



LISTAHÁSKÓLI ÍSLANDS
Iceland Academy of the Arts

Tónlistadeild

New Audiences And Innovative Practice

Composing as Patching

Analog Synthesis, Listening and informed sound.

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Introduction.

In this essay, I will use audio signal processing as a metaphor for describing my musical composition and performative soundscape “Gita, to guess.” The metaphors I will use are drawn from independent synthesis modules that are found on my modular synthesizer. The sounds that I produce with my modular synthesizer depend on the interplay and relationship between these individual modules. “Gita, to guess” is a mixture of performed soundscape and spoken narrative, superimposed with music compositions influenced by jazz. Excerpts and paraphrases of the 2009 English translation of the ancient Hindu text “The Bhagavad Gita” by Eknath Easwaran are used as the text in “Gita, to guess.”¹ This essay represents a template for my method of composing. In this method, I approach the compositional process in the same way that I approach modular synthesis patching.² Rather than approaching composition as through-composed--composing in a linear order--the composition is made up of sections or modules that inform each other. “Gita, to guess” was composed using this template.

¹ “The Bhagavad Gita” is set on the eve of the epic battle, Mahabharata and is a dialogue between the prince Arjuna and his charioteer Sri Krishna, who turns out to be the God Krishna. At first Arjuna experiences the pending battle as meaningless. Krishna explains, that it is not for Arjuna, a human, to understand the higher plan of the Gods but to accept them and goes on to exemplify Hindu values. For more information about this narrative please see Easwaran, Eknath. *The Bhagavad Gita*. Tomales calif. 2009

² The modular synthesizer is made up of various modules. These modules are connected with cables and the connected modules are referred to as a “patch”. The process of connecting the modules is referred to as “patching” .



A modular synthesizer representation of “Gita, to guess.” www.modulargrid.com

Signal Generator: Signal Processing as a Metaphor for Listening

“Man I'm losing sound and sight, of all those who can tell me wrong from right, when all things beautiful and bright, sink in the night. Yet there's still something in my heart, that can find a way, to make a start, to turn up the signal, wipe out the noise.”³

In this Peter Gabriel lyrical verse, the signal is “something” that is of value to him in his “heart”⁴, whereas the “noise” is an obstacle. Signal to noise ratio (S/N),⁵ an important term of audio technology, indicates how loud a signal (a desired source) is compared to noise (an undesired source). I approach S/N as a metaphor for discussing listening as a subjective experience. At the core of this metaphor exists the question: what is the difference between hearing and listening?

³ Peter Gabriel, *Signal to Noise*.

⁴ The “heart” is here used as an image of identity or character.

⁵ “The ratio of the strength of an electrical or other signal carrying information to that of interference, generally expressed in decibels.” Oxford Dictionaries, s.v. “signal-to-noise ratio,” accessed May 5, 2018, https://en.oxforddictionaries.com/definition/us/signal-to-noise_ratio

The composer Pauline Oliveros writes in her book, *Deep Listening - A Composer's Sound Practice*, "to hear is the physical means that enables perception. To listen is to give attention to what is perceived both acoustically and psychologically".⁶ Listening is a cognitive action that relies on thought and experience. To illustrate this truth, let's turn to a little story about my niece. Brought up in Denmark with Faroese parents, my niece is bilingual. When she was asked as a child, "what does the duck say," she would reply, "in Denmark the duck says 'rap' and in Faroe Islands the duck says 'gvagg'." The duck's identity is not inherent in the "rap" or the "gvagg" but through the experience of nursery rhymes and children stories, my niece was informed that these sounds represent a duck. To her non Faroese speaking friends, the word "gvagg" would be perceived as noise as it doesn't contain any meaningful data.⁷ The distinction between signal and noise is not to be found in the sound itself, but in the perceivers ability to make sense of it. In the words of philosopher Jean-Luc Nancy, "...listening strains toward a present sense beyond sound".⁸

"Gita, to guess" is set within the soundscape of a café: with its associated sounds of chatter, cups clinking, chairs scraping across the floor and coffee making. These environmental sounds play a key role in "Gita, to guess." In my composition, I superimpose these café sounds with a recorded soundscape⁹ played through six speakers dispersed amongst the audience. The sounds utilized in the soundscape can be classified as unbound sounds. Unbound sounds are sounds, that are a byproduct of the action producing the sound.

⁶ Oliveros, *Deep Listening*, xxii.

