The Kerf of Sound

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A Dissertation presented to the Graduate Faculty
of the University of Virginia in candidacy for
the Degree of Doctor of Philosophy

Department of Music

University of Virginia
April 2025

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Abstract

This dissertation explores "kerf"—the width of material removed by a saw blade—as a conceptual framework linking material-driven experiences in instrument making to philosophical questions of absence and presence. I extend kerf beyond a physical consequence of woodcraft towards a suggestive, destructive parameter that connects my dual creative research: “composing instruments” made from wood, wire and composing "Tinnitus Music" in response to hearing impairment.

Chapter 1 examines kerf through the arbrasson, a rubbed, friction idiophone created with chainsaw cuts in wood. This instrument draws inspiration from the livika of New Ireland—a carved log with three "tongues" that produces piercing sounds when rubbed with moistened palms during Malagan funeral ceremonies. The chapter compares these instruments, asking how much of the livika lives on in the arbrasson. The chapter also features a first-hand account of building arbrassons and making music with them.

Chapter 2 chronicles my decade-long practice (2014-2024) of composing instruments through various daxophone designs: The Starship Daxophone, The Student Model, Apprentice Model, Seaplane Model, Doubleneck Tripod, and Minimal Daxophone. These instruments function as para-compositions, shaping specific sonic aesthetics before they're even played. Technical descriptions are balanced with first-person accounts of woodworking processes and the relationship to wood as a material.

Chapter 3 analyzes tinnitus itself as a form of kerf—an absence that manifests as presence and a damage that gives way to material in the form of pitches and responses to sound. I document how my musical responses to this condition have evolved through two projects: *Tinnitus Journal* and *Masking Songs*, one finished and one unfinished composition that each encounter my tinnitus differently.

The dissertation concludes with a multimodal experiment—a nearly two-hour film documenting an extended conversation between synth designer Peter Blasser and myself.

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Introduction

0.1 Woodworking as Electronic Music

Working with wood is subtractive synthesis. With blade or saw, you whittle away chips from the blank until you are left with something new, that constitutes a specific articulation of form against an unarticulated mass—a tuned note excerpted from the all-sound, a spoon out of a tree branch. And, just as trees grow wild, ceaselessly, in nearly every biome, the ambient noise which always surrounds us saturates our perception. To make music is to carve out space in the world to differentiate from this allsound, to create signal in the mulch of noise. The first cut into a piece of wood is like the first note played in silence - it creates a division; it defines what will be heard. Before the cut, possibilities are infinite but formless. After, we work within the boundaries of what's left, shaped by what's been taken away. And, to make things from wood is to take the world of material—be it the space of sterilized, dried wood known as "lumber" or the space of wet, raw wood known as "trees"—and to transform it with the saw into something beyond the sum of its parts: organizing fibers, organizing frequencies.

There is always something left over from this encounter—a residue. The woodworker can scarcely imagine making a single cut without producing a cascade of dust of chips. The width of the saw blade determines not just how much material is shredded down into sawdust, but what forms are possible in what remains. The proper term for the width of the blade is the word "kerf", which stems from an old Middle Dutch word which means "to carve." Kerf can mean many things. The saw creates a thin

channel in the material—that channel itself is called the kerf, too. It is waste, or negative space. It is an empty word, and its space suggests something is possible. In this way, a kerf is like a “hole”—one would count the holes in a shower drain as things, but they are not objects, they are absences. A kerf defines its opposite. Take for example, the sumptuous sculpture below, a work from sculptor Christian Burchard, a piece that I wish was a musical instrument. A rigid piece of lumber can easily be bent into any shape if it is kerfed repeatedly to 2mm below the surface. The kerf makes this twisted sculpture possible; it suggests a legacy of tactics that makes this thing no longer just wood. It is empty space, and it is the vestige of the thing which made that space. It is absence, and it is presence. In fact, it is not a binary but trinary: It is space, and it is a thing, it describes what made the thing.

Figure 1: A Slow Unfolding, Christian Burchard, Pacific Madrone[1]

Sound suggests a different legacy of residues, and a different way of shaping the world. Sculptures do not disappear when we close our eyes. But sound is vibration, and after the song is over, vibrations do stop. The woodturner Dennis Elliott once mused, “In creating music, you’re creating out of thin air. There’s no material that you’re working with when you begin. When you’re working with a solid object like a piece of a tree, you can only do it once. The responsibility is therefore greater than creating a new song which can be wiped out and started again.”[2] He's not the only one to think this way. Isidore of Seville, in the 7th century: “Unless sounds are remembered, they perish, for

[1] “Christian Burchard, A Slow Unfolding,” Momentum Gallery, accessed March 29, 2025, https://momentumgallery.com/artists/57-christian-burchard/works/5652/.
[2] Dennis Elliott, “Dennis Elliott - Lathe Turned Wood Sculpture - Dennis Elliott Studio,” accessed March 29, 2025, http://www.denniselliott.com/description.htm.

they cannot be written down." Eric Dolphy also famously said, "When you hear music, after it's over, it's gone in the air. You can never capture it again."

These observations come from a great and longstanding tradition of exploring the immateriality of music[3]. Don Idhe writes, "The auditory world is one of "flux" and it is primarily temporal. I close my eyes and note that one sound follows another, that a single sound "exists" for a moment and "passes away," and that there is an "in-constancy" to this "region" in which the surging of time is dramatically present. This intimacy of temporality with the auditory experience forms a central tradition concerning sound and may be found recorded by philosophers as diverse in points of view as Søren Kierkegaard, Edmund Husserl, and P. F. Strawson".[4] Idhe's bibliography indexes the historical scope of this perspective. Still further, in her 2004 essay "Music: Drastic or Gnostic", Carolyn Abbate explores a framework for considering musical temporality. Abbate: "Musical sounds are made by labor. And it is in the irreversible experience of playing, singing, or listening that any meanings summoned by music come into being."[5] This perspective, the "drastic", is characterized by immediacy and the material presence of music. Through "drastic", Abbate is referencing Vladimir Jankélévitch, distinguishing the apprehension of music as a "gnostic" thing, i.e., a "text" to be studied. The gnostic disciplines approach music through the traditions of score analysis, research, or interpretation. Yet, analysis is not how we *experience* music. Thus, this scholarship attempts a corrective of music's status as a stale textual object and instead hopes to

[3] To distinguish sound from music is outside the scope of this dissertation, but the field of sound studies is replete with affirmative and pessimistic texts which maintain and refute the relationship between sound and music.
[4] Don Ihde, *Listening and Voice*, Second edition (Albany: State University of New York Press, 2007).
[5] Carolyn Abbate, "Music—Drastic or Gnostic?," *Critical Inquiry* 30, no. 3 (2004): 505–36, https://doi.org/10.1086/421160.

restore both its phenomenality and its physicality. It stems from earlier critiques, such as Adorno's critique of the work concept in music, which renders music as a cultural commodity (inline with the score) rather than an experience in time. Sound's magic lies in its flux, its impermanence, its fleeting nature, which registers the power of the moment in which we experience it.

But, somehow, people who listen know this to only be one part of the story. Why then, do I hear, on demand, in my mind's ear, "2 Towers"[6], a song I have listened to by the noise-rock band Lightning Bolt perhaps over one thousand times? And then, why do my ears ring, after I go to see them perform? Sound begins in material. There is no thin air. A rosined bow strokes a thin tongue of hardwood and causes it to vibrate; its vibrations cause a wafer of piezo quartz to create a voltage; that voltage travels inside circuit boards and eventually emerges from physical speakers, electromagnets pulsing and shaking thin paper diaphragms in direct proportions to the voltage across their coil; the speaker oscillates inside a hollow wooden box that amplifies through its resonance. Air molecules collide and compress, mechanical waves travel through space until they reach our ears. Again, I think about that dust left over by the kerf of the sawblade. It reminds me of one of history's most memorable attempts to visualize sound by Ernst Chladni, first published in 1787 in his book *Discoveries in the Theory of Sound.* Chladni sprinkled sand over a thin metal plate and bowed it with a violin bow, which, as it resonated, displayed the most curious patterns. These patterns are nodal still points—the areas of most minimum vibration—and as pitch changes by bowing or resonance,

[6] Lightning Bolt, "2 Towers," Youtube, November 20, 2009, https://www.youtube.com/watch?v=UTPLcst4OL8.

different patterns emerge, demonstrating the physicality of an otherwise invisible phenomenon.

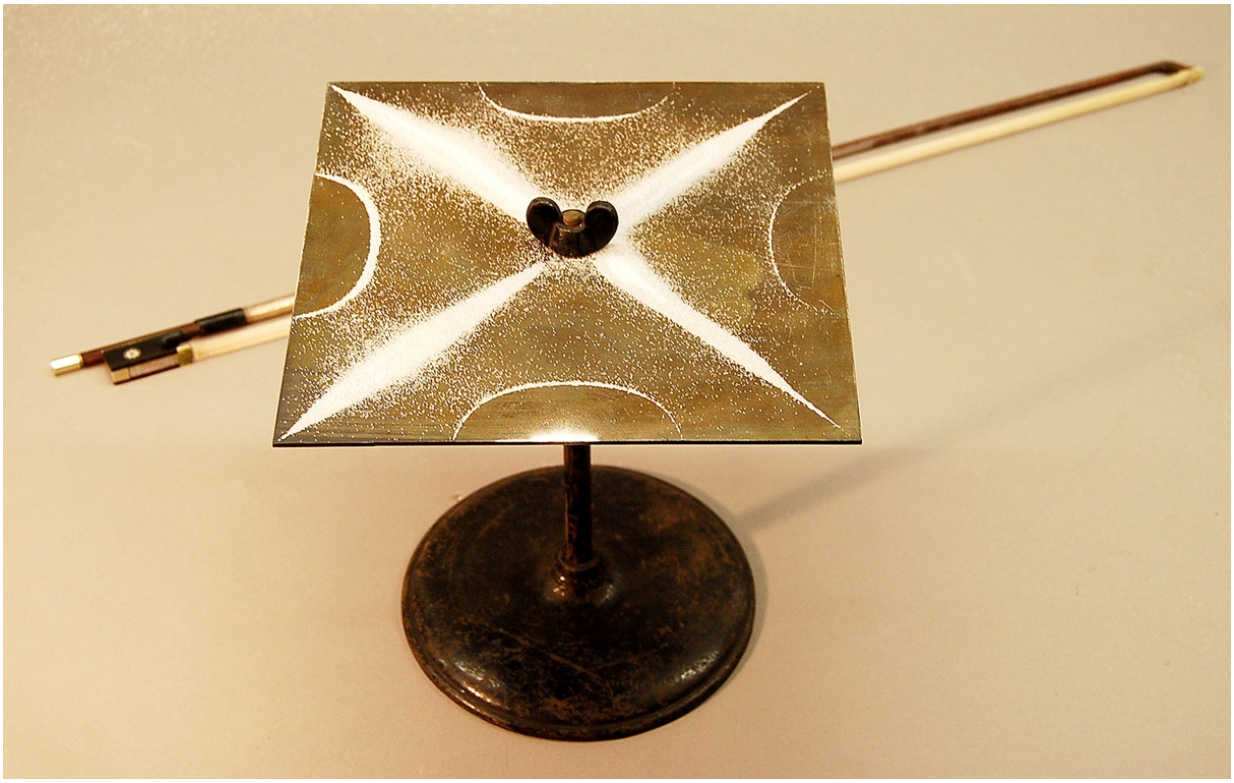

Figure 2: Chladni Plate, Smithsonian Collection[7]

Chladni's innocent experiment shows us the alchemical remainder of these sonic happenings. Music does not merely just disappear, but it reorders its subjects. Sound shapes, sound scatters.

And *before* the sounds, someone had to build the instruments.

[7] "Smithsonian - Chladni Plates," accessed March 29, 2025, https://americanhistory.si.edu/science/chladni.htm.

0.2 The Grain

Music is like a log—years of time and experience compressed into form. Yet, already, with this first invocation, I have made some assumptions in language about sound, music, craft, and making. Take for example, the word “woodworking”. It assumes function, aka, labor, rather than decoration or whimsy—evidenced by the field of Craft’s sharp emphasis on woodturning or woodcarving being distinct, different disciplines than carpentry or furniture design that incorporate under the masthead of wood*work*ing. Thus, woodworking would not suggest the work concept, but rather a disembodied sort of functionary labor that builds the world yet doesn’t elevate it, or rather, doesn’t elevate the workers.

I’ve wondered about these metaphors from my post—sometimes stationed in the academy library, but just as often holed up in the basement woodshop, surrounded by instruments that I will make, am making, have made. In both rooms, I am surrounded by trees: by paper, by lumber. And I think about the way people talk about wood without realizing it. We often hear the phrase “against the grain” to describe ideas that go against cliché patterns of thought. The implication is that we should aspire to think “against the grain” to be distinct from what is usual, contrary to engrained patterns. I see this cliché everywhere. You can just google “[insert topical idea]” and “against the grain” and see how the ideas of Zizek run “against the grain” of typical Lacanian analytic philosophy, for example.

The woodshop, the library. Again, they are both full of different wood-products. But only through working with lumber have I understood the real dimensions of this metaphor. In fact it’s much *easier* to carve against the grain, because the end-grain is

the hardest, densest surface of the wood, and whilst carving it is nearly impossible to get chips out. If you want to say, carve a spoon, you have to carve against the grain, or else your carving will be full of pockmarked surfaces every time your knife goes into the grain uphill. And this train of reasoning brings me to ask yet another more fundamental question; namely: what is the object I am carving with my argument? Is it a piece of cherry, or oak? Cherry, which carves easily like butter, has no visible growth rings, while oak thrives in the summer months and slows in the winter, resulting in those classic ring porous growth rings that result in alternating ridges of material that is alternately easy and sometimes difficult to carve smoothly. But these are hardwoods—maybe the idea is a coniferous wood, and thus is packed with resin and even less cooperative under the knife. Or maybe the object is not a straight-grained piece of wood, but is “curly” or “flamed”, meaning that its grain undulates and twists up and down throughout the vertical plane, creating pockets of shimmering wisdom that is difficult to carve unless you approach it from just the right angle. Or maybe the idea like a burl of wood, a rhizomatic swirl of grain, bark, and dirt, a tornado of wood that has twisted itself every which way to defy the carver, meaning you can only attack it with abrasives. Or maybe the idea is like a manmade piece of hard plastic acrylic, and such, there is no grain, and it can be cut in any direction to yield an endless ribbon of waste.

