4). Cage's approach differed from the Futurists in that he did not look to a source of noise, but rather to noise as a sense of 'outside' – relationally defined by one's attention and the process of listening. There was no attempt at recuperation through a musical representation, but rather an opening up of music to the possibility of 'all-sound'. He looked to the world around him in sound and considered its musicality: 'Wherever we are, what we hear is mostly noise. When we ignore it, it disturbs us. When we listen to it, we find it fascinating … We want to capture and control these sounds, to use them not as sound effects but as musical instruments . . .' (Cage 1961: 3). Once again, the desire is to grab hold of sounds, bringing them into meaning by imposing a musical ordering – not by reducing it to symbol but by ordering the sound *itself*. Russolo's noise was something that arose from technologies around him, in contrast to the silence of pre-industrial life, which he then transformed into musical pitches – noise made musical. Cage's noise of diffusion and of the periphery was always there, but his concept of noise *in* music was facilitated by the advent of recording, amplification and transmission – music formed from noise.

Thus the history of the conceptualisation of noise in music, noise as music and music as noise is integrally tied to the use of technology in the service of music, and as such is tied to the parallel development of electroacoustic music. It has shifted its true meaning with context, leaving in its wake noise-objects that others have attempted to commodify and over-aestheticise as did the Futurists. To avoid such a situation, in our attempt to codify and find appropriate representations for electroacoustic and experimental music, we should acknowledge the existence of that which cannot yet be placed in the context of that which already has been.

Through the developments of science and technology, noise has taken on a multiplicity of meanings with varying degrees of concreteness. In an acoustics context, it has come to mean very specifically a sound comprised of random fluctuations in time or of a broad frequency spectrum ('acoustic noise'). This is precisely the noise that Cowell referred to when he discussed the noise inherent in every musical tone – the attack portion of a bowed string instrument, the 'breathiness' of a flute, etc. In the context of signal processing, these sounds are treated as residual – as a difference that cannot be directly modelled. In the case of the so-called sinusoid + noise model, the sound that cannot be represented deterministically as slowly varying sinusoids is instead represented by a time-varying envelope of white noise, determined by the difference between the ideal of the model and the real of the signal. Similarly, in source-filter models such as LPC or the channel vocoder, historically used in speech applications, a noise source is acted on by resonant filters that impart a stable, deterministic spectral shape on the sound.[2] Interestingly enough, Russolo's intonarumori acted as a sort of source-filter model in that they consisted of a vibrating membrane (acting as source) inside a wooden box having a phonograph-like horn attached (acting as resonator/filter). Thus the Futurist noise-boxes were of the same fundamental construction as speech synthesizers, vocoders and later analogue synthesizers. The latter three were introduced specifically as a means of communication and expression, while the former was intending to break from all previous musical order. The difference is that in the time of the Futurists, music and language had long been mediated by symbolic representation, whereas by the time of the vocoder and synthesizer, recording technology allowed *sound itself* to be given representation. This sonic representation gave rise to models, and so the acoustic noise of source and residue that was once externalised was given form within the representation as embodied by the tools themselves.

Midway through the twentieth century, Claude Shannon articulated his theory of communications, providing another formal definition of noise ('communications noise') as any interference present in a channel between sender and receiver that obscures the intended message, thus preserving the subjectivity of 'disturbance'. This again presented a representation upon which communications systems could be modelled. Noise in this context acts on a signal, causing it to lose meaning. Aden Evens claims that 'Physicists have it backwards when they characterise the formal relationship as one where noise modulates signal . . . it is noise that binds the signal, that serves as medium . . .' (Evens 2005: 15), and thus in his formulation it is the signal that modulates noise, bringing it into the realm of meaning. These two points of view articulate the dual nature of noise as unwanted/disturbance and as background/outside.

The crackle of vinyl, radio static, tape hiss, etc., brought noise – both in the acoustic sense and in the

[2]See Zolzer (2002) for a discussion of these and other sound modelling techniques.

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communication theoretic sense – directly into the musical work. That is, in listening to recording or transmission as the primary musical event, the random fluctuations and interference patterns of the medium become an essential part of the work. A 'layer' exists between listener and communication, and the signal is modulated by a noise consisting of random fluctuations – thus collapsing acoustic and communications noise. To 'successfully' listen to the musical signal as represented by the symbolic score is to not listen to this noise, which in turns takes on meaning as silence. Even as the audibility of the medium took on meaning as background, floor, silence, later 'warmth', it was simultaneously foregrounded by artists concerned directly with the materials and tools at hand; this includes artist Moholy-Nagy and composers Milhaud, Hindemith and Cage, who all conceived of recording technology as a re-presentational instrument. It is not that they necessarily sought out the noises of the technological medium, but they were embedded within said 'instrument' – assuming the role of the noise Cowell found in every musical tone. The difference is that the noise was in the representation, and could not be written off as the *in-between* of notes on a page. This noise took on meaning as part of a musical object of contemplation even as it took its place as silence.