⁷ "Random fluctuations that obscure or do not contain meaningful data or other information." Oxford Dictionaries, s.v. "noise," accessed May 5, 2018, <https://en.oxforddictionaries.com/definition/us/noise>.

⁸ Jean-Luc Nancy, *Listening*, 6.

⁹ I staged a café and recorded the sounds. I made four separate layers of sounds. Mouth sounds, tabletop sounds, floor sounds and coffee making sounds. These recordings are arranged on four separate tracks in Ableton Live (software music sequencer and digital audio workstation) giving me separate control of each layer.

For instance, clinking coins, a ringing cash register and tearing paper are unbound sounds because their sonic emission isn't the goal of the activity producing the sound. For instance, the purpose of dropping coins into the cash register drawer, is to keep the coins in the cash register drawer and not to make the sound of coins clinking. Closing the cash register drawer is not to make it ring but to keep the drawer shut. The meaning of the sound isn't bound to the action making the sound. When the aforementioned sounds appear as a rhythmic sequence in the intro to Pink Floyd's song Money¹⁰, they are produced with their sonic emission in mind. But I still refer to them as unbound sounds, because they are more often than not experienced unbound. Unbound sounds are malleable in that they are able to adopt the role of both signal and noise depending on the subjectivities of the listener.

In the book "On Sonic Meditation," Pauline Oliveros writes, "attention is narrow, pointed and selective. Awareness is broad, diffuse and inclusive".¹¹ I observe the dynamics of awareness when I am at a traditional concert. My attention is pointed at the stage where the written composition is emitting from. In addition to the sounds coming from the stage, I am also aware of the sounds happening around the stage--inside and outside the performance site. The reverberation of the room, the sound of the person next to me and the truck passing by outside are all sonic ingredients, that together with the activities on stage, compose the concert. The musicologist, Christopher Small discusses the relational qualities created in a musical setting in his text, "Musicking: The Meanings of Performing and Listening."¹² He writes:

¹⁰ Pink Floyd. *Dark Side of the Moon*, 1973.

¹¹ Pauline Oliveros, *On Sonic Meditations*, 139.

¹² Small, Christopher. 2010. *Musicking: the meanings of performing and listening*. Middletown: Wesleyan Univ. Press [u.a.].

“The act of musicking establishes in the place where it is happening a set of relationships, and it is in those relationships that the meaning of the act lies. They are to be found not only between those organized sounds which are conventionally thought of as being the stuff of musical meaning but also between the people that are taking part, in whatever capacity, in the performance.”¹³

As articulated, Small introduces the term “musicking” by focusing on the act of music rather than understanding music as an object. During the compositional process of “Gita, to guess,” I remained consciously aware of the subjectivities of attention through Small’s theoretical stance of musicking.

The recorded narration and pre recorded café soundscape, as well as rhythmic patterns of unbound sound in “Gita, to guess” are not coming from the stage but from dispersed speakers amongst the architectural site. By introducing “musical meaning” to the entire architectural site, I am including the entire architectural site in the music; including everyone in it.

As stated previously, the core of “Gita, to guess,” is founded on the relationship between signal and noise. This relationship is determined by each individual listener. One key influence that drove this intention is the composer, John Cage’s most famous work, “4’33.” This piece was written in 1952 for any instrument or combination of instruments.¹⁴ The piece consists of three movements of tacet. The performer or performers are instructed to not play their instrument for the duration of the piece. Although no sounds are to be produced by the musical instruments of the performers, the performers on the stage--like audience members--can produce sounds like breathing, coughing, and shifting. These sounds are

¹³ Christopher Small, *Musiking - The Meanings of Performing and Listening*. 1998.

¹⁴ Cage, John. 4’33”: for any instrument or combination of instruments. New York, N.Y.: Henmar Press. 2000.

superimposed with the environmental sounds of the site: electrical hum, cash terminal beeps, car engines moving past, and wind. These are unbound sounds. In “Gita, to guess” the distinction of signal and noise is blurred by the mixture of unbound sounds from the venue not intended as signals and the pre recorded and arranged unbound sounds, intended as signals. By including the venue itself in the composition, it becomes a module, an active ingredient, in the patch.