I don’t intend to reduce the possibility of metaphor in this polemic. I mean to focus it—"cutting against the grain” may be the *only* way to cut something, depending on what you’re trying to make, and depending on what material you choose to utilize.

If woodworking is subtractive synthesis, *The Kerf of Sound* is a way to describe material affordances in instrument building. It seeks to identify both a sonic material and

unravel the working method of “carving” or resonating it. I extrapolate “kerf” beyond a physical consequence of handcraft, and towards as a suggestive, destructive parameter—a portion of material that must be removed to make a new thing possible. In my creative research, the word “kerf” promises to link two activities that in some respects have always been distinct: building instruments made from wood and circuits (Composing Instruments), and making music in response to the effects of tinnitus (Tinnitus Music). Both activities represent the dominant frameworks of my aesthetic wheelhouse for decades now. It has been not entirely obvious to my interlocuters, or even to myself, how these two activities are related. In writing this dissertation, I hope to both celebrate the differences in these modes of thinking and creating, while finding new ways to identify and specify the basis of sonic material. Ideas can of course cut—and if I want to cut to the heart of the matter, hearing loss in music is exactly this: death by a thousand cuts.

Chapter 1 centers on a case study of sonic kerf in a very literal way, through the example of Arbrasson, a friction idiophone made from chainsaw cuts into a block of wood. The Arbrasson’s story begins with its Ancestor, the livika. Hailing from New Ireland, the livika is a carved log consisting of three “tongues” that is rubbed by moistened palms to produce a piercing, loud cry. Unlike the jaw harp, which is found all around the world, the Livi livika ka is singular to Melanesia. However, in 1992, José Le Piez, a sculptor based in France, created the “arbrasson”. Carving notches into polished logs, he crafts polyphonic sculptures that sing like birdsong when rubbed. Le Piez discovered the concept accidentally. He did not know the livika. Yet he was captured by the sound, and as he learned to control it, he built over 200 arbrassons. His instruments

extend the livika, featuring more notes, and wider tonal range. By adding kerfs to material, the uncarved block gradually becomes an instrument—by damaging it, weakening its structure as a building material, the wood develops affordances in the terms of resonances—losing integrity and gaining specificity.

Chapter 2 veers from the carved block and to the sawblade—the affordances and consequences of different tools, the choices of handcraft, design by machine. Here, “kerf” takes on a process-based register. In this chapter, I primarily explore my relationship with the daxophone from 2014—2024. The daxophone is a bowed idiophone, invented by Hans Reichel in 1987, consisting of a bowed hardwood strip that is amplified by a piezo and turned by a curved block of wood. I have been developing my daxophone craft since 2005. This exposition details my craft of *Composing Instruments,* which I practice by building daxophones that function as a kind of para-composition. I thus shape the music that emerges from these machines, which is already quite specific with regards to sonic aesthetic before anyone else plays them. My analytic approaches for this chapter are threefold. The chapter, being primarily concerned with my own technical and mechanical developments in the pursuit of different daxophonic inventions, is specific with regards to different instruments I have invented: the Starship Daxophone, the Student Model Daxophone, the Apprentice Model Daxophone, the Seaplane Model, the Doubleneck Tripod, and the Minimal Daxophone. These instruments represent different aspects in an emergent Cottage Industry where I have developed a small-scale business model, interfacing with approximately 75 customers over a period of 5 years. These customer relationships represent a critical process of reflection, iteration, community-building that expand the

possibility for daxophone in the world. These relationships have also created opportunities for me to develop and hone my craft, experiment with designs to see how musicians might use them, or whether the designs have market value.

This exposition balances technical descriptions with a process-based, first person account of being in the woodshop, starting from blanks of exotic hardwood wood, exploring their origin and relationship to me. The shop is site of creative imagination and shaping, where particular tools from handcraft to the cyborg CNC machine impart their biases through my designs. I take the reader through a firsthand experience of my thought process, wherein tasks such as sanding, cutting oiling, choosing and orienting wood for resawing all have a philosophical valence. In a deliberate manner, I have endeavored to purge this description of academic tenor in order that the poetry of the shop experience sings out more clearly.

Whereas the previous chapter explores a kind of para-composition—*Composing Instruments*—Chapter 3 attempts to answer a different question: what does *my* daxophone music sound like? In doing so I explore a different kind of material, and a different type of cutting. In this chapter, I explore the material of hearing damage, and kerf takes on a philosophical dimension. In noise induced hearing damage, acoustic trauma leaves the stereocilia damaged, and unable to respond accurately at certain frequencies. Thus, sound itself is like a saw, and after it “cuts” the stereocilia, it leaves kerfs that assert their negative space upon the listener, filtering the allsound, or even becoming hotspots for ringing tones interpreted by the brain. My composition, *Masking Songs*, deals with two principles of audiology, *Masking* and *Suppression*. Whereas Masking, the occlusion of sound through the use of another sound related in frequency,

is a normal feature of acoustic experience, Tinnitus researcher Pawel Jastreboff postulates that since tinnitus is not an acoustic sound, it must be suppressed through attention and dynamics alone, *not* specific frequencies related to the tinnitus itself. While forging a distinction between “impaired ears” and “normal ears”, this dichotomy also suggests compositional strategies for dealing with tinnitus directly. Masking Songs is a collection of songs that is a new attempt to both formally deal with specific topics in neuroscience in my tinnitus music, and also to compose notes on paper. This “good old-fashioned” kind of music making is distinct from a way I have made music about tinnitus for many years, from 2011—2020, which was primarily through an intuitive improvisation and performance art practice centered upon with another multi-channel, long stringed feedback instrument of my own invention, the Lady’s Harp[8].

Finally, this dissertation concludes. The entire conclusion is a work of multimodal scholarship, *Deer Tick…and the Kerf of Sound,* in the form of video documentary, produced during Covid in collaboration with Peter Blasser, a fellow instrument designer who suffers from misophonia, or hatred of sound. Blasser is a friend and longtime collaborator of mine, and as such, this chapter contains the healthy spirit of friendship, this is our first time since knowing each other speaking together about our hearing disorders and studying how they shape our music making. Rather than enter an analytical space, the film itself is the conclusion, breaking and expanding the written form.

[8] The Lady’s Harp will be discussed at length in Chapter 3, but a detailed exposition may be found in my master’s thesis. Daniel Fishkin, “What Would Tinnitus Music Be?” (Master of Arts, Middletown, CT, Wesleyan University, 2015), https://doi.org/10.14418/wes01.2.91.

0.3 Interconnections

The case studies at play in each of these chapters are distinct. But there are overlaps, and in many cases, these overlaps create resonances and connections. For years, I've intuitively explored these activities in my art practice and scholarship without necessarily forging deliberate connections.[9] In short, the dilemma of having tinnitus itself has for me proven to be rich aesthetic territory and has provoked an urgency that has led to many repeated acts of music-making. Those acts invariably involved the use or creation of novel musical instruments of my own design. But this is not to say that connections between instrument building and damage have never been discovered. For example: When I invented the Lady's Harp, I was just exploring sonic materials, but when I first showed my Lady's Harp to a neuroscientist in 2014, she remarked it resembled a mechanical model of the human ear.[10] Though, I should not be so quick to romanticize the connection between building instruments and tinnitus: for example, it has been long evident to me that my experience of tinnitus, in a way, is both part and parcel of a desire to *live in sound*. I found shelter from the painfully loud concert spaces in the woodshop, and yet, what kept pulling me back into the loud concerts, and what sustained my curiosity in the woodshop, building instruments, was a desire to find a way to always be involved with making music. This feedback loop is self-sustaining—but what does it sustain? Like an ouroboros consuming its own tail, there are indeed limits to our resonant experiences. I discussed these ambivalences in conversation with Psychoanalyst Monroe Street back in 2016:

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[9] "Composing's one thing, performing's another, listening's a third. What can they have to do with one another?" John Cage, *Silence: Lectures and Writings* (Wesleyan University Press, 1961). p. 15.
[10] Jascha Hoffman, "Q&A: Tinnitus Tunesmith," *Nature* 505, no. 7482 (January 1, 2014): 159–159, https://doi.org/10.1038/505159a.

MS: I wonder if it's also a way of distinguishing yourself from others. Or is there a difference between making sound and listening to sound? When you make sound you listen to it, obviously, but when you listen to sound...I guess you're also making it.

DF: Well, tinnitus is a way to always be making sound.

MS: Making your own sound.

DF: It's like autonomy.[11]

Fundamentally, living with tinnitus is both the experience and in fact the consequence of *always making sound*. Always in the woodshop, year after year, I am engaged in the business of *making sound.* Composing Tinnitus Music has been, thus, a pursuit to *make something out of tinnitus*, to carve it as if it were a material. Inventing instruments is exactly the same impulse—a thing doesn't exist, and here I am, trying to take a material or idea and make it become something. In both of these cases, "improvement" and "degradation" mean that the situation will become ever-more resonant—that things will just keep ringing more and more.

Let me clarify some important discrepancies. I do intend to make a distinction between *having tinnitus* and *composing with tinnitus*: hearing loss affects 48 million Americans, roughly 20 percent of the population, while tinnitus affects at least 10 percent of them as well. Most of these people just want their hearing damage to go away. They don't want to devote an entire artistic practice to exploring the sonic parameters of ringing, continuing sound. Similarly, when I developed a herniated disc in

[11] Monroe Street Schostal, "Tinnitus, Speaking: Listening in with Daniel Fishkin," *The Senses and Society* 19, no. 1 (January 2, 2024): 80–87, https://doi.org/10.1080/17458927.2023.2300091.

2017, I knew I'd never make art about it in a direct fashion—it was simply a medical experience of disability, rather than an artistic one. The reason I found myself composing music about tinnitus was probably not the impulse to make "lemonade out of lemons" but related to the fact that I had trained myself, as an experimentalist, to take listening very seriously.

Along these same lines, I intend to make a similar distinction between *composing instruments* and *building folk instruments* like violins or guitars—the type of activity that governs both the traditional craft of a luthier epitomized by Stradivarius or the factory production comparable to Leo Fender. Again, I don't mean to diminish these craft practices—I aspire to them, in fact. But these activities do not describe my specific approach. Every guitar maker knows what every E-string will sound like before the guitar is built, for every E-string will sound the same. Composing an instrument shares more similarities with the noise-table assemblage, for example, or prepared piano, or tabletop guitar, or even a Modular synthesizer. But unlike these lineages, I actually go to the woodshop, to make an object. A tabletop guitar player *recontextualizes* the guitar through extended technique, thus the object's relations change. A composer of instruments makes a *new thing* in the world.

By invoking this term, I do not intend to stake any claims towards authenticity. I am merely trying to precisely define a larger framework for the aesthetic context and community towards which I align myself. I should also emphasize that some degree of overlap and contradiction in this term might be acceptable. For other composers of instruments, take, for example, Pauline Oliveros' description of assembling the equipment for I of IV, her seminal sinewave/delay piece:

> I remember a review of I of IV in some magazine, and some guy was talking about it in very positive terms, but then said 'Well, it must not be any good, because it must have been just thrown together in real time.' That kind of attitude still prevails in an academic sense, that you have to construct these pieces very carefully. Well, I do construct them carefully, but at a very different level… The instrument is constructed carefully, so that I can interact with it at a deep level.[12]

It is no coincidence that the Oliveros piece in question, I of IV, was created on lab equipment before the dawn of commercial synthesizers. The piece is an improvisation that was captured in the studio. Oliveros is very skeptical of the legitimization of experimental work—because the conservative attitude about what constitutes a "serious piece" misses where actual work takes place. What she is describing here, is the assembly of a system that produces a very specific piece of music yet does not need to be constructed on staff paper, linearly, in order to exist. Improvisation in this context is both necessary yet not expressive—it is about a virtuosity that defines itself through connection to the instrument—a virtuosity of listening. Oliveros composed an instrument that could play only this piece of music and did so with verve. Relatedly, Oliveros states, "As I was making I of IV, I was also listening to it. I was riding with it as it came out and I was enjoying it."[13]

You Nakai uses related terminology to describe the compositional output of David Tudor, for example, who, in addition to making bespoke electronic devices consisting of simple electronic components, actively pursued an extremely specific art

[12] Martha Mockus, *Sounding Out: Pauline Oliveros and Lesbian Musicality* (Routledge, 2011), https://doi.org/10.4324/9780203935590. Page 27.
[13] Barry Schrader, *Introduction to Electro-Acoustic Music*, 3rd Printing edition (Englewood Cliffs, N.J: Longman Higher Education, 1982).

practice of making nonlinear feedback connections between the devices themselves—recontextualizing their possibility by suggesting new ways to use them, constantly. Simply put, what Tudor did was “composing instruments”. But the perplexity grows from here, because, as Nakai asserts, for Tudor, an instrument refers to “any material (usually physical, but not always) that can be used to realize a performance”[14] —which unites the heterogenous activity in the long career of the pianist, organist, and performer of customized electronic circuits. An instrument thus could not even make sound, on its own: many of Tudor’s beloved instruments were just a few passive components in a soapbox. So, too, could a dissected organ pipe with a transducer attached to it, be considered an instrument. Yet, as Nakai suggests, Tudor’s aesthetics may have also been shaped by his formative experiences performing on the pipe organ as a young musician. According to Thom Holmes:

> “The pipe organ produces sound by driving pressurized air through its organ pipes, triggered from a keyboard. Because each pipe produces a single pitch, the pipes are provided in sets called ranks, each of which has a common timbre and volume as controlled by its associated keyboard, or manual. A given rank, in turn, is controlled by stop, a kind of on/off switch for one or more ranks. The use of stops enables the organist to selectively turn off certain ranks to produce different combinations of sounds, as opposed to hearing all sounds simultaneously. The player can add or subtract sounds through a combination of organ stops.”[15]

[14] You Nakai, *Reminded by the Instruments: David Tudor’s Music*, 1st edition (New York New York: Oxford University Press, 2020). Page 18.
[15] Thom Holmes, “Experimental Music for Pipe Organ, The Original Synthesizer,” Noise and Notations, August 27, 2023, https://www.thomholmes.com/post/experimental-music-for-pipe-organ-the-original-synthesizer.