Certainly electroacoustic music has always had the medium itself as a central focus and has even defined genres based on this: tape music, computer music, laptop music, etc. This has been necessarily so in that the tools defined the available sound world, and so in a sense *were* the space of exploration. It is not that the medium was the message in the sense that it somehow became the content, but rather that the introduction of a new medium brought about changes in our reception of the content it carried and could not be divorced from this. Noise is the aspect of these changes in reception that we cannot immediately place. More specifically, with recording came a movement from symbolic to direct physical (signal) representation, bringing with it that which was previously un-representable and so came from 'noise'.

The process of this noise becoming music began with the ideas and actions of Russolo, Cage and others, but emerged *as* music beginning with the work of Schaeffer and *musique concrète*. Once the continuous, physical representation of sound was in place, Schaeffer and later others were able to develop a theory of sonorous objects giving noise in the dual sense of environment/background and as signal/disturbance a space to be understood musically.

3. NOISE AS A MEANS

Before the use of technological objects in music, noise was simply a burden. Afterwards, it became a process that obscured the line between music and 'otherness'. As Douglas Kahn notes: 'The existence of noise implies a mutable world through an unruly intrusion of an other, an other that attracts difference, heterogeneity, and productive confusion' (Kahn 1999: 22). This 'productive confusion' is precisely why noise should persist in the dialogue surrounding music. Anything can happen in noise only in its existence outside of established musical codes. While we proceed with our understanding and (inevitable) codification of experimental musics, we should not lose sight that there are always other ways of receiving sound as music and, by extension, the world. It is simply not enough, however, to define noise as 'the outside' or the complement to current musical order. This sort of binarism will bring it into a meaning and representation that succeeds in absolute noise abatement, because noise cannot carry meaning apart from itself *as* meaning. It is inevitable that the contemplation and identification of noise will bring about a new order, a new representation system whether in the larger context of art, in music, etc. The important thing is to be aware of this. According to Kahn, 'Avant-garde noise … both marshals and mutes the noise of the other: power is attacked at the expense of the less powerful, and society itself is both attacked and reinforced' (Kahn 1999: 48). To be aware of the potential of appropriated noise as counter-hegemony, we must not over-aestheticise it and abstract it from its context (social, environmental, etc.). This represents the 'failure' of, for example, Russolo's noise.

The anecdote of Cage entering an anechoic chamber in search of silence only to hear his own biological processes has been retold countless times. What is not always communicated, however, is his experience as 'not objective (sound-silence), but rather subjective (sounds only)' (Cage 1961: 13–14). Another way to articulate this might be to say there was a breakdown of subject-object, of self-other in his pursuit of the impossibility of silence. The pursuit of the impossibility that is noise has similar potentials. The potential lies in our desire to place ourselves in noise – even as it exists no place itself – rather than attempt to 'hear the world of sound without hearing aspects of the world in sound' (Kahn 1999: 4). Jacques Attali did just the opposite, listening to the world through sound (noise and music). That is, he considers music and noise as they exist within a capitalist system of production, and as such they are firmly rooted in their socio-economic context. The importance of this approach is that Attali then implicates the individual in the creation of meaning, through the '. . . conquest of the right to make noise, in other words, to create one's own code and work . . .' (Attali 1985: 132). This does not mean that Cage, who wanted to '. . . let sounds be themselves rather than vehicles for man-made theories or expressions of human sentiment' (Cage 1961: 10) was silencing the noise around him, as his lack of expressive intent does not

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determine one's reception of meaning. Rather, Cage introduced a noise/music dialectic through both his writing and his use of all-sound. Moreover, he introduced the *presence* of noise by his pointing of music outward into the world, causing a re-formation in our coded strategy of listening, and thus creating a noise-music for its time and place. Naturally this noise has dissipated, and our sonic environment as a place of musical discovery is commonplace. The extent to which Russolo's sound culminated in 'noise as music' is held in his notion of modern technology as music – in his hinting of the existence of an outside. To the extent that he wished to extract the sound of said technology and reduce it to the established musical representation, his was a dissipation of noise and re-affirmation of existing codes.