Ghost in the machine - Interlude I¹⁵

Listening Dictation: Place: Reykjavík Roasters. Date: 17th of April 2018“Hum, whirr, dunk, chink, pulse, whirr, squeak, pulse, whirr, ding, a pulse, whoosh, slurp, clink, clink, dunk, dish, a pulse, dink, ding, chatter, dish-dish, slurp, chatter, cups, clink, music, chatter, door, squeak, chair whirr, pop music, grinding whirr, money chingle, chatter, beans whirr, chair whirr, door, thump, cup clinging, beans grinding, “Do you smell it...coffee”, pop music, chatter, cash terminal beep, chair thump, metal twang, chatter cups clinking, beans whirring, cup dunk, pop music, drums, vocal, hi hat, minor to major to the chorus, beans grinding, How much coffee do they need? chorus again, laugh - a short one... not a real one, a new lower hum, paper bag rattling, chorus again, three chorus’ already?, where are they from?, speaking English, can’t make out the accent, coffee grinding, they are grinding into bags for selling, new song, slower, softer, paper bag rattling, female singer in the chorus, beep beep beep, coffee grinding, dunk’s, can’t make out the accent whilst the coffee is grinding, chatter, Irish accent, don’t know what they are talking about though, dum-dum-dum, chorus both male and female this time, cups, spoons, “Skilur þú még ekki?” vinyl crackle from the speaker, “Northern Ireland - Belfast”, pop music from the speaker.”¹⁶

In this listening journal entry, inspired by Pauline Oliveros’ *Sonic Meditations*, we can observe my S/N listening from passive to active; noise to signal. In the beginning of this

¹⁵ In this text, I will include two “Ghost in the machine Interludes.” These brief journal entries are meant to emulate diversions that often occur during the patching process involved in making sound using an analog synthesizer. While patching, unexpected, yet inspiring results occur. I call these moments, “Ghost in the machine.”

¹⁶ Composer Pauline Oliveros writes in the introduction to her work, *Sonic Meditations*, “sonic Meditations are an attempt to return the control of sound to the individual alone” (Oliveros 1974). Using Pauline Oliveros’ Sonic Meditation “Learning to Fly,” I am attempting to control the perception of sound.

journal entry, I am practicing a reduced listening¹⁷ where I focus on the phonetics of the sounds. Reduced listening emulates¹⁸ hearing or passive listening as the sounds aren't allowed to trigger any cognitive action.¹⁹ When I write the word "pulse," I start to describe an effect of a sound. "Pulse," in this case, becomes "a pulse" indicating that I have noticed a pattern which evolves into "music." "Where are they from?" indicates a curiosity, a heightened interest in the sounds from the next table over from me. The moment where I write, "can't make out the accent while the coffee is grinding," demonstrates an unfavorable S/N between the conversation in the space and the coffee grinding. This illustrates cognitive filtering of the sound, distinguishing signal and noise.

Synthesizer: Signal processing as metaphor for informed sound.

"You are only coming through in waves. Your lips move but I can't hear what you're sayin'.²⁰

In these two lines, Pink Floyd is describing a listener who does not understand a being (most likely a human) talking. Sounds appear to be produced but are not carrying any information. The analog synthesizer generates sound using a voltage-controlled oscillator (VCO)²¹ that creates voltage oscillations at frequencies within the audible range (20 Hz -

¹⁷ The composer Michel Chion writes in the book "Audio Vision, Sound on Screen": "Reduced listening takes the sound - verbal, played on an instrument, noises or whatever - as itself the object to be observed instead of as a vehicle for something else." (Chion 1994, 29)

¹⁸ I call this emulating because some cognitive action is required to write the sounds in letters. Ideally this practice should be done without writing.

¹⁹ There is some cognitive action required, to link the sounds heard to letters and subsequently writing them on paper. To avoid this cognitive action, the listening experience could be committed to memory, but that would include another cognitive action.

²⁰ Pink Floyd, *Comfortably Numb*. 1979.

²¹ "A VCO is tuned by the application of a control voltage. As the control voltage is changed, the signal output (frequency) changes." (Chadabe 1967, 108) Control voltage is a signal that can vary in voltage.

20.000 Hz). I think about the synthesizer as a metaphor for discussing talking as informed sound. What is the difference between making sound and making informed sound?