The pipe organ's different ranks are related by range—32', 16', 8', 4', etc. The ability to combine stops to directly shape the overtone content of its composite waveform is a simple form of additive synthesis. But beyond mere synthesis, the pipe organ is an instrument that is not a thing, but a *place*—a realm into which one enters. Nakai articulates this best in comparing the organ to Tudor's contribution to the legendary architectural sound installation at the Pepsi Pavillion, a major public sculpture and performance installation commissioned by Pepsi-Cola for the Expo '70 in Osaka, Japan. Tudor's contribution, among other things, involved the creation of a completely custom mixing and modulation console that could route his sounds throughout the 37 channel sound system of the Pavillion's mirrored dome. Nakai writes[16]:

> "…the exposure to the largest of all musical instruments whose body extends to the interior space of the church it is installed in appears to have also inspired in Tudor an extraordinary idea about the physical scale of instruments…it was not only the scale of interface… but also the scale of what that interface controlled and how it did so. In electronic music, it is common to call an electronic device, or even a configuration of multiple devices, an "instrument." But Tudor's conception of the Pepsi Pavilion as a musical instrument does more than just expand the term to include many objects. For if the oscillating dome in its entirety is a musical instrument, then the musical instrument is obviously larger than a human being— as with the organ, listeners and performers alike are now housed inside

[16] I'm grateful for Nakai's more succinct definition of this paragraph, which he delivered over coffee somewhere—it could have been San Diego or Tokyo, "For Tudor, the instrument is not here (*gesturing in front of us*) … but *there! (gesturing out into the space)"*

the instrument. Tudor consequently becomes not only a composer of the Pepsi Pavilion, but also its component, and quite literally so."[17]

Of course, then, composing instruments may be about mixing and constructing these assemblages that are not *things*, but sonic environments that resist a kind of functional or causal sonic logic. Plainly stated: a sonic environment may be too vast (or remote) to be understood or even perceived by the eye. The person *Daniel Fishkin* is also an instrument for his tinnitus to perform upon—which it has done in puzzling ways, shifting in dynamics and chords for a period of 15 years. And, my tinnitus, too, has proven instrumental for enacting a long sequence of decisions about how to make sound in the world for audiences to hear.

In this respect, both composing instruments, and composing tinnitus music each operate under a kind of *embodied listening* that happens in a purely acousmatic realm. The notion of embodiment can be traced back to phenomenology, particularly to Maurice Merleau-Ponty (1962). He defended the bodily basis of human existence against Cartesian mind-body separation and the general disembodiment of experience in relation to knowledge in Western culture. Embodiment recognizes the body and mind as one entity, and it emphasizes how our body and experience shape how we perceive, feel and think. "Indeed, on a very concrete level, embodiment refers to our physical existence, to being a body and having a body"[18] Embodied Listening has grown in the field of sound studies to index the reality of the body, but also to "grapple with the essential ephemerality of sound. According to Salomé Voegelin: Writing about sound is

[17]Nakai, *Reminded by the Instruments*, 2020. Page 301.
[18] Marja-Leena Juntunen et al., "Embodied Listening and Expression in the Arts: Panel Report," *Finnish Journal of Music Education* 24, no. 2 (n.d.): 162-174,.

a constant effort to access the fleeting and ephemeral, that which is barely there and yet influences all there is. Sound is the invisible layer of the world that shows its relationships, actions, and dynamics." Sound's embodied reality reflects its material constraints—its materiality *is* transient. The cartesian dualism of sound is that it is a quintessentially physical phenomenon that also disappears. Voegelin goes on to clarify, "The invisible mobility of sound shows the nonideal as a subjective ideality that is contingent and full of doubt. It reveals the tentative and fragile communality of this material conception and introduces alternative relationships between humans and the world."[19] To suffer from tinnitus is to undergo an embodied sonic experience that is profoundly real and destabilizing—yet, tinnitus is an invisible symptom, a phantom sensation that persistently eludes neurologists and patients, for it cannot be measured directly.

Tinnitus, then, is *acousmatic.* It is "unseeable" or "hidden" in that it is an experience of sound divorced from its source. Tinnitus of course does in fact have an origin: be it noise-induced hearing damage or other cochlear dysfunction, or simply a perceptual hallucination without pathology, but quintessential characteristic of acousmatic experience is the *distancing* of sound from its source, not its complete separation. The sound of a violin through loudspeakers is acousmatic in that it distances the sound from its source, though the pathway can be *reconstructed* by the listener if not completely found by coming into contact with the media directly. Acousmatic sound has been celebrated by composers since the era of Musique Concreté—notably Pierre

[19] Salomé Voegelin, *Sonic Possible Worlds: Hearing the Continuum of Sound* (New York, New York London New Delhi: Bloomsbury Academic, 2014).

Schaeffer—and scholars such as Michel[20] Chion[21] and more recently, Brian Kane[22], whose heroic text *Sound Unseen* attempts to linearize and catalog how this pervasive term has become in the discipline of sound studies. Of course, a vivid exposition of these two terms, embodied listening and acousmatic listening is beyond the scope of this dissertation. It's clear, already by now, how tinnitus remains acousmatic and nevertheless embodied. It isn't immediately clear how instrument building could be abstracted from its visual dimension, though. How then could building an instrument be acousmatic?

As a daxophone maker, I am constantly besieged by principles that I can't see with my eyes. I cut shapes, I move curves, I sand surfaces, I drill holes. I listen to the grain as I work. But, I never really know what is going on inside the wood, what the instrument will sound like. With certain shapes, I have developed a kind of familiarity, a sense of how the thing will sound. Yet, I'm still often surprised by the end result. There's another secret in the wood, a set of principles that reveal themselves to me again and again as I have the fortune to work with a hundred or so from over 50,000 species of different trees upon this earth. The real story is in the material itself. The daxophone, too, is an uncanny mimic. It poses a real question as to whether it resembles another instrument, or in fact whether it resembles itself. If, abstracted on recording, the daxophone is heard, does an uninitiated listener know it is a daxophone, or interpret it for a trumpet or a violin? Or a baby, or some wild animal? Does the daxophone,

[20] Michel Chion, *Audio-Vision: Sound on Screen: Second Edition* (Columbia University Press, 2019).
[21] Michel Chion, *Sound: An Acoulogical Treatise*, trans. James A. Steintrager (Durham: Duke University Press Books, 2016).
[22] Brian Kane, *Sound Unseen: Acousmatic Sound in Theory and Practice*, Reprint edition (New York, NY: Oxford University Press, 2016).

eventually, in the horizon of history, become heard as a daxophone, or is its great benefit that it can ultimately refute causal listening, in the acousmatic sense?

Finally, Composing Instruments does not, for me, culminate in building up a personal orchestra to take up residence in one's garage, or piled up in an archive at a university somewhere[23]. Instruments *depend* on community. Though I often bemoan how pedestrian and meaningless the word "community" has become, it's hard to argue with its deployment in this context: without a network of players and builders to make different concepts of music with a particular instrument, to make more sonic articulations or songs with it, an instrument cannot survive the vicissitudes of history. Without community, instruments will eventually perish. For an instrument like the daxophone, a new, ever-expanding network of players might involve, in late-state capitalism, the marketplace. I have learned this over the years, through the accords of running my own independent business and selling daxophones to interested musicians.

To a great respect, this understanding of the network which sustains the futures of instruments is a new development in my research. Earlier projects, which nonetheless were still yet about composing instruments, did not have the same community-driven scope. For this reason, my Lady's Harp project, while once so central to my creative agenda, is driven to the footnotes again and again in this dissertation. A larger discussion of the musicians for whom the Lady's Harp is named, Maryanne Amacher and Ellen Fullman, is thus outside the scope of my current writing. In fact, a

[23] In the case of David Tudor, his instruments survived specifically because they are preserved in the Wesleyan University archive, where they remained mute only temporarily—today, they have been reenergized through the careful, many-years long effort by a rhizomatic network of care and interest, enacted by researchers and friends, scholars and musicians, from all over the world to bring new clarity and context to Tudor's art practice and his creations.

larger discussion of Maryanne Amacher's personal ontology of listening forms the bulk of chapter one of my Master's Thesis, where I concluded that a tinnital listener, having had their relationship to sound change through hearing loss, might be able to relate more to Amacher's music than her contemporaries and predecessors, John Cage and La Monte Young.[24] Amacher's insistence on understanding combination notes, and not ignoring them, was pivotal to my inclusion of tinnitus within my music. Furthermore, her physical technique on the mixer, which became central to my playing technique of the Lady's Harp, was inspiring. Yet I don't suffer from tinnitus the same way that I used to—a discussion that awaits the reader in chapter 3. And so Amacher, who formed so much of my early understanding of experiential and experimental composition, seems regretfully beside the point of much of my analysis.

The Lady's Harp was also named in tribute to Ellen Fullman, the inventor and champion of the Long String Instrument, a thirty-to-eighty-foot-long string installation in which she strokes bronze and steel wires of different lengths with rosined fingertips. By stroking these strings, Fullman activates the longitudinal mode of vibration, which is uncommon in organology, as most instruments utilize the transverse wave to sound. The longitudinal wave needs long, long strings in order to bring its fundamental pitch down to usable frequencies, and thus Fullman's breathtaking installation is pragmatic, not poetic. Of course, I named the Lady's Harp as a way of citing Fullman's project more poetically—my Harp is not acoustic, nor longitudinal. But by citing Fullman I hoped to pay tribute to a composer of instruments who I felt had created a musical *realm*. In 2016, I collaborated with Fullman firsthand, inviting her to participate in a series of

[24] Fishkin, "What Would Tinnitus Music Be?"

concerts about hearing damage called *Composing the Tinnitus Suites: 2016* with the intent of asking a question to her and her music—would the ontology of her music, focused on acoustic purity and mathematical precision—be challenged by the interruption of tinnitus? The results of this encounter bore indirect fruits, as I have since found, in Fullman, a long-distance pen pal with whom I have shared techniques and technologies in our craft. We talk a lot about blades, rosin, and wood types. Indeed, my interest in finger-friction that is so integral to the arbrasson, the subject of Chapter 1, is entirely connected to the bowing mechanism of Fullman's Long String Instrument! But, too, as I compare my work today with Ellen Fullman versus a few years ago, I note important differences. Fullman does not sell instruments, nor exactly does she teach her LSI. She rather pursues sonic perfection as a completely individualized process. Perhaps it would be impractical to sell forty-foot-long instruments. I wondered the same thing, as I made my Lady's Harp. Yet, my tinnitus has become less gravitational in my musical life. As such, no longer do I find myself looking for large musical realms like Amacher's music or Ellen Fullman's Long String Instrument, or even my own Lady's Harp.

With any luck, I do hope that my future writing will have the opportunity to remedy this omission and find a synthesis to explore Fullman's work more directly, for example. After all, she is as equal and salient as an influence and friend as is Reichel, Blasser, and Le Piez. But, as my attention has gradually shifted to smaller inventions, the saga of these instruments proliferating throughout the world has become not merely possible but integral to my craft pursuit. As I explore in Chapter 2, my instruments eventually make their way into the world on their own accord, eventually finding their home in the

care of other players, who in turn contribute to the global culture of daxophone, adding up to something that ultimately is beyond my intention and control, and beyond my wildest dreams.

0.4 Manifesto

I build instruments because I want to live *in* sounds, *with* music. I don't want the music to stop at the end of the concert. My instruments are characters in my life. I carry them with me to and fro. I hear their songs ringing in my ears, even as they rest silently across the room.

Chapter 1: Lost Tongues

1.1 The Uncarved Block

Someone has cut down a tree in the suburbs. It is a wide, old fruit tree like black cherry, but perhaps it could be a fast-growing deciduous tree like catalpa or paulownia, which bear no fruit. Unlike most trees, destined to become mulch in the jaws of the wood chipper, the owner of this tree knows a friend who will take it away for free, who can make something with it. Thus, it is carefully sliced into thick, four-inch slabs with a chainsaw[25], cutting lengthwise parallel into the grain at a shallow tilt in sequential slices, creating wet ribbons of fibrous sawdust that litter the yard. Its end grain is sealed with paraffin wax, or latex paint, which seals in moisture, allowing it to escape more slowly through the rest of the wood's side grain, reducing the effects of quick movement during its drying stage which lead to catastrophic cracking, or "honeycombing"[26]. Then, it sits in its new owner's yard, slabbed and stickered to facilitate even distribution of moisture, and under a blue hardware store tarp, it remains for years, perhaps a decade.

That new owner is a craftsman of the wood lathe. His name is Phil Brown, a self-taught woodturner who, during and after a long career working for the Department of Agriculture as a specialist in farmer's cooperatives, enjoyed a prolific retirement in the form of a second career as an artist, emerging as one of the American Woodturning

[25] As Mattias Wandel writes, "the trouble with milling with a chainsaw is that chainsaws are not well suited for it. A chainsaw is designed mostly to cut across logs and branches, which is cutting across the grain." Rather than using a different blade, we can change the way we approach the material to cut long slabs easily. Mattias Wandel, "Chainsaw Milling Experiments," Woodgears.ca, accessed March 25, 2022, https://woodgears.ca/chainsaw_mill/chainsaw.html.