4. SIGNAL TO SYSTEM

What can be said about 'noise as music' – that is, noise as a phenomenon followed by its process of becoming music – after recording, Russolo, Cowell, Cage, etc.? We can look to the latter third of the twentieth century for one such development. By this time, devices of music technology – tape machines, phonographs, oscillators and tone generators, channel vocoders, and so on – were more visible (and audible) as tools of creation. They had boundary and definition, and they themselves were object representations of the new way of thinking in *sound* rather than through notation. Now that these musical objects had boundary, it only made sense to look towards the *in-between* of said objects, of the blurring of the line formed at their point of interaction. This exploration could be seen in the move towards live performance in the 1960s, and it is no surprise that Cage was at the forefront. His *Cartridge Music* of 1960 achieved a recontextualisation of music technology-as-instrument: rather than the phonograph as a re-presentation instrument, it was a proliferation of phonograph arms playing the physical presence of objects – not capturing and controlling the world but interacting with the world in a feedback loop.

In the decade to follow, a systemic view of music in the context of performance developed, and focus shifted from the objects of technology to the process of technology. In the summer of 1966, Pauline Oliveros devised a setup at the University of Toronto Electronic Music Studio that allowed her to '. . . [play] the classical studio in real time' (Pauline Oliveros Interview). The setup employed tone and noise generators, amplifiers and tape machines with feedback loops. In her own words: 'The whole set up was quite non-linear and required careful listening and instantaneous responses to play' (Pauline Oliveros Interview).

In performing the studio as instrument, Oliveros was interacting with/in a system, rather than controlling a device. The particular setup at Toronto produced the pieces *I of IV, Big Mother is Watching You*, *No Mo* and *Something Else*. In listening to these pieces we are listening to the *system itself* and the process of the sounds becoming. This type of work engenders a different listening strategy than a piece of tape collage. Content still matters as does materials that are input to the system, but rather than the form being determined solely by a sound's morphology (micro) and juxtaposition (macro), the interaction within (and with) the system endows it with form. In Oliveros' case, techniques such as a '. . . double feedback loop between channels . . .' lead to a '. . . continuous reiteration of attack until: it decays, a new attack occurs, or a resonant mode is activated . . .' (Oliveros 1984: 41). Rather than the noise of recording and transmission – of signal representation – as in earlier times, the noise here resulted from the 'instabilities' of the system: the by-product of amplified difference tones, the resonance brought on by feedback loops, these elements and fragments of source then fed-back to interact and collide with one another nonlinearly. Moving further in the direction of sonifying the processes of technological systems[3] are the electronics pieces of David Tudor, documented in works such as *Untitled* (1972) and later *Toneburst* (1975). As with Oliveros, Tudor wanted to reveal the inner-workings of a musical system by turning the process inside out. In his own words: 'The deeper this process of observation, the more the components seem to require and suggest their own musical ideas, arriving at that point of discovery, always incredible, where music is revealed from "inside", rather than from "outside"' (Tudor, in Adams 97: 14). The depth of Tudor's observation extended to the electronic component level, from which he built up his systems by way of modular electronic 'boxes' that today remain largely a mystery. While we can say that these musical building blocks achieve amplification, phase shifting and modulation, the truth is that the resultant effect of each box likely transcends these descriptions. Thus Tudor was subverting the accepted determinism and logic of electroacoustic music technologies at an atomic level. To further reveal the hidden voice within the cracks of his system, he took away the source and destination, leaving only the process. That is, he directly sent output to input, creating a 'feedback oscillation' that was a result of the system and yet existed no-place. With no input – no 'musical content' per se – and no form to grab on to, there was only the musical material that was the 'machine noise' of the past. That is, the once-noise of recording/amplification/transmission – given meaning through signal representation of sound itself – now became the musical material subjected to Tudor's inverted system. The object-centred noise, rendered musical in the move from symbol to signal, now interacted within this system.

[3]Other composers went down this path of creating interactive electronic systems whose process defined the music, including David Behrman and Gordon Mumma.

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When this dynamic interaction created a form and structure not patterned after a 'musical' ordering in time, a noise resulted not from any object but from the *process itself* – systemic noise.

It should be noted that parallel to the aforementioned developments of interactive electronic music systems, another development of systemic misuse via feedback as well as distortion was emerging in the structure of 'popular music'. This usage was centred around the guitar, beginning as early as Muddy Waters in the 1950s (Poss 98), through experimenters such as the Velvet Underground and Jimi Hendrix in the 1960s, the 1970s' early industrial music of Throbbing Gristle and into the 1980s with New York's 'no wave' scene, giving the sound a place in more of a popular musical context. The usage differs in that the systems of Oliveros and Tudor *were* the materials as well as the structure, whereas here the by-product is framed in a commonly accepted form of Western musical structure.