Applying rhythm²² to sound generates patterns that can be recognized and used to convey information. This is utilized in morse code²³ where a signal is turned on and off. On the modular synthesizer, the audio signal is turned on and off with the voltage-controlled amplifier (VCA.)²⁴ The VCA responds to control voltage (CV). When the VCA receives a CV signal of 0V no sound is passed through. As the CV signal is increased the volume of the sound passed through the VCA is increased accordingly. To create a pattern, a sequencer²⁵ is used. The sequencer stores gate²⁶ and CV information to be transmitted, one after the other based on incoming gate messages. The series of events stored in the sequencer is called a 'sequence'. The module sending the sequencer gate messages is called a 'clock source' and the messages are called the 'clock signal.' The clock signal is usually a steady pulse of gate messages causing the sequencer to output the stored gate and CV information as a steady stream. Sending an audio source to a VCA controlled by gate signals coming from the sequencer as CV produces a rhythmic audio pattern. In "Gita, to guess" samples of unbound sounds are triggered with a sequencer and played back through the speakers dispersed

²² "The systematic arrangement of musical sounds, principally according to duration and periodic stress." Oxford Dictionaries, s.v. "rhythm," accessed May 3, 2018.
<https://en.oxforddictionaries.com/definition/us/rhythm>

²³ "an alphabet or code in which letters are represented by combinations of long and short signals of light or sound." Oxford Dictionaries, s.v. "morse code," accessed May 3, 2018.
https://en.oxforddictionaries.com/definition/us/morse_code

²⁴ A VCA (voltage controlled amplifier) is "...a circuit or module that varies the volume or amount of gain of an incoming audio signal by responding to changes in voltages or digital values that arrive at its control input..." (Vail, 2014).

²⁵ "...an analog sequencer typically has knobs or sliders arranged in one to three rows of eight or sixteen columns. It traditionally scans from left to right across the columns, transmitting gates or triggers and control voltages based on the knob positions" (Vail 2014).

²⁶ A gate signal is a CV signal that is either 0v or a fixed positive voltage (depending which standard is used) resembling an on/off switch. The CV signal stored in a sequencer can vary between 0v and a positive voltage (depending which standard is used).

amongst the audience, creating recognizable audible patterns from various directions.

Hearing the unbound sounds from around the café as “organized sounds”²⁷ is hearing the café being performed as music.

Adding pitch variations to the rhythm of the sound adds another layer of information. To achieve this on the modular synthesizer, the CV information on the sequencer is applied to the VCO on the modular synthesizer. The sequencer now sends gate signals to the VCA and CV to the VCO producing a rhythmic pattern that varies in pitch; a melody. In “Gita, to guess” melodies are used in the form of musical compositions, to demonstrate bound sounds and to act as a counterpoint to the unbound sounds. “Dánjal” is a composition with a section, where the instruments have short four bar solo sections that go back and forth between the musicians, resembling a conversation. “Røtur og trø” is a composition that has lyrics²⁸, even though it is performed instrumentally in “Gita, to guess.” The words are based on the image, that the roots of a tree are similar to its branches. As the branches extend higher into the sky so do the roots grow deeper into the ground. This image also represents “Yggdrasil” the tree of life and an image of the cosmos from Norse mythology; a Norse counterpart to the Hindu theme of “Gita, to guess.” The title “Narvana” is a wordplay based on the Estonian town, Narva, and Nirvana, that appears in “The Bhagavad Gita.”²⁹ “It Started With a Drum” also has lyrics and is constructed in such a way, that the first four phrases end on the letter “m” which is sustained, sampled and looped. This produces a sustained “mmm” sound associated with meditation which in turn is closely associated with Hinduism.

²⁷ Varése, “The Liberation of Sound” *Perspectives of New Music*, Vol. 5, No. 1 (Autumn - Winter, 1966), pp. 18 . In this article composer, Edgar Varése defines music as “Organized sounds” .

²⁸ Trøini, sum aldrin bera frugt. Børmini, sum aldrin hava hugt. Aldrin hava sæð, røtur sum eitt træ, skilja ei tað... The trees, that never bear fruit. The children, that have never looked. Never have seen, roots as a tree, do not understand...

²⁹ “And the state attained is moksha or nirvana, both of which signify going beyond the conditioning of maya – time, space, and causality.” - Eknath Easwaran. “Bhagavad Gita.” iBooks. 2007.