[26] David L. Cassens, "Quality Control in Lumber Purchasing," Forestry & Natural Resources 133, accessed March 25, 2025, https://www.extension.purdue.edu/extmedia/FNR/FNR-133.pdf.

movement's earliest advocates. He develops a signature shape[27], a conical flare or vortex, which he repeats hundreds or thousands of times, placing his pieces in renowned institutions like the Smithsonian Museum and throughout a network of private collections that bolster the emerging field of turning for decades. Phil Brown, like most woodturners, preferred to work with green wood, turning the rough contours of a piece while it was still wet to reduce heat's dulling effects on his gouge and also to minimize sawdust in the shop.[28] Phil Brown, also like most woodturners, never refused the gift of material, and his backyard accumulated more slabs of wood than he could ever use during his lifetime. The cherry tree in question, sitting for years under tarp, has long since dried out, and is no longer useful for Brown. And so, the wood sits, waiting to become something. In 2017, I receive the Windgate Fellowship from the Center for Art in Wood in Philadelphia, and during that summer, I meet Phil Brown for the first time, where he gives me this log of cherry wood, early in the morning after breakfast at his house, during a weekend tour of private woodturning collections in Maryland. Then, in 2018, Phil Brown dies of cancer. Nearly another decade will pass before the wood can become something.

It seems like an obvious truism, yet it is easy to forget that trees grow slowly, often spanning generations beyond human lifespans. As such it seems that the tree itself as material, in the form of "lumber" or "wood", inherits so many biases from that gradual process of nature: it takes so long to dry and to be ready, it takes so long to do

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[27] Tib Shaw, "Anniversary Profile: Phil Brown March 31, 2016," *American Association of Woodturners*, March 31, 2016, https://www.woodturner.org/common/Uploaded%20files/MemberProfiles/20160331Brown.pdf.

[28] "Phil's pieces often took years in the making to allow a piece to dry after rough turning his delicate shapes. His shop was filled with hundreds of roughed out bowls, some which have been drying since the mid 1970's." Alex Bradley, "Fine Turned Wood – Alex Bradley & Phil Brown," accessed March 27, 2025, https://fineturnedwood.com/.

something with it, and finally it lives a second lifetime or perhaps more as a piece of art or furniture, beyond its vernal life. I think of this when I remember how often I held that log of cherry from Phil Brown before doing anything with it, turning it over, pondering what I could make with it. But this is only the story of the material. It a story of the possibility to become something, which might have otherwise become firewood at any point of its long voyage off the soil[29]. It is the saga of the thing that was nothing—the saga of a log which is no longer a tree but not yet a musical instrument, a liminal time which could ignite (or decay) depending on a series of decisions or delays on behalf of its countless stewards.

Here is the cherry log. It is dry. In fact, I have already cut it, not once, not twice, but four times on the bandsaw, thinking about making a salad bowl, but abandoning it when realizing it was still yet too big for the lathe to which I had access. I covered its newly exposed grain with housepaint to preserve it—and in that state, it sat for nearly 8 years, a nearly doomed boat anchor. And then, I **cut** it—maybe forty times, and it is no longer a log, no longer material. I have rendered a musical instrument. The story of the *log* ends and the story of the *arbrasson* begins.

In fact, *this* story really starts in 2015. Just before finishing my Master's at Wesleyan, I am in the studio with my best friend there, the instrument Designer Peter Blasser. He shows me a curious YouTube Video[30].

[29] "Irik chuduk synmaan bolza / Kazhaa xöree tutkaj ertik./ Ijem küzhür ölbeen bolza / Iji karak bolgaj ertik. (If the rotten log hadn't broken, / it would have become a fence./ If my mother hadn't died, / I would have eyes and ears.") Irik Chuduk, (traditional) ref. Albert Kuneizen, Yat Kha, Yenisei Punk, 1996. *Irik Chuduk,* literally "rotting log", also means "little child" in Turkish.
[30] José Le Piez, "Arbrassons Sur Valserine," (accessed 2015-06-01), https://www.youtube.com/watch?v=RXTyynBuLmI.

Figure 3: José Le Piez plays the Arbrasson[31]

The sound captures me immediately, but the visuals confuse me—I hear synthetic, loud, high-pitched sequences of melodic phrases, but what I see is just a skinny French man in the woods rubbing carved logs. It clearly works from friction, but I can't figure out if it is amplified, or if the blocks are hollow. I can't tell how old it is—is it ancient? Or something new? It's in French, a language I don't know. I could translate it, but, my master's degree is already almost over, my thesis successfully defended, and Peter and I end up talking about other things. Before I leave Connecticut, I spend my days in the woodshop designing a new concept for a daxophone soundboard before I

[31] José le Piez, *Le bois qui chante,* https://www.youtube.com/watch?v=bTcmDvVmqYk (screenshotted June 15 2024).

pack up the U-Haul and lose access to cutting tools for an indefinite period of time. So, there is no chance I will make any time to explore this new instrument, and I attempt to file this conversation away in the lumber pile of my memory somewhere, along with a thousand other instruments I've learned and forgotten. Periodically, over the next 8 years, I will remember this instrument occasionally, like a meme, sometimes succeeding and often failing to find the original video. I never learn its name.

Some ideas take a long time to dry out.

8 years later, during a residency in Budapest, I meet a new collaborator, Etienne Rolin, who shares my fascination with invented instruments. We bond over glissandi—he is the first customer of the "glissotar", a newly invented slide saxophone that uses a magnet to seal over a longitudinal slit to produce continuous tones. He tells me, you must come visit Bordeaux, my friend José Le Piez makes wooden instruments that remind me of yours, that sing when you rub them, called *Arbrasson*. Finally, I remember the afternoon in Connecticut at the end of my graduate studies! And so, a sequence of events is set into motion that will bring me to Bordeaux, France, where I will caress the arbrassons myself for the first time.

1.2 Discovering the Arbrasson

In the summer 2023, I met José Le Piez, convening in his hermitage in the woods where he works as a tree surgeon for a renowned vineyard in Martillac, France. From the outset, I had approached this trip, partially funded by UVA's many scholarship programs, as a complete DIY opportunity. Since everyone in July was on vacation, when I asked Etienne about setting up a show at his local cabaret, he mused that while

he and José were available, there might only be two people there. As a veteran experimentalist, I have no shortage of experience in these tiny door gigs. Thus, instead of playing another poorly attended show, I imagined we might create the illusion of a performance, filming our encounter to create aesthetic material that could evolve alongside my dissertation. This film*, Modos de Transporte: Bois de Rose,* was made collaboratively with Catalina Jordan Alvarez, who is also my wife; our then 1 year old child Lou plays a starring role, which gave our film shoot an air of ludic chaos. We also played music together, exchanged instruments as gifts, and talked at length on camera about the philosophies behind our work. I will discuss *Bois de Rose* later in this chapter, for the task at hand is to explore the object and instrument, the arbrasson, directly.

I found José Le Piez to be friendly and serious. His vocations include professional magician, arborist, black belt in aikido, sculptor, and finally a musician. One condition upon meeting José was that I had to sign a contract of secrecy (a common practice in illusionism) stipulating I would not take the secrets of this instrument and begin selling my own versions until 10 years had passed, though I was permitted to build my own and teach people how to build them. We didn't cut a single piece of wood together, but I understood the mechanism of this instrument almost natively, as I have built daxophones—which are also a subset of the sames Hornbel-Sachs category of wooden friction idiophones —since 2005[32]. I left France that summer and immediately began making my own arbrassons—in fact, not even before returning, as I made my first Arbrasson experiments in Berlin, visiting my friend, the instrument designer, Peter

[32] In a way, the arbrasson is a daxophone in reverse. Whereas the daxophone has **one tongue** that can produce **infinite frequencies**, an arbrasson can have **infinite number of notes** that each produce only one note, occasionally overtones of the fundamental.

Blasser, who will be featured at a later point in this dissertation. The secret of the Arbrasson was not something I learned how to do directly, but something that gradually made sense to me with each cut on the bandsaw.

Figure 4: "Five Members of the Tribe of Arbrassons", from Le Piez's website[33]

[33] José Le Piez, “Arbrassons,” pulsar, accessed March 27, 2024, https://joselepiez.wixsite.com/pulsar.

José invented the Arbrasson by accident, while building furniture. Le Piez explains:

> “These "unidentified sound objects" that I call the Arbrassons turned my life upside down[34] in June 1997. I was presenting an exhibition of solid wood furniture when I thought I was suffering from auditory hallucinations. By laying my hand on one of my sculptures, I heard birdsong springing between my fingers. I would never have imagined that a simple caress of the hand on the surface of a piece of wood could produce sounds reminiscent of flutes or pygmy songs. The surprise was total. My hand had slid along a series of slats standing on the edge of a sculpture like the mane on a horse's neck.”

He later explains that as he began to understand the instrument he had invented, he went to the nearest conservatory to ask if his instrument had any ancestors from the field of ethnomusicology. It was then that Le Piez learned about the livika.

[34] Indeed, my own discovery of the arbrasson turned this entire dissertation upside-down!

Figure 5: The Livika (Metropolitan Museum)[35]

Hailing from New Ireland, the livika (also called the lounuat) is a carved log consisting of three "tongues" that are rubbed by moistened palms to produce a piercing, loud cry. Its name refers to birdcalls, and it was played at Malagan funeral ceremonies. Curator Eric Kjellgren writes, the Livika is "both a first of its type and a revolutionary design"[36] Unlike the jaw harp, which is found all around the world, the livika is singular to Melanesia. Yet it is considered "extinguished" by the field: there are no practicing indigenous players, and only about 50 known instruments exist in museums around the world. Very few recordings exist of the livika being played in its original context. Even

[35] *Friction Drum (Lunet or Livika)*, Metropolitan Museum of Art, Wood, shell, H. 9 1/4 x W. 20 x D. 8 1/4 in. (23.5 x 50.8 x 21 cm), late 19th–early 20th century, https://www.metmuseum.org/art/collection/search/313665.
[36] Josie Glausiusz, "Oceania's Musical Technology," *Nature* 463, no. 7283 (February 1, 2010): 882–882, https://doi.org/10.1038/463882a.

this picture from the website of the Metropolitan Museum of Art is accompanied by a recording of the livika being scraped, rather than rubbed, which produces a quiet percussive sound instead of its iconic singing resonance.

Despite its clear status as an Oceanic curio and a "revolutionary design", the scholarship around the livika mostly ends in the 1980-90s with the work of GF Messner[37] and Brigitte Derlon[38]. I have found only one article on the livika since 2012, a work of systematic musicology by Rolf Bader[39] that explores the acoustic interaction between the cut plates of the livika. Why, if this instrument is so unique in its "design" formation and acoustic engine, would it be truly so uncommon amongst the entire treasury of sonic culture?

Here, a central question of my research emerges: What, if anything, does the arbrasson inherit from its "ancestor," the livika? Or: is the livika, in fact, "dead"? Though the field of organology has debated more recently the meaning of the "life" of an instrument, I found it imperative to attempt to answer this question mostly on an acoustic basis, for the cultural context of these instruments almost completely defies any linkage. In other words, as an instrument maker, the sound *itself* of the instrument called to me—in fact, it is the thing that I believe has asked this question of me.

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[37] Gerald Florian Messner, "DAS REIBHOLZ VON NEW IRELAND MANU TAṢA ḲUL ḲAS. . . (Der „Vogel" Singt Noch . . .)," *Studien Zur Musikwissenschaft* 31 (1980): 221–312., Gerald Florian Messner, "The Friction Block Lounuat of New Ireland: Its Use and Socio-Cultural Embodiment," *Bikmaus* 4, no. 3 (September 1983): 49–55.

[38] Brigitte Derlon, "L'objet Malanggan Dans Les Anciens Rites Funéraires de Nouvelle Irlande," *RES: Anthropology and Aesthetics*, no. 19/20 (1990): 178–210.

[39] Rolf Bader, "Outside-Instrument Coupling of Resonance Chambers in the New-Ireland Friction Instrument Lounuet," *Proceedings of Meetings on Acoustics* 15, no. 1 (February 1, 2016): 035007, https://doi.org/10.1121/2.0000167.

Figure 6: A snapshot of one of Le Piez's Arbrassons[40]

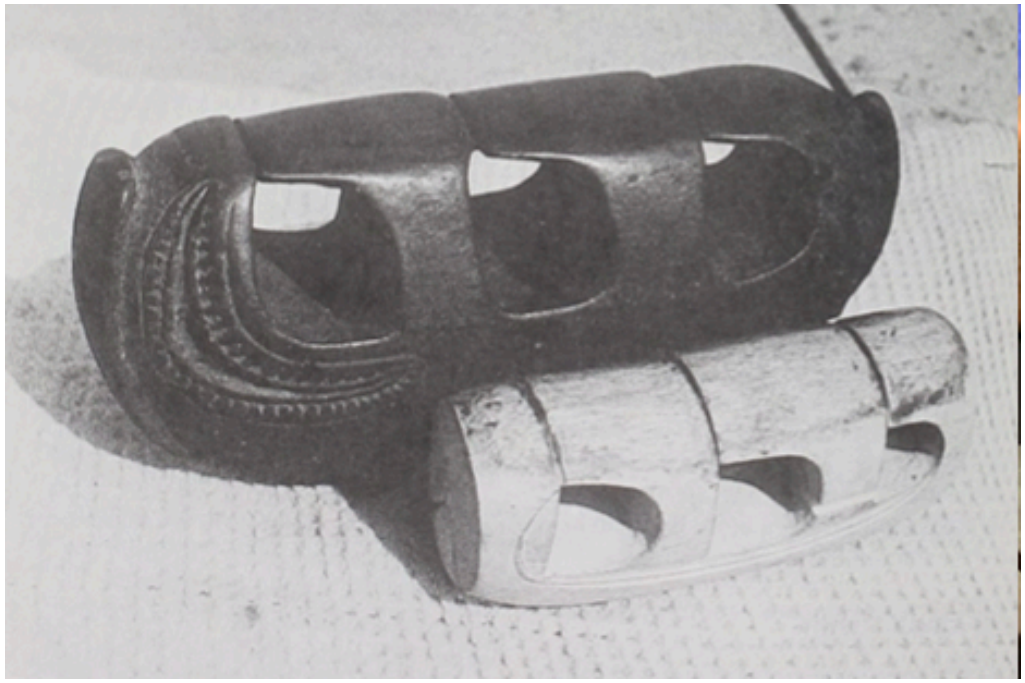

Figure 7:: Lounuat from New Ireland, Nalik, made by Gomson Luki[41]

[40] Arbrasson Photo, Daniel Fishkin, 2023.
[41] Messner, "The Friction Block Lounuat of New Ireland: Its Use and Socio-Cultural Embodiment."