Inspired by these developments as well as free jazz, in the late 1970s and early 1980s, the Japanese artist Masami Akita further abstracted the sound and freed it from the guitar (taking Lou Reed's 1975 album *Metal Machine Music* as a point of departure). He called himself Merzbow in reference to the work of Dadaist Kurt Schwitters, and developed a sound that has been dubbed 'noise music' and heralded noise as genre. As with Tudor, Merzbow's sound is rooted in the misuse of electronics and the sound of systemic failure, dispensing with the guitar and utilising mixer feedback and broken electronics. Like Tudor, his sound material was the non-place of an inverted system. It is this idea taken to extremes – peering so far inside the system that we do not have a dynamic process, but a window that frames one part of this interaction, freezing it in time. In this regard, perhaps Merzbow is the culmination of so-called systemic noise? Paul Hegarty argues that in noise music's awareness of itself it somehow can '. . . endlessly live on the line between music and that which is perceived as noise . . .' (Hegarty 2002: 194), seemingly an impossibility if we consider noise as that which is outside of our systems of representation. I see Merzbow as existing on another line: between Tudor's systemic noise – defined by a perceived dis-ordering within the system dynamic – and the feedback/distortion sound objects from blues/progressive/psychedelic rock. In this sense, Merzbow is as much a form of minimalism or ambient music as it is noise.

The recuperation of systemic noise into a musical context is tied to the notion of a system – tape studio as instrument, network of circuitry, etc. – coming to be understood as 'instrument', 'piece', or something in between. It occurs when a musical process not based on a juxtaposition of sounds objects, and not based on the determinism of input/transformation/output can be perceived and understood as a musical form. Recent artists working in the digital medium have focused on generating processes that in one way or another sonify the non-deterministic qualities inherent within a system.

Kim Cascone articulates an 'aesthetics of failure' wherein '. . . it is from the "failure" of digital technology that this new work has emerged: glitches, bugs, application errors, system crashes, clipping, aliasing, distortion, quantisation noise, and even the noise floor of computer sound cards are the raw materials composers seek to incorporate into their music' (Cascone 2000: 13).

Thus the focus of interest is once again technological mis-appropriation. Whereas Tudor created a music defined by the complex nonlinear processes resulting from his system, recent artists such as Cascone and others generate such processes to use as musical raw materials. In the age where signal representation was the paradigm – of arranging musical sound objects – Oliveros' tape systems and Tudor's electrical systems were a sort of noise-music. As the dynamic musical processes that resulted from such systems came to be understood as musical forms – moving from a signal to a systems representation for music – they were able to be utilised by artists in the same way that Oliveros, Tudor and others used the noise-objects of the past.

5. CONCLUSION

It is important to remember that noise can and has taken on a proliferation of meanings in the twentieth century. In an absolute (and therefore non-existent) sense it can be seen as that which exists outside of systems of meaning and representation, as the process that obscures our understanding of this outside. In a Cageian sense it is that which escapes our attention – the background. Acoustics and communications describe it as randomness and as disturbance while noise ordinances have in the past simply identified it as loud sound. Looking at noise through the lens of twentieth-century music history, it can be seen that these definitions interact: the background of environmental sound was such because it existed outside of symbolic representation, as did the acoustic noise inherent in every tone (in the words of Cowell). The prominence of the modern city soundscape and the introduction of technology for recording/amplification/transmission caused artists to grab hold of this sound as musical material. In particular, recording allowed direct signal representation for the noise of background and of acoustics – the noises of the pre-modern world lead to a 'noise music' for its time and finally to a new music under a new representation. Later, the sonic objects brought about by recording became musical material within interactive electronic systems. Rather than hearing an arrangement of objects, the sound resulted from processes and interactions within the system itself. When these did not take on a perceptibly musical form or structure, a new sort of noise arose that resulted not

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from signal but from system. As a systems representation formed in which the tape music studio, the network of electronic feedback circuits, etc., came to be understood as musical instrument, piece or structure, this 'noise music' could be understood simply as music. The sonification of the system, its processes and their failures have now been appropriated and are the musical materials of choice for artists from 'Japanese noise' to 'glitch'. I do not claim that these are the only noises, and certainly not that these are the only artists seeking to expand the boundaries of 'music'. Rather, in this age where 'noise' has become genre, it is worthwhile to consider its place as musical other, and how this may have shifted throughout history. More than just the technology itself, the *possibilities* it afforded sparked a progression from symbol to signal to systems representations and the noises of the previous period became the new musical materials. I hope it is clear in this discussion that I do not think that noise is *a* thing or place – or that I claim to know some 'new noise'. There is and always will be many noises. Rather than fix a definition for it as musical style, we should perpetually consider where it might have been and where it might be now because, as Michel Serres notes, 'Noise nourishes a new order. Organisation, life, and intelligent thought live between order and noise, between disorder and perfect harmony' (Serres 1982: 126). Moving from symbol to signal to system, from object to process and from mechanical to communications and information systems, we can consider music and noise in the context of their representations (or lack thereof) as determined by the social, economic, political and (historically) technological systems that define them.

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