Probably the most common way to make sound carry information, is to shape vocal sounds into words. In “Gita, to guess” I collaborated with text writer Hans Jacob Kollslíð and actor Búi Egason Dam. Hans Jacob Kollslíð translated passages of “The Bhagavad Gita” into Faroese. Búi Egason Dam’s narration of the passages was recorded and arranged, together with the café soundscape in Ableton Live. The narration is divided into three sections. A selection of Arjuna’s questions paraphrased into one text, Krishna’s answers to Arjuna’s questions and Arjuna’s recognition of Krishna’s divine wisdom. The sections are played back through the speakers dispersed amongst the audience. The musical compositions are performed in between the narrated sections. Arjuna’s questions are first played at a low volume so they blend into the café soundscape. The questions are then repeated, this time at an audible level. Krishna’s answers are then played back, individually, in random³⁰ order and from random speakers amongst the audience. “Gita, to guess” ends with playing the narration of Arjuna’s recognition of Krishna’s divine wisdom.

Composer John Cage says in an interview “When I hear, what we call music, it seems to me, that someone is talking.”³¹ I use this analogy to emulate the conversation in “The Bhagavad Gita” in the form of improvisation sections within the musical compositions performed. The improvisations are performed in such a way, that the musicians switch the role of soloist and accompaniment frequently, resembling a conversation, where persons talk back and forth, rather than one soloist performing an entire solo, resembling a speech. The musicians are further encouraged to include sounds in the improvisation, not originating from

³⁰ The answers are arranged separately in Ableton Live. I trigger a random generator that chooses what answer is to be triggered.

³¹ Cage, John. “John Cage About Silence.” Youtube. July 14, 2007. 4:18.
<https://www.youtube.com/watch?v=pcHnL7aS64Y>

the pre recorded material or the musicians performing. This is done, by listening for unbound sounds from the café and reacting to them, as if the café was a musician performing. In this way, I also create a musical conversation between the music and the unbound sounds of the venue.

“Gita, to guess” is a musical context where compositions and sounds are used to instigate a listening environment. Instead of trying to eradicate the unbound sounds of a given venue, as a traditional concert does, "Gita, to guess" accommodates the unbound sounds as part of the music performed as well as the musical context. As a composer/performer I have experientially learned to embrace the order and chaos of unbound sounds. “Gita, to guess” is my way of giving the unbound sounds a voice.

Ghost in the machine - Interlude II³²

TheHserre ie wse h ocnoiteld noeibse wlt'sea coy n tthfoesuo
sasiothinds non k f tpeaioplmbocue alll ata ilgkati. Ling et'sna ts. al
ny et twbove e rs armpee teiopmlallyee a ,rew anttea lkainnd idgt a
tto te twlthe same ill l sound anybody like timea this. , Your but
blurred I brain decided roar. can White the normally hell noise
"with has itpick out" . a similar effectIf one . people You want to of
hear so the many judge me different two voices tones on all and at
the this, actually same listen they timecan go , it youblurs to into it
-and knowunderstand it-. wherethat . If I don't know three 'people
are why hissing' or talking simultaneously, your it brain can 'took
me probably still pick so out shushing' long to one look soundvoice.
It's . However, into also this. Maybe why because I if nature 1,000
soundspeople , believed such as rainare that , talking simultaneously,
wind, there is waterfalls or I was oceans, no way the only are often
included on one cursed that your brain can with this pick out one
voicesight. . It white noise Misunderstood I see little dots or players.
flickers during There are the day and in turns out the night so many
different tones that 1,000 people talking that can only be together
sounds created by those forces of naturedescribed as a lot like , that
it turns into natural white noise

Conclusion

In this essay, I have discussed how I use audio signal processing as a metaphor for approaching my musical compositions. I specifically focused on my performative soundscape "Gita, to guess." I have described how "Gita, to guess" uses bound and unbound sounds, signals and noises. I have described how listening is a subjective act. Further, I have

³² "Ghost in the machine - interlude II" is a letter based interpretation of noise and signal conflation. Three texts, describing white noise, are attributed each their colour. An algorithm, utilizing a computer made random generator is deciding how the texts are mangled together. This is how I experience three people talking at the same time.

described the individual components of “Gita, to guess” as modules. The result is a performance and a ‘patch’ called “Gita, to guess.”

When I build a patch using my modular synthesizer, the modules are connected and configured in different ways. The modules interact and behave like a complex organism.³³ I interact with the “organism” to make different sounds and through the sounds, the “organism”, in a way, communicates back to me. Because of the many interactions between modules this is a complex “organism”, that I don’t fully know. Through our interaction we converse and my performances with the modular synthesizer is a display of a conversation between myself and the “organism” I configured.