At first, I imagined the arbrasson as a true reincarnation of the livika, influenced by how meaningfully Le Piez himself honors both the livika and New Ireland's culture. However, after immersing myself in both historical research on the livika and the practical experience of building arbrassons, I began to wonder if the opposite might be true. Indeed, the arbrasson and the livika share an acoustic engine. Yet the arbrasson's sonic resources, cultural context, and aesthetic function is sui generis, and belongs to a global, secular moment that remains permeable and in flux. In this chapter, I hope to explore these extremes. The livika was a sacred instrument, permitted to be played only during the elaborate Malagan funereal rites in New Ireland, its haunting sounds supposedly representing, "the painful voice of the deceased"[42], and the "sounds produced by the livika were also similar to the hooting of the owl, a bird associated with the world of the dead"[43]. When we hear the arbrasson, are we also hearing into the spirit world and hearing its dead ancestor's voice in harmony?

1.3 Material, Form, Gesture

We begin with material: the tree, which situates the arbrasson as a creation of the forest. The name "arbrasson" comes from the words "tree" (*arbre*) and "sound" (*son*) in French, while also playfully indexing the French word for "friction" (*abrasion*), describing how the instrument works. It is often the fantasy of the instrument collector to imagine that different species of wood sound different—however, with the arbrasson, as it is an idiophone with no resonating chamber, each piece of wood clearly offers a

[42] Derlon, "L'objet Malanggan Dans Les Anciens Rites Funéraires de Nouvelle Irlande.", page 182.
[43]"Instrument à Friction Malagan, Nouvelle-Irlande, 19e Siècle," Collection Marc Ladreit de Lacharrire, accessed September 27, 2024, https://collection-lacharriere.quaibranly.fr/fr/instrument-a-friction-malagan.

specific sonic and gestural template for note placement, register range, timbral quality, and volume: every piece of wood sounds unique.

Figure 8: José Le Piez in Forest, with chainsaw[44]

[44] José Le Piez, *Le bois qui chante,* https://www.youtube.com/watch?v=bTcmDvVmqYk (screenshotted June 15 2024).

Figure 9: José Le Piez in forest, cutting arbrassons.[45]

Le Piez, working as a tree surgeon for gardens and museums across France, has unlimited access to ancient trees, has made perhaps hundreds of arbrassons. Situated in a small vineyard alongside one of Martillac's most renowned winemakers, Le Piez maintains the many acres of woodland there in exchange for a large studio that functions as his rural hermitage, outfitted with gas stove, chainsaw, hand tools, and his entire instrumentarium. It is perhaps irrefutable that each arbrasson is unique both in terms of its sound as well as its sculpture. One of my first surprises upon meeting José was that he used Paulownia, specifically harnessing its modest mass to material ratio to

[45] (ibid).

make bright, high pitched, loud arbrassons[46]. Le Piez shares a sensibility common to all wood artists: different kinds of wood inspire different sculptures, that the material "gives something back" to its worker. Yet for Le Piez, that sensibility is not poetic, but tactical, because the material choice governs specific note range and location on each instrument.

The tree is the template for the arbrasson—it's impossible to ignore how "tree-like" these instruments remain, their pervasive "live-edge" aesthetic rules their design even despite some figurative pieces such as Le Piez's "Sun and Moon" arbrassons. Thus, the vernal material of arbrasson in the hands of Le Piez never quite becomes lumber. It is not—is never—wood. Like having a hammer and seeing in the world nothing but nails, the chainsaw carries a poetry with it that is integral to José's practice.

> "[With] the chainsaw I have the strongest relationship, not only with the material, but also in the ritual. For me, it is a question…of transforming an extremely violent tool of death into a gesture of life. It is in this violence and the fury of the sound of the chainsaw…that the most creative act springs forth. Indeed, I find all the tension that one can have in pruning and in budo…I will give small depths of saw cuts, chainsaw cuts, different by varying my breathing, my center of gravity, and this is what will then give on the arbrasson the melodic line."[47]

Le Piez does not tune looking for particular notes, but tunes into his body with minute attention to his breath, repeating cuts with his chainsaw like a sword, cutting the sonic

[46] Paulownia, though common as a resonator for zithers, is an extremely fragile wood with low mass, and thus not easy to work with, and especially unlikely as a choice for a sounding element—a xylophone made from Paulownia wood wouldn't last a fortnight!
[47] Dominique Regef, "José Lepiez et les Arbrassons - entre terre et ciel," accessed February 27, 2024, http://www.pastel-revue-musique.org/2012/12/jose-lepiez-et-les-arbrassons-entre.html.

template for each note as a single, immediate slice, before eventually refining and finishing the surface with sandpaper and varnish.

The chainsaw defines the arbrasson, producing an absence in the tree that halts its arboreal growth in both a real and literal sense. To make an arbrasson, one cuts down the tree. Then, with purpose, one cuts it again. It is no longer a tree. The essence of the arbrasson is precisely these two cuts or *kerfs* into a piece of wood: one optionally at 90° and the other critical cut at an unspecified angle between 100° and 130°. With an increasing number of these cuts, the "melodic line" blooms, and an instrument capable of producing many tones emerges.

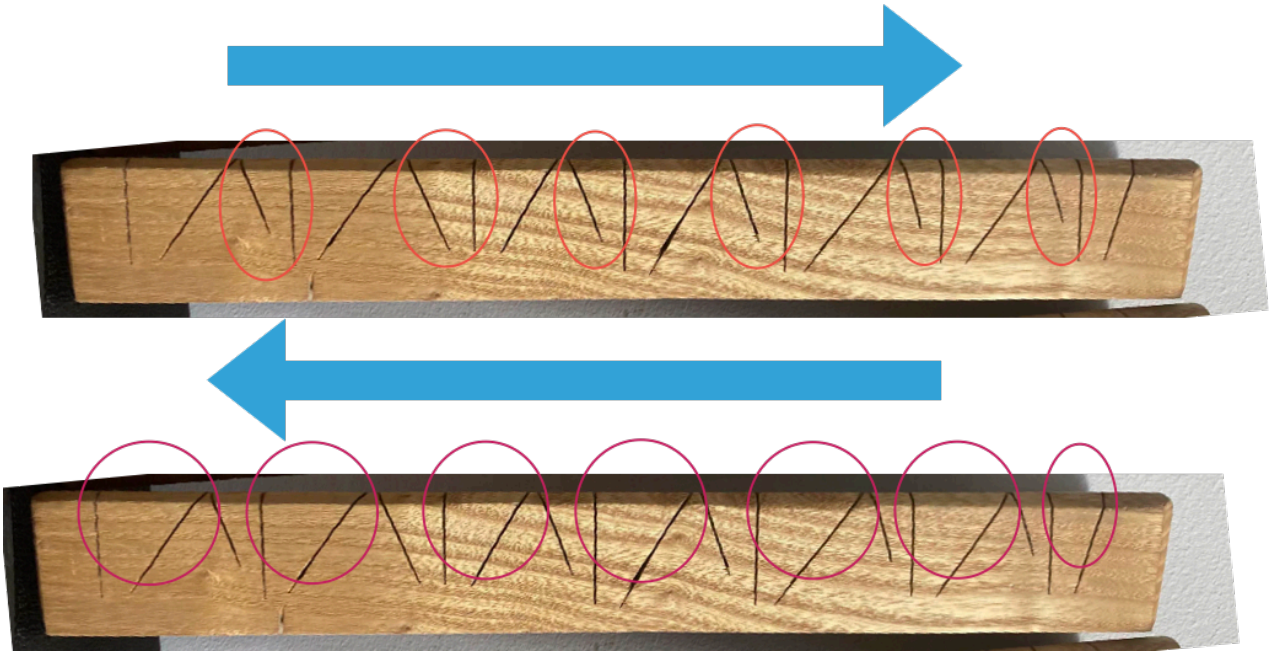

Figure 10: Mechanics of note generation on arbrasson[48]

Yet, despite the spiritual nature of Le Piez's approach, the acoustic principles that govern the arbrasson can easily be achieved with dried lumber—it is a simple fact

[48] Daniel Fishkin, *Arbrasson Note Direction Demonstration*, June 10 2024.

that I was able to replicate consistently using many different woods in my studio, once I understood how the mechanism worked. Depending on the direction of the angle, the arbrasson key will resonate on either the push or pull stroke. To play an arbrasson, one simply puts a small amount of liquid rosin, water, or paraffin hand crème on their palms, rubs carefully to absorb it, and then approaches the instrument, and caresses it to produce a barrage of bright, resonant tones. The number of notes and their placement on an arbrasson is undefined, up to the builder to decide. I discovered quite early that, as an abstract painting can be clouded by too much pigment, some arbrassons are rendered unmusical or structurally unsound by the placement of too many notes in parallel succession. Indeed, as each kerf weakens the overall structure of the wood, too many notes on an instrument make something that isn't interesting to play. The overall mass of the material decides its volume as well as its root pitch—smaller planks of wood may not project as loudly, and their tone quality is decidedly different. Tones can be easily lowered by deepening the kerf, which allows the key to vibrate more freely. However, they cannot be raised without reducing the overall length of the key—a task made all the more difficult for the luthier as the key no longer remains anchored, and can easily snap if too much force is applied against the grain.

The arbrasson's relationship to the livika soon invites a curious tinkerer to wonder: What does the livika sound like, in comparison? Indeed, this comparison invites us to ponder: What exactly makes the arbrasson sound like an arbrasson? Both instruments adhere to a relative tuning—there are no platonic tuning schemes utilized by Le Piez or New Ireland culture, so their sonic identity has little to do with tuning. Bart Hopkin, in his seminal tome on instrument design, argues that it is not merely the

instrument's tonal character but rather the way we touch it that gives the instrument its identity.

> "…The configuration of the pitch elements establishes what kinds of musical patterns will be characteristic to the instrument. Piano music sounds "pianistic," and guitar music is "guitaristic," in large part because of the nature of the physical interface between the player and the instrument…the nature of the playing movements is a key to the character of the instrument…These ideas can be incorporated into the word gesture. Gesture has its physical aspect in the movements one makes to play an instrument. It has a musical aspect in the characteristic turns of phrase, the sorts of note clusters, or the rhythmic patterns that seem to fit the instrument most naturally." [49]

Whereas the size and tuning of the livika is highly variant, its shape is always consistent, which conventionally has 3 notes only, and always pointing in the same direction.

Plainly, arbrassons vary widely in design, number of notes, note direction, number of players, grain direction, and wood choice. This expressive variation gives rise to a wider range of extended techniques and variation in dynamics, expanding its vocabulary and function as an instrument. We can clearly delineate specific physical and melodic gestures associated with each instrument. Consider again the push/pull arrangement of notes on the arbrasson: its varied gestures produce different patterns, like a harmonica or concertina that chugs in both directions. On the livika, by contrast, the notes are always in the same orientation.

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[49] Bart Hopkin, *Musical Instrument Design: Practical Information for Instrument Design*, First Edition (Tucson, Arizona: See Sharp Press, 1996). Page 30

Figure 11: Collage comparing differences in forms between arbrassons and livika[50]

[50] Daniel Fishkin, *Comparative Collage of Livikas and Arbrassons*, digital image created in Microsoft PowerPoint, (10 June 2024).

1.4 Sonic Overlaps

At this point in my research, it seemed clear that I was looking at two totally different (if related) instruments. Yet a piece of the puzzle was missing: the actual sound of the livika. If its acoustic engine were truly related to the arbrasson, I would be able to hear it right away. But this moment reveals a non-cochlear impasse in my research: because a) I had not at this time played livika, and b) there are so few recordings of the livika, there are scant resources to make the comparison of the friction mechanism directly. Messner states that the majority of the repertoire for the lounuat has been lost—when he was conducting fieldwork, despite a previously rich body of music for large ensembles of 20 or more livikas, he was only able to record 3 songs[51]. This lacuna could be related to the difficulty of preserving the instruments themselves, which were typically cremated or thrown into the ocean after the death of their builder.

After months of research, I was only able to find three recordings, total, that demonstrate the sound[52] of the Friction Drum of Papua New Guinea as played in its original context[53]. Two recordings come from Messner's fieldwork, retrieved with special

[51] Messner, "The Friction Block Lounuat of New Ireland: Its Use and Socio-Cultural Embodiment."
[52] I did find a few museum demonstrations of the Lounuat being played. At both the Nurnberg Natural History Museum, and at the Übersee-Museum Bremen, digital tours exist of this instrument, demonstrating its sonics alongside visual and audio history of its context. But these demonstrations merely show the physicality of the instrument, not its location in the musical culture that spawned it. Naturhistorisches Museum Nürnberg, "Friction Drum (Lounuat)," accessed March 27, 2024, https://www.museum.de/audioguide/65/53/EN. "3D Imaging of Sensitive Objects," *Culturalheritage.Digital* (blog), accessed March 27, 2024, http://www.culturalheritage.digital/.
[53] One such difficulty are the various names of the Livika. Also known as the *lunut, lounut, lounot, loanuat, lounuet, lounuat and kulepa ganez, kulepaganeg*, Messner explains that different Livikas were named after different types of birds and also with respect to the size of the instruments. These wide variations make it easy for a new researcher to entirely miss a particular author—searching "Livika" easily returns Derlon's work but nothing of Messner, who refers to the instrument exclusively as the Lounuat.

permission from the Vienna Phonogram Archive, and indeed, they were not even digitized until I requested to review these recordings in Summer 2024[54].