The artistic practices used in “Gita, to guess” are present in previous works of mine. “Barr-in,” is a 23 channel recording of a bar in Tórshavn. The recording is played back through 23 speakers in a space not resembling a bar. This led to the curiosity of a multichannel audio social setting as a backdrop for a performance. The piece “Nerasuf” for trombone, guitar, percussion and recording, starts with recording 20 seconds before the musicians start playing and this recording is played back later in the piece, whilst the musicians are playing. This way, recorded unbound sounds are included in the music performed, a key element of “Gita, to guess.”

“Gita, to guess” is now a patch made up of modules: Pre recorded unbound sounds of a café sound environment, sequences in the form of compositions, a six speaker array configuration, and a recorded narration based on an ancient Hindu text. As with the modular

³³ “A whole with interdependent parts, likened to a living being.” Oxford Dictionaries, s.v. ”organism,” accessed May 3, 2018. <https://en.oxforddictionaries.com/definition/us/organism>.

synthesizer, I now interact with this “organism” and get to know it. As with the modular synthesizer, the modules in “Gita, to guess” interact and a change on one module can change the behaviour of many. For instance, I could add a section, where the musicians have a series of events, i.e. notes and rests, stored in scores similar to a sequencer. Each musician then chooses an unbound sound to be the clock signal for the sequencer. For instance, a musician could choose the sound of glass clinking to be a clock signal. Every time the unbound sound, in this case glass clinking, is heard, the musician advances one step in the sequence. This sequence module is still in line with the composition “Gita, to guess” as it attributes a signal value to an unbound sound. But this module can also address other topics. For instance, if the musicians decide not to use the same unbound sound as a clock source, their sequences will not advance in-sync. This might entice me to alter the ‘narration module’ so it will reflect the out-of-sync behaviour of the musicians. For instance, one of Arjuna’s questions could be played and be replied by an answer of Krishna’s intended for another question. A minor adjustment, in this case adding a module, has an effect on how the other modules behave and consequently how the “organism” behaves. By describing “Gita, to guess”, a programmatic composition, as a patch, I am now beginning to envision a modular synthesizer patch as a programmatic composition.

On the horizon, the duo “Resterne af Rigsfællesskabet” featuring myself and Jesper Pedersen on modular synthesizers in collaboration with Greenlandic dancer/actor/musician Miké Thomsen on traditional Inuit drum dancing will implement and refine the composition template mentioned in this text. In May 2018 “Resterne af Rigsfællesskabet” received a grant from Nordic Culture Point to realize a project, where the trio sets up performances in Denmark, Faroe Islands, Greenland and Iceland. The performances deal with the current and

historical relationships between the countries in the Danish commonwealth and Iceland, the country that most recently became independent from Denmark. In addition, I have received three months artists salary from the Faroese government, to work this project and to develop “Gita, to guess” further.

(Postscript) Filter: Signal processing as metaphor for Character.

I remember getting my first wah-wah³⁴ pedal in 1995. I couldn't understand, how I had played guitar without it. I still have it on my pedal board³⁵. Since then, modifying the frequency content of a sound during a performance has been a favoured practice of mine. When performing with the modular synthesizer, I often simulate vocal overtone singing, by exaggerating partials of a sound source using a bandpass filter with a high resonance setting. I have noticed similarities between the sonic phenomenon, that a resonant filter produces and how I perceive the world around me. When the filters' resonance is set sufficiently high, it exaggerates the set frequency. If the sound source being filtered has any information/energy at the set frequency, the frequency is exaggerated to produce an audible pitch. I compare frequencies to moral values and the world to a sound source full of different frequencies or values. When people sharing common values gather in groups, they reinforce their values. This has the same effect as applying several filters, with the same frequency setting to the same sound source, effectively raising the resonance of the filter.³⁶ As individuals, I believe we are filters set at certain frequencies, resonating with the world around us, producing a

³⁴ A wah-wah pedal is a bandpass filter where the frequency is controlled by the foot. This effect was made famous by Jimi Hendrix's Voodoo Chile amongst others. A bandpass filter lets a band of frequencies through the filter whilst rejecting others based on two parameters; frequency and resonance. Frequency determines the center frequency of the band and resonance is an indication of how narrow the band is.

³⁵ A contraption to have guitar effects pedals mounted on.

³⁶ This can be compared to the phrase “This resonates with me” meaning: “I find this agreeable.” Curiously, the resonance on a filter works similarly by feeding the filtered audio signal back into the filter to be refiltered.

sound. The sound of the individual is added to the world, to be filtered again, by the same individual as well as others and so we are all temporary filters in a perpetual feedback loop.

If I imagine the frequency content of the universe, I imagine it as white noise³⁷. In the book “The Computer Music Manual” Curtis Roads describes white noise as a sound that has “... a flat spectrum (i.e., in a long segment of white noise all frequencies are equally strong on the average) ... Even though all frequencies are present in white noise, it evokes no sensation of pitch...”.³⁸ When routing white noise through a bandpass filter with a high resonance setting, the set frequency is heard as a clear pitch. David Novak writes about noise in the book “Keywords in Sound” where he describes the reactions of then-Prime Minister Noda Yoshihiko to anti nuclear protesters sound demos. “Noda initially dismissed the demonstrations as just “a loud noise”: but by the end of July 2012, ..., he began describing the sounds of the protests as ‘unheard voices’ to which he would ‘carefully listen’ (Noda, 2012).³⁹ Noise is a collective of signals and shouldn’t be dismissed as insignificant. Based on this, I have built a computer synth (using the computer software Max7) where bandpass filters are applied to a given sound source and the frequencies of the bandpass filters are determined by a piano keyboard. This computer synthesizer along with “Ghost in the machine - Interlude II” and the comparison of individuals and filters all came about unintentionally⁴⁰ whilst preparing for this essay. All are dealing with the filtering of noise and are now in the process of being shaped into a future project, separate from, but triggered by “Gita, to guess.”

³⁷ Brandon Labelle writes in the book *Background Noise. Perspectives on Sound Art*, “... the Ursound as primary soundscape must in the end be pure noise, as the sound of the universe exploding into being, its signals still traveling, as white noise from dying stars” (Labelle 2015, 239).

³⁸ Curtis Roads, *The Computer Music Journal*, 1063

³⁹ David Novak, *Keywords in Sound*, 133

⁴⁰ Like a “Ghost in the Machine.”

Bibliography

Cage, John. 2000. 4'33": for any instrument or combination of instruments. New York, N.Y.: Henmar Press.

Cage, John. "John Cage About Silence." Youtube. July 14, 2007. 4:18.

Chion, Michel, Claudia Gorbman, and Walter Murch. *Audio-vision: sound on screen*. New York: Columbia University Press, 1994.

Easwaran, Eknath. *The Bhagavad Gita*. Tomales, Calif: Nilgiri Press, 2009.

LaBelle, Brandon. *Background noise: perspectives on sound art*. New York: Bloomsbury, 2015.

Lucier, Alvin. *I am sitting in a room: for voice on tape*. New York: Lovely Music, 1990.

Nancy, Jean-Luc. *Listening*. New York: Fordham University Press, 2009

Novak, David, and Matt Sakakeeny. *Keywords in sound*. London : Duke University Press, 2015.

Oliveros, Pauline. *Sonic Meditations*. United States: Smith Publications, 1974.

Oliveros, Pauline. *On sonic meditation*. La Jolla, Ca: Center for Music Experiment and Related Research, University of California at San Diego, 1973.

Oliveros, Pauline. *Deep Listening: A Composer's Sound Practice*. Lincoln, Neb: iUniverse, 2005.

Oxford University Press. *Oxford English Dictionary Online*. [Oxford, England]: Oxford University Press, 2002.
<<http://www.oed.com>>.

Roads, Curtis. *The Computer Music Tutorial*. Cambridge, Mass. [u.a.]: MIT Press, 2012.

Small, Christopher. *Musicking: The Meanings of Performing and Listening*. Middletown: Wesleyan Univ. Press [u.a.], 2010.

Vail, Mark. *The Synthesizer: A Comprehensive Guide to Understanding, Programming, Playing, and Recording the Ultimate Electronic Music Instrument*. New York, NY: Oxford University Press, 2014.

Varèse, Edgard, and Wen-Chung Chou. 1966. "The Liberation of Sound". *Perspectives of New Music*. 5, no. 1: 11-19.

Discography

Gabriel, Peter. *Up*. Real World PGCD11, 2010, CD.

The Jimi Hendrix Experience. *Voodoo Chile*. Polydor 2095-001, 1963, single.

Pink Floyd. *The Wall*. Harvest SHDW 411, 1979, LP

Pink Floyd. *Dark Side of the Moon*. Harvest SHVL 804 1E 064 o 05249, 1973, LP.