I am not permitted to share these recordings under direct agreement with the Vienna Phonogram Archive, but anyone can write to the library and obtain an encrypted digital copy. One recording is simply Messner himself playing two different livikas, describing each pitch from low medium to high and playing them sequentially. The next recording contains indigenous people from New Ireland playing livika. Yet when I listen to it, I hear harsher, squeakier tones, and someone speaking in Pidgin languages which I cannot understand. It sounds like someone who has forgotten how to play the arbrasson is touching the instrument, though I know that is a meaning I am adding.

Both recordings, of Messner and his interview subjects, sound like demonstrations of the instrument. Yet one song, recorded by BBC radio journalist John Thornley in 1985, and later released on record as *Songs and Dances from Papua New Guinea*, can be easily accessed on YouTube[55]. This recording, played more clearly and accompanied by chanting voice, sounds a little closer to an arbrasson. Unlike the field recordings from Messner, it actually sounds "like a song", and indeed it sounds "like an arbrasson." Yet I find these recordings suggestive, rather than evocative. They demonstrate something that is impossible to access. It's clear to me that whatever we can hear or see of the livika today, rather than explaining any ancient mysteries behind

[54] Messner B 24685 - 24686, Messner: Papua New Guinea 1979, 19770302, Vienna Phonogram Archive, http://catalog.phonogrammarchiv.at/session/7736; *Messner B 26349 - 26350*, Messner: Papua New Guinea 1977, 19790514, Vienna Phonogram Archive, https://catalog.phonogrammarchiv.at/session/7958.
[55] Various and ed. John Thornley, *Songs & Dances From Papua New Guinea: Healing, Feasting & Magical Ritual* (Topic Records Ltd., n.d.)., https://youtu.be/pUt1rYK30zw?si=BPDFQDR-FcULhTdI&t=2720 (Accessed June September 2023).

the arbrasson itself, that the Friction drum of New Ireland remains irreducible and unrecoverable in time[56].

Looking for more recent scholarship on the arbrasson proves nearly futile, with an important exception. Bader's 2012 publication[57] explores the spatial resonance of the livika by analyzing its sound propagation with a 128 channel microphone.

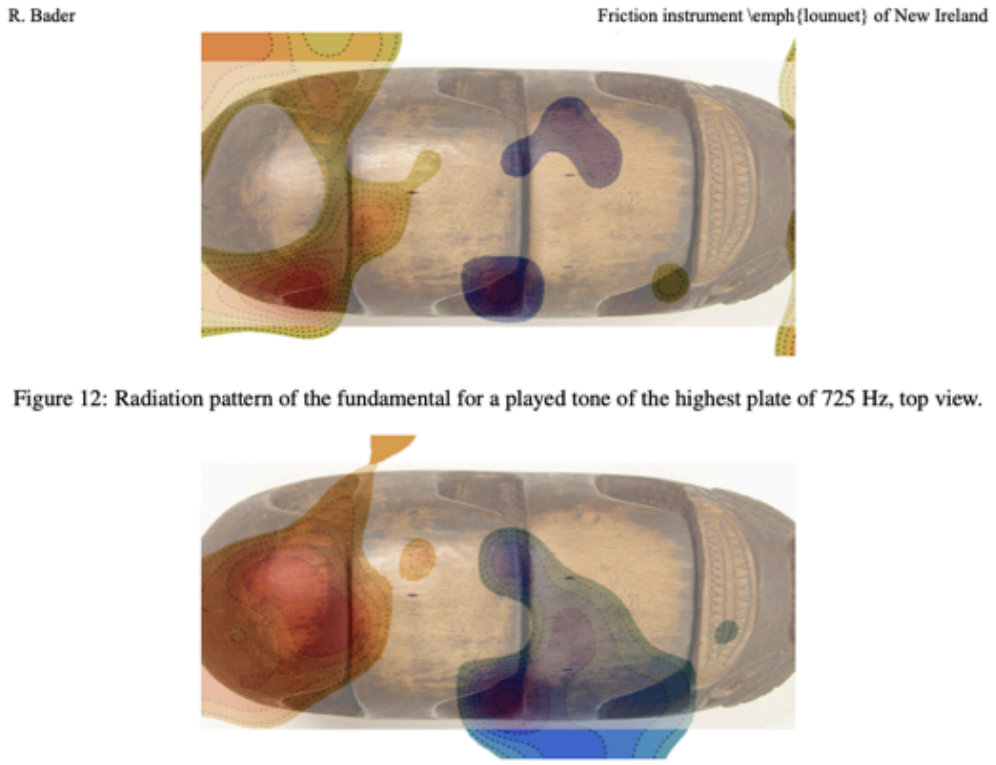

Figure 12: Excerpt from Bader's text, showing sound radiation patterns from the livika

[56] Thornley writes, "Having entered his tiny realm on the second floor without so much as a genuflection, I watched him snap an audiotape into a massive player and was startled by a piercing, resonant wail. 'The Papua New Guinea friction drum,' he announced proudly. 'Thought to be extinct. The Livitu villagers of New Ireland broke the taboo by playing it for me. It should be heard only when someone dies.'" Style: Now that's what he calls music: Where on earth does Radio 3 get its strange ethnic music? From the tiny office of the producer, John Thornley," The Independent, July 22, 1994, https://www.the-independent.com/money/style-now-that-s-what-he-calls-music-where-on-earth-does-radio-3-get-its-strange-ethnic-music-from-the-tiny-office-of-the-producer-john-thonrnley-reports-john-windsor-1415780.html.

[57] Bader, "Outside-Instrument Coupling of Resonance Chambers in the New-Ireland Friction Instrument Lounuet."

Bader's fundamental argument, and the thrust of his research is thus: the carefully carved chambers under the friction plaques of the Livika interact and aid the instrument in resonance production. His analytical conclusions are supported by indexed by Messner's research as well as personal correspondence with Messner. Bader writes: *"Clearly the holes below the plates play a crucial role for sound radiation. The size of these holes is decisive which might be the reason why modern instruments do not work properly anymore as the knowledge about shaping the hole correctly to radiate the plates might be lost."* [58]

Indeed, knowledge has been lost. But what does it mean for an instrument to "not work properly?" On the surface, the notion of a break between a once vibrant musical tradition and a current state of affairs in which tradition, both in terms of repertoire and in terms of construction techniques, seems consistent with my own findings. And yet, some of Bader's conclusions give me pause, having explored the mechanism of the arbrasson directly. One observation of Bader's, also asserted by Messner in 1983, is that the livika is incredibly loud—around 120 decibels. The livika and the arbrasson indeed *can* be loud, up to 112 decibels according to Le Piez, but can also played gently. It was easy to recreate these extremes of both loud and quiet on my own arbrassons—and it simply depends on how the player touches the instrument. Also, Bader asserts that over-rubbing, i.e., overtone production on the livika is impossible. I cannot validate whether this is true, but while arbrassons play fundamental pitches, some also respond well to extended techniques and produce overtones willingly. I recorded this upon visiting Le Piez, who was able to toggle between fundamental and first overtone simply

[58]Bader.

by changing the bowing position of his palm on the outer ring of the arbrasson sculpture called “Sun”. Yet, in many of my arbrassons, I haven’t been able to replicate all of these techniques, suggesting some secrets that await discovery.

But comparing volume and extended techniques has its limits, because it suggests an alternate approach toward *playing* the instrument—and Bader’s argument specifically concerns the construction of the *instrument* itself. If we return to the essential thesis of Bader’s analysis—that the cavities below the tongues of the lounuat aid in its tone production—we find thoughtful and patient carving rituals depicted in the New Ireland scholarship, echoing the elaborate carving practices of the Malangan Cult, and suggesting particular social contexts and registers of secrecy by which these instruments were crafted methodically with an (unknown) array of tools[59].

What does it mean for an instrument to not work properly? One only needs to listen to hear that the arbrasson can sound like a livika. However, Bader’s argument cannot be applied to the arbrasson, in which the sounding key is made only through cuts made with a chainsaw! Dispensing entirely with the concept of tuned, carved cavities, the arbrasson has exactly two linear kerfs made in the material—with these two slices, it matches and perhaps exceeds the sonic resources of those carefully tuned cavities. Is Bader’s argument cut in half—with the very chainsaw that gives birth to the arbrasson?

On one hand, it seems obvious that I’m talking about two instruments entirely: one is called the Arbrasson, and the other is called Livika, each with specific geographical, cultural, and acoustic features. Indeed, Messner argues that the Livika

[59] Messner suggests that string was used to free the tongues of the Friction Drum. Messner, “The Friction Block Lounuat of New Ireland: Its Use and Socio-Cultural Embodiment.”

cannot be understood out of cultural context of the Malagan. I admit that there is limited rhetorical value in using one instrument from a different century and location to explain or disprove the acoustic features of another. However, only a year after the Arbrasson's discovery, Le Piez learned about the Livika. José writes:

> "In 1998 I presented my sculptures at the Musée de la Musique de La Villette in Paris. This led me to meet the Ethnomusicology department of the Musée de l'Homme who assisted me in my research with interest. I discovered there the only known cousin of the Arbrassons, a specific ritual instrument of the forest tribes of the island of New Ireland, in Papua – New Guinea, where it is known under the names of nunut, launut, lunuwat or even livika."[60]

And, consider to how Le Piez describes the experience of being invited to play Livikas, which hadn't been played in a century, inside the Collection of Jacque du Branly, in Paris, in 2008:

> "The curator of the Oceanian collections was there, as well as Brigitte Derlon, the New Ireland specialist, who was very moved, because she heard the last initiate playing in this country. They were stunned, they didn't expect such a powerful sound at all. We were less surprised, because we knew the arbrassons!"[61]

The sonics of the arbrasson itself *warp the reality* that these are different instruments. I find this distinct from the taxonomy of the hundreds of different flutes or zithers found worldwide. There are only two wooden instruments in this category that are bowed with rosined hands: the arbrasson, and the livika. The future of the arbrasson is still being written—unlike the livika, which the field has deemed "extinguished," Le

[60] Etienne Rolin and José Le Piez, *Dialogue—Art and Nature* (Zachprod, 2010).
[61] Regef, "José Lepiez et les Arbrassons - entre terre et ciel."

Piez shares his instruments freely, performs with them, teaches other people how to build them. Yet that future folds back within itself: nearly immediately after the arbrasson's "invention," did Le Piez find the livika in the archives, and began to affirm that instrumental legacy through specific design practices, which have only grown more nuanced and developed as he learned more about this culture, and worked with ethnomusicologists, and eventually played instruments from New Ireland directly. How much of one instrument lives inside the other?

I finally experienced this convergence myself firsthand, nearly 1.5 years into my research, when I had the rare opportunity to play a livika for the first time at the Metropolitan Museum, at the invitation of curator-in-emeritus Ken Moore. I met Moore at the American Musical Instrument Society conference in Phoenix, where I had delivered a lecture on the relationship between the livika and the arbrasson. I cannot overstate the significance of the opportunity to play this instrument: for a builder and player in my position, it closed the loop of conjecture that formed the basis of my early research. This livika, or kulepa ganeg as it was catalogued, was acquired in 1893—perhaps one of the oldest instruments I have had the opportunity to play.

Touching this Livika was extremely different compared to touching an centuries-old Stradivarius violin—I noticed termite holes all over the instrument, and even though it was nearly a solid log of material, it was surprisingly light. A rare object of extreme archival significance, standard playing techniques could not be observed—I had to play it with rubber gloves, but unfortunately I could not add moisture to the instrument—not even water. Putting on these gloves did challenge the slip-stick effect that so critically defines any friction instrument—I found I had to pull on the note plates extremely hard

to get them to resonate. When the pitches began to appear, they blossomed, filling the room with a powerful, loud resonance. I played the kulepa ganeg, talking with Moore, recording on my iPhone with sound only, taking in the moment, and letting it flower in the forest of my sonic memory. Without a doubt, one aspect of Bader's research was confirmed by this empirical experience—the low notes of a livika are indeed loud. The carved, three-dimensional cavities and significant mass of the sound plates suggest that the acoustic engine of the livika, while related to the arbrasson, indeed amplifies more efficiently. Whether that quantitative observation supports Bader's qualitative point, that it is possible that modern livikas "don't work as well", leaves me still searching for a comparative analysis that links the livika and the arbrasson in a manner that reaches beyond nomenclature. Put simply: different pieces of wood sound different. Talking with the curator Ken Moore, he underscored this point—different instruments, especially instruments from non-Western instrument period collections in collections around the world, can sound wildly different in terms of tone production and volume. This point—less contested in application to the rarified Stradivarius—is no less salient when applied to the "simple" livika. And through these differentiations, a more universal family tree of friction lamellaphones, containing all its instantiations, takes root.

Figure 13: The livika at the Metropolitan Museum that I was allowed to play.[62]

1.5 Music and Magic

As I mentioned earlier, José Le Piez has worked as an arborist and magician for a long time, and only after discovering the arbrasson in 1997 did he begin to make music. In conversation with Etienne Rolin, he suggests, “I don't think I have the soul of a musician. Otherwise, I would have felt the need to learn an instrument very early on.”[63]

In some ways, this reminds me of the livika’s status as a funeral instrument, only meant to be heard in conjunction with specific ceremonial praxis. Yet one difference is clear. If the Livika represents the idea of the gateway to the underworld, the arbrasson,

[62] *Friction Drum (Lunet, Livika or Kule Paganeg)*, late 19th century, Wood, stain, L. 17 × H. 9 1/2 × D. 6 3/8 in., late 19th century, Metropolitan Museum of Art, https://www.metmuseum.org/art/collection/search/501966.
[63] Rolin and Piez, *Dialogue—Art and Nature*.

for Le Piez, represents a connection to the natural world, to the trees of the forests, in which music is a reflection of nature rather than human expression. He explains his relationship to music by invoking his longtime partner Patricia Chatelin, with whom he has played arbrassons as a duo for decades: “Patricia was always a bit like the guardian of the arbrassons! I was tempted by all-out experiments, and Patricia told me: "Be careful, here you are straying into music, you have to remain a sound sculptor, a giver of sounds... a ringer of gifts!" She was very involved in vigilance and listening.”[64] Whereas the livika is underwordly, the arbrasson is sylvan. In fact, the only thing that is chthonic about the arbrasson is its inheritance from the livika itself.

While Le Piez brings with him certain biases from his career as an illusionist, namely, the tradition of secrecy and copyright, I’m compelled to consider another notion of magic. Before the influence of Carl Jung, who theorized that alchemy was symbolic of the attempt to understand the individual psyche, alchemy was understood as a physical transformation of the natural world. In other words, magic is not a secret knowledge that a magician possesses and disperses. Magic is akin to witnessing and understanding the processes which go on inside Nature itself[65]. Or as José explains:

> JL: It is a primordial language which is that of the prehistory of music, that is to say how, in time immemorial, men discovered that matter has things to say. They begin to dialogue with her, and little by little invent the music. Before the music there is dialogue, and this happens in a musical universe, that of nature, of the

[64] Rolin and Piez.
[65] I am grateful to You Nakai for sharing this perspective with me, who suggested it to me after inviting me to lead the first Arbrasson Workshop in Tokyo, in March 2024.

sound ecosystem of the forests, of the songs of insects, there is a musicality all around them. They invent music without naming it."[66]

These two understandings of magic—magic as secret trick/magic as natural phenomenon—are at odds. The act of signing the contract for Le Piez, documented for the film *Bois De Rose*, indexes the former approach, preserving the secrets of the arbrasson and thus the economic livelihood of Le Piez. It's difficult to say exactly how seriously José took the contract. I had certainly never been asked to sign anything like it before by any of the incredible instrument designers who, over my now twenty years of curiosity into this field, have graced me with their wisdom and time. At the end of filming, José even suggested that the contract was meant to be a kind of joke, a performance for the screen!

Nonetheless, my epistolary relationship with Le Piez has continued now for two years since making the film; we have discussed technique, and building strategies, as well as sharing music. One day, he suggested that we form a "groupe international de recherche pour l'arbrasson," though nothing came of the idea. Perhaps he was more interested in having me respond to the many emails he receives about how to make arbrassons. I have upheld my end of the contract in that I have not yet sold any arbrassons. In writing this chapter, however, I practice respect for a different kind of magic. Take, for example, the use of the sine wave in Alvin Lucier's music, which I have described for years as akin to casting a spell. In Lucier's piece *Music for Pure Waves, Bass Drums and Acoustic Pendulums* (1980)[67], a critical component is the

[66] Regef, "José Lepiez et les Arbrassons - entre terre et ciel."
[67] Alvin Lucier, "Music for Pure Waves, Bass Drums and Acoustic Pendulums (1980)," accessed March 27, 2025, http://alvin-lucier-film.com/bass_drums.html.

unornamented sweep of a sine wave oscillator from low to high and back down, in order to resonate the pendulum of a ping-pong ball on a string to begin striking a bass drum. As the pitch changes in resonance with the pendulum (a pendulum's movement itself is sinusoid), the rhythms of attack on the drum change. Many of Lucier's other pieces utilize this "nonmusical" arrangement of the oscillator, such as *So You... (Hermes, Orpheus, Eurydice*) (2018), in which the sine wave sweeps resonate the chambers of large amphorae—large ceramic vessels. Another such piece in this lineage is *Music for Cello with One or More Amplified Vases* (2014)[68], in which there is no sine wave oscillator, and the cello sweeps linearly. In these pieces, during the long, austere sweep, different resonances in the vessels emerge and add volume to the plain sweeping instrument. All of these pieces eschew the language of tonality for a more direct acoustic interaction with their materials. The music of these pieces doesn't live in the composer's idea of harmony, but in the things that resonate in front of us, in the world.

In an unexpected twist, this lesson from Lucier's music relates indirectly to the livika and the arbrasson. In fact, the spectrogram of the livika itself reveals that its primary tonal signature is a sine-wave (a fundamental) mixed with a noise burst. The powerful volume of that lounuat I heard at the Metropolitan was exactly the sound of a sine wave resonating in a chamber of the instrument. The Arbrasson is yet another friction lamellophone, and the act of playing and building it reveals how much musical potential rests latent in simple materials. Indeed, a reoccurring experience I've had

[68] Jocelyne Prince, "Alvin Lucier's 'Music for Cello with One or More Amplified Vases,'" accessed January 15, 2025, https://jocelyneprince.com/sculpture/alvin-luciers-music-for-cello-with-one-or-more-amplified-vases/.

when I share my arbrasson with audiences, is that they hear my instruments, and think the sound is magical, for it seems so improbable for birdsong to emerge from notched logs. Then they ask to touch them, and the suspicion of magic continues, for they think that I am performing some kind of trick when they touch them, and are unable to make a sound with their dry hands. But the only magic at play here is in the *physical world*. The magic is how materials interact. These materials, while reflective of specific cultures and personalities through the annals of history, are nonetheless primeval—they are evergreen. They belong to no one. As I discover and share the secrets of the arbrasson, I seek ultimately a greater understanding, and hope to preserve this magic so that it may prosper for many other musicians. In my own music, through my own instruments, I seek to add to the grand repository of culture. Let not these tongues be lost again.

1.6 Bois de Rose

Modos de Transporte: Bois de Rose is the pilot episode of multilingual travel documentary that explores handmade sound and cultural exchange. In the pilot episode, its host (Catalina Jordan Alvarez) takes a high-speed rail train from Paris to Bordeaux and discovers local cuisine, sightseeing, and music. At a local cabaret, she discovers three improvisers playing uncommon musical instruments: glissotar, daxophones, and the arbrasson. The performers are José Le Piez, Etienne Rolin, and Daniel Fishkin. Entranced by their music, she asks the three if she could interview them for her TV show. They counter her request with an offer: she is invited to visit Le Piez's studio in the French countryside, only if she signs a waiver of secrecy. The next day she visits Martillac, where she finds the three engaged in another musical communion. As if

possessed by the sounds of their instruments, the travelogue dissolves into an abstract film of long takes and slow sounds. As music plays, the musicians begin to speak—about sound, music, travel, and philosophy.

Such is the narrative of *Bois de Rose*—a fictional non-fiction film that is the second multimodal filmic counterpart in this dissertation. Instruments need community to survive. Thus, it was important that I make *Bois de Rose* collaboratively in multiple aspects. The film itself I wrote and produced with Catalina Alvarez, who is my life partner—though in the reality of the film, Catalina and I have never met. This inverts another relationship in the film—in the film's reality, I know José, but in real life, I had only just met him. The soundtrack is representative of my first meeting with José himself and our translator/collaborator Etienne Rolin. Utilizing only arbrasson, daxophone, and woodwinds, it was recorded on the first day we met. in a sense, the film score itself is metonymic of the film narrative: the first sounds of the title sequence, "New Ireland Stomp", is the first improvisation between the three of us. Its music, insistently tonal, suggests a folksy welcome to strange sounds. The content of the film explores the philosophies of instrument builders. The film explores instruments as both vessels of communication, and as emissaries of nature. Yet in making the film, other topics began to emerge.

The film itself was partially improvised. Catalina had written a script, which was offered to me for a second draft, but I found that I wanted to write a series of "text prompts", meant to guide conversation like open-form music. In the way most low-budget films are made, decisions about who would hold the microphone, what happens where, and which scenes were shot first, were decided only on the spot. While

attempting to shoot a particular scene, José, out of nowhere, said to me (in French), “I will now show you the five doors of the tree,” and then proceeded to monologue for about ten minutes, the different ways to “enter” the tree’s realm—by the sightline of the branches, through its electromagnetic field, by touching its trunk directly, and by inhaling the moist air of its soil.[69] The chaotic energy of my son Lou playing on screen, an artifact of the process of two artists traveling abroad without childcare, somehow captures the spirit of the conversation—observing the chaotic and mysterious processes of nature.

An important moment in the film, while written into the script, also happens in reality: José and I exchange instruments, a daxophone in exchange for an arbrasson. Indeed, this gift was pre-ordained: José and I planned this exchange in advance, and I had brought particular instruments for him.

> JOSÉ: I have an arbrasson… in *Tilia*. Hai! [hands it over]
>
> DANIEL: I will receive it. Thank you.
>
> JOSÉ: You’re welcome. It has three notes, symbolic of the Livika of Papua… The form is of a boat. The voyage of industry.

The instrument that José has chosen to give me directly locates the arbrasson to its ancestor, the livika. This moment is a symbolic precursor to many days of research yet to come. Yet the phrase, “the voyage of industry,” does not suggest that I will conduct an ethnomusicological immersion to the lands of New Ireland. On the contrary, it

[69] Nao Nishihara suggested this notion to me: “As humans, we need physical contact with wood, and we want to touch the forest through the wood on our fingertips. Nao Nishihara, “Email To Daniel Fishkin,” March 15, 2024.

suggests that José and I specifically are emissaries of “industry,” a larger process of modernization that brings along power tools, lumber processing factories, and global exchange. The gift of the boat, and its subsequent voyage predicts a global resurgence for the Arbrasson and the Livika, of which this dissertation is a component. Later in the film, another interesting conversation transpires between Etienne and me along these lines.

> DANIEL: Do you think José’s instruments are going to be a secret forever?
>
> ETIENNE: I hope not, because this is beautiful artwork that should be shared around the world one day.
>
> DANIEL: [laughing sarcastically] It sounds like a fairytale, the way you say it.
>
> ETIENNE: It is a fairytale. He’s a magician, this guy.
>
> DANIEL: It’s not just the arbrasson, it’s everything—it’s the daxophone, it’s Boulez, it’s all the secret magic of music, how much longer is it going to remain a secret? Or, is that what makes it good, that it’s a secret?
>
> ETIENNE: I think that, uh, we can’t unravel all the mysteries, and that’s the beauty of life. Life is a mystery. Art is a mystery.
>
> DANIEL: It sounds so *cheesy* when you say it like that.
>
> ETIENNE: Well, it’s *true*—how can you get around it? Life is a mystery. And it’s always surprising. That’s the beauty of José’s work—he can’t predict what he’s going to make. How

about you, as a daxophone [sic], when you're sawing away? Do you hear the sound?

DANIEL: Yeah, I do. But I guess this is the last mystery—is that there's a secret in the wood.

This improvised dialogue, shot to accompany a slow-moving pan of José sawing notches into an arbrasson branch, reflects a number of tensions inside the film process. One obvious dissonance is the conversation between me and Etienne. I, having asked Etienne to "reflect pontifically," am unnerved by my conversation partner's trite platitudes, and Etienne in turn seems to resist my prodding to get to something deeper. But there is some truth here. At the time, I had not yet begun my research yet into the livika. But clearly, I am already asking the questions around acoustic phenomena of the arbrasson and its cultural property that comprise the earlier section of this chapter. My desire to understand the "mystery" of the arbrasson, to codify the "magic" through acoustic principles, and my ambivalence about this process are on full display.

Yet I can't help but linger on Etienne's slippage, calling me a *daxophone* myself, rather than a daxophonist or daxophone maker. Do I, or did I, belong to a "tribe[70]" of daxophones, if José belongs to a tribe of Arbrassons? If these questions seem too theoretical, consider again the longstanding practice of naming instruments after their inventor[71]. In Electronic Music, this was for a long-time par for the course: early

[70] José's words, not mine, could easily be mistaken or critiqued for a neo-primitivist idealistic aesthetic, but I invoke to use its simple and most universal meaning: a grouping in terms of kinship structure.

[71] "The formula of <man's last name> for the system and a modernist or otherwise universal concept as module name was pervasive in that time period known as the good old days of synthesizers. Of course Rodgers is instrumental in debunking this as the true beginning or source of invention, and also for the alternative readings that bring feminism into the history of this time. It seems that subsequent synth names would also reject that monolithic nature of naming." Peter Blasser, "Stores at the Mall" (Master of Arts, Middletown, CT, Wesleyan University, 2015), https://doi.org/10.14418/wes01.2.84.

examples include Leon Termen's Theremin; the ondes Martenot, invented by Maurice Martenot. More modern examples not only represent individual *inventions* but *company* mastheads: the Moog synthesizer, the Buchla music machine, The Serge synthesizer, the ARP (after Alan Robert Pearlman). The tradition stems from acoustic music, too: the bandoneon, the sousaphone after John Philip Sousa, and most famously, Adolphe Sax christened his invention the saxophone. Hans Reichel, perhaps, refuted this practice when he shortened the name of his "badger-like" invention the *dachsophone* to *daxophone*, to, in his words, "echo Adolphe Sax."[72] But "daxo" was and is an empty signifier, waiting to be filled with meaning.[73] Later in his career, Reichel would use the word "dax" for an entire family of fonts that resonated heavily in the arena of design; today, FF Dax is one of the most popular humanist sans-serif fonts and is heavily utilized in marketing and European signage. Meanwhile, Reichel patiently pioneered his daxophone through the construction of unique forms, a library of over 400 daxophone tongue shapes in different woods, as well as cultivating his recording and performance practice. It was not merely the uniqueness of his invention, but perhaps the word itself, that he began to claim to define himself. The *daxophone*, though, is not the *Reichelphone*—each daxophone "tongue" has its own "voice" that distinguishes it:

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[72] Very few people, in fact, know what a badger sounds like—and perhaps that is the point. In the liner notes to Shanghaied on Tor Road, Hans wrote, "I had a Swedish LP called "Mammal Voices Of Northern Europe, Vol. 1" which featured wolves, rats, bats, fieldmice and also a badger (German: Dachs). I was impressed by the badger's astounding sonic range, from very low to very high notes. Thus the dachsophone got its name - with echoes of Adolphe Sax. Later on I changed the "chs" to "X" because I got fed up with having to keep on repeating the story." Hans Reichel, "This And That About This Thing," accessed March 1, 2024, http://www.fmp-label.de/fmplabel/catalog2liner/fmpcd046_t.html.

[73] Elsewhere, I have already written about the sematic slippage of the word that resulted from Reichel choosing the word "Dax", to describe the curved piece of wood used for modulating notes on the daxophone. The physical dax gives the instrument it's unique sonic gesture, in the sense of the term that Bart Hopkin has elucidated earlier in the chapter. Daniel Fishkin, "The Mystery of the Acoustic Cantilever: Building a Dax for Your Daxophone," *Popular Woodworking* (blog), August 30, 2018, https://www.popularwoodworking.com/editors-blog/the-mystery-of-the-acoustic-cantilever-building-a-dax-for-your-daxophone/.

> “Each [tongue] is essentially an instrument in its own right - perhaps imperfect but unique. They all have one thing in common: They are self-willed and stubborn, sensitive to change in the weather and moody - right up my alley. Some look attractive, others range from being unassuming to being unattractive. Some are real howlers, whereas others prefer to murmur away quietly to themselves. Some are versatile and co-operative, others are out for one thing only. I have tried friendly persuasion, and have often sworn at them using the foulest language. Occasionally I've sawn the head off some of them. Music can be brutal, I always say”.[74]

Having developed over 75 kits of unique daxophone setups for customers worldwide since 2019, I have made perhaps an uncountable number of tongues. It’s very common that I make 80 different tongues or so a year. With over 400 or 500 tongues under my belt myself, I can indeed confirm the puzzling variety in material, the sheer unknowability as I’m working on an instrument, as I’m “sawing away,” and the complete thrill of discovering a new shape or wood that gives rise to a new voice. Having customers means that I can afford to keep making new instruments. But sometimes I discover such a distinctive singer in the woodshop that I don’t want to sell it, and I stash it in my own quiver where it will join the cast of characters I call upon in concert. The sheer variety of sonic results to be found in the wood suggests a kind of agency in the acoustic mechanism itself. The material of the instrument asserts itself on the player, it feeds back on the music they produce.

[74] Reichel, “This And That About This Thing.”

We return then to Etienne's question, "what about *you*, as a daxophone?" If I myself am a daxophone, then like a "francophone" or "anglophone", I speak the language of the daxophone. That language is not a universal language, like the 88 keys of the piano. The language of material cannot be chromatically translated for idealized MIDI rolls of sound. Working with this curly material—both as a player and builder—is like carving a knotty log; it is not uniform, its limitations are ever-present, and as the material asserts these limitations, they cannot help but end up in the music. Indeed, it would not be a stretch to say that, at least in part, I *identify* as a daxophone (player, builder, maker)—thus, it suggests that it is my name, now.

Little did I know that these innocently improvised questions would recur for the next 12 months in the woodshop, as I began to carve away my own fledgling arbrassons, and to figure out what music they had in store for me.

1.6 Making My Arbrassons

The first time ever I laid my hands upon the arbrasson, I knew my life, and this dissertation would change. I knew this change might not necessarily be titanic, but in a fundamental sense, the circle around me had grown wider. After almost 20 years of exploring the daxophone, I felt reasonably clear that I understood the category of friction idiophone and had even begun to work intentionally with the limited overtone series[75] at

[75] Unlike a string, wherein the modes of vibration correspond exactly to the integers of the overtone series, the modes of vibration of an untuned cantilever are enharmonic. For example, the first three nodes of a rod suspended at one end are, according to Bart Hopkin: 1, 6.27, 17.55. These raw overtones can be tuned by modifying the bar in a variety of ways. Hopkin, *Musical Instrument Design*.

play in the mechanism[76] of the acoustic[77] cantilever.[78] Yet, here right in front of me, was a completely different approach, right in front of me, that I had not imagined. The effect of this discovery cannot be overstated. It called into question everything that I had imagined this dissertation to be about. I would soon abandon the previous framework of this dissertation—how tinnitus and hyperacusis bear creative effects on musicians—and seek to carve a larger framework to encompass my entire instrumentarium. But this is getting ahead of that moment in time. I knew I had to understand the arbrasson, and to do so, I needed to spend time in the workshop, and build my own.

[76] Tong Instruments, "Kalimba Tines: Modifying the Overtones," Accessed March 26, 2018, https://www.youtube.com/watch?v=iKp4dsZf0VE.
[77] See also: David M.f. Chapman, "Characterizing the Sound of an African Thumb Piano (Kalimba)," *The Journal of the Acoustical Society of America* 123, no. 5_Supplement (May 1, 2008): 3806–3806, https://doi.org/10.1121/1.2935513.
[78] See also Prashanth Shyamala, Subhajit Mondal, and Sushanta Chakraborty, "Detection of Damage in Beam from Measured Natural Frequencies Using Support Vector Machine Algorithm," 2016, 306–10, https://tinyurl.com/45km8m34.

Figure 14: Early Arbrasson experiments, made from catalpa, with rectangular forms[79]

[79]Catalpa Arbrassons, Daniel Fishkin

Figure 15: A Cherry Arbrasson, 2023[80]

[80] Daniel Fishkin, Cherry Arbrasson.

Friction defines the arbrasson—the very same slip-stick phenomenon that governs the interaction of the rosined bow hairs upon the string of a violin. In building my first arbrassons, I puzzled over various design choices that changed the basic way I made sonic contact with the instrument. What to use for rosin? José, in our first jam session, asked that I not touch his arbrassons if I had rosin on my hands: “Ce serait une catastrophe!” I soon discovered that José preferred— of all things—to use hand lotion. But before figuring out exactly which hand cream he used, as I was traveling throughout Europe, I tried random body lotions I found in hotels, which had a disastrous effect! Eventually, I found a very tacky French hand cream in an Aldi in Berlin that seems to produce a sonic miracle. Later, corresponding with José, I discovered that he utilized a specific one: *Neutrogena Concentrated Hand Cream (Norwegian Formula)*, which is mostly made of water and glycerin. I wanted to find an alternative to the hand cream for several reasons. Just as José warned of a “catastrophe!”, I did not want this hand cream to interfere with my bow hairs, as I hoped to play daxophone alongside the arbrasson. Yet I soon discovered that equally crucial to the rosin/cream was the concept of finishing—the finished surface, whether sanded or planed, had to be exactly right, and correspondingly it needed to be oiled or varnished in exactly the right way to produce the right result. José was unspecific about the type of varnish he used—spray can varnish, I noted in his studio. Having worked with hard-wax finishes since 2015, I was not very familiar with these toxic surfactants. In Berlin, I took an arbrasson that had been ruined by lotion and attacked it with green spray-paint. Once it dried, I coated it with spray varnish—the kind that smells so strong, you can feel your brain cells dying as you use it. But it worked. How fine to proceed with sanding also vexed me. I didn’t get

very much “grab” with my fingers on pieces only sanded to 220 grit, so going up the grits to 600 was mandatory and exhausting. I know, however, that (according to David Ellsworth, see chapter 2) the way to love sanding is to do very little of it.

Back in the States, I tried another approach. I noticed, after sharpening my blades one day, that the surface of a freshly cut piece of wood does not only shine, but it also “grabs” the fingers. Theorizing that sandpaper dulls fibers, I concluded that a sharp blade over a clean-grained piece of wood could produce an initial tack. Planing down a piece of catalpa, I quickly made an arbrasson in an hour, using a Japanese saw. It sprung to life immediately, no varnish at all, though copious hand crème was needed. I carried with me on the subway as I went to Henrik Vibskov’s[81] 2023 NYC Fashion Gala, mesmerizing party goers with the magical sound of the arbrasson, and bewildering them too, as they failed to play it, unable to produce a single note without the needed glycerin hand cream. This was progress, but I didn’t like how much hand cream I had to use. Thinking back on my experiments, I realized something about my impulsive intuition with the spray-paint: the problem with wood is that its porous nature is continually absorbing the material you use for a finish or for friction—the sealing effect of spray-paint and spray lacquer was distinct from whatever sanding or planing I had performed. Though the visual language of spray-paint over hardwood piqued my interest, invoking an anti-natural modernist aesthetic far away from Le Piez’s live-edge arbrassons, ultimately I had to refuse, for I felt that I had too much talent and experience

[81] Henrik Vibskov is an avant-garde fashion designer based in Copenhagen and NYC. In 2021, Vibskov awarded me the PIG Prize for emerging talent. My work sample for this prize included *Composing the Tinnitus Suites: 2020*, included alongside Chapter 3, featuring a jumpsuit made by Vibskov.

working with wood surfaces directly. The next step was to systematically explore the concept of varnish.

Modern spray varnish is synthetic, made from an impossible and vast variety of materials in four categories: a resin, a drying oil, a solvent, and possibly a metal drier to accelerate the drying process. Synthetic varnishes might be made from polyurethanes or phenolic resins, but the basic chemistry is meant to imitate olde resin varnish, which is comprised of only linseed oil, pine resin, and a solvent. I found a product comprised of only two ingredients, Tried and True Varnish Oil, which contains no solvents, for it is only boiled linseed oil and pine resin—safe enough to apply without a respirator. This simple finish is infamous in the woodworking world because it stays tacky for weeks on end—some customers hate this, or resort to adding their own solvents, but I realized that this oil remaining "sticky" might actually be an asset for the arbrasson, for it would aid in friction.

My instincts proved correct, for the oil worked exceedingly well; it poured thick like honey out of the can and smelled like the calm forest. Rubbing it on was an almost narcotic experience. I soon discovered in my research that many violin rosins are simply a combination of beeswax and pine resin, melted together. Thinking about the success I had with hand cream, I began to theorize that the slip/stick effect is simply that: one needs some amount of *stick* and some amount of *slip* to make the right rosin for an arbrasson[82]. But the varnish oil wasn't enough stick when it finally did dry, weeks after I applied it, so I needed to find a rosin formulation for the 3D surface of the wood.

[82] Other makers have tried different solutions. Water can wood as a substitute, just like a wineglass. My Japanese Daxophone customer, the experimental instrument collector and composer Shirato Hideaki, made his own arbrassons from Kiri wood, and instead of rosins, uses latex gloves.

Figure 16: Tools of the trade for making the arbrasson sing: Neutrogena hand cream and liquid rosin

I tried rubbing a cake of rosin directly on the wood, but it cracked, and my smooth-talking arbrassons began to shriek. They smoothed out again with the hand cream. But other formulations of resin were on my mind since my youthful days of trapeze, so I began hunting for liquid rosin on the internet[83]. Later, I found an even simpler formulation. According to hurdy-gurdy makers, rosin will melt in a bottle of 99% isopropyl alcohol; when it is applied, the rosin remains on the surface after the alcohol evaporates.[84] This formula would prove invaluable later, when I conducted an arbrasson workshop in Japan—a thick layer of rosin in alcohol can be painted on with a brush, which dries instantly, and can be tamed with a little Neutrogena for a ready-made arbrasson surface.

[83] Ellen Fullman, my collaborator from 2016 and pioneer of the Long String Instrument, also used powdered rosin and denatured alcohol to build up a rosin base on her strings.
[84] Neil Brook, “Slippy,Sticky,” accessed March 19, 2023, http://www.hurdy-gurdy.org.uk/slippy,sticky.html.

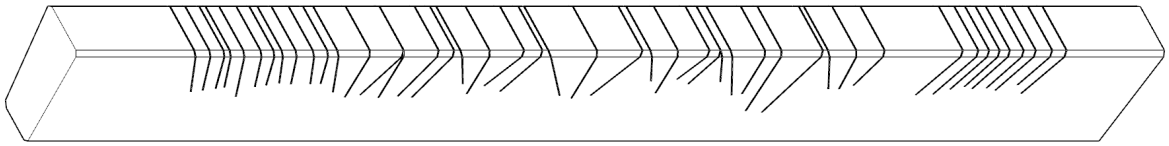

Figure 17: a simple arbrasson shape, modeled from one of my first experiments.[85]

I should mention form. Early in my woodworking career, much of my material came from 2×6s found in the trash, and so the rectangle was a dominant form in my design language, almost to a fault. As my craft blossomed, I attacked the rectangle. I even sanded down the hard edges of the first daxophone starships I made for my band when they brought them to me for annual repairs a few years later. Yet, years later, upon visiting Robert Wilson's Watermill Center in 2019 for a residency with the Daxophone Consort, I began to rethink my initial skepticism of hard edges. I began to realize that simple shapes—square, the rectangle, the triangle—have a modernist power to them that distinguishes them apart from the natural world. Thus, many of my initial arbrassons were simple forms—rectangles from the wood kiln, rather than peeled branches. Later experiments grew more ambitious, but I found it impactful to keep simple shapes—take, for example, the "Monolith" from Kubrick's 2001. Or, Japanese timber framing, where small bevels or chamfers give the illusion that a plank of wood is much thinner than it is.

[85] Femi Shonuga Fleming, Abrasson Model, 2024.

Figure 18: Cherry Arbrasson, my "boat", with capo “oars”

I made my first substantive arbrasson from a large piece of cherry wood, given to me by Phil Brown, the woodturner. The size of the wood allowed me to conduct several experiments on tuning and proportion. I didn’t begin with the intention to tune my arbrassons to any scales. The first notes I carved didn’t make sound, and I tried deepening the cuts until the keys started vibrating. Having experimented with different widths, I found myself stumbling upon random scales, the most resonant and non-“flubby” notes I had ended up with based on proportions of trial and error. With this cherry wood, I attempted a more deliberate tuning. I divided the instrument into two sides, a “bird” side and a “bass” side, and labored a long time on the tuning until the lowest notes rang out clearly with long decays. As I cut the fundamental lower and lower, I ended up with a peculiar scale: 1/1, 4/3, 3/2, 7/4, 7/3, 2/1, 5/2, with the octave

slightly misplaced, for I had cut a single tine too wide, and rather than have it be out of place with the rest of the grouping, bisecting the key proved a strategic option. This was the first arbrasson that I referenced the livika obliquely. On the wide curved side, I tried a different approach, splitting the notes down the middle to double my real estate, and carving random high-tuned clusters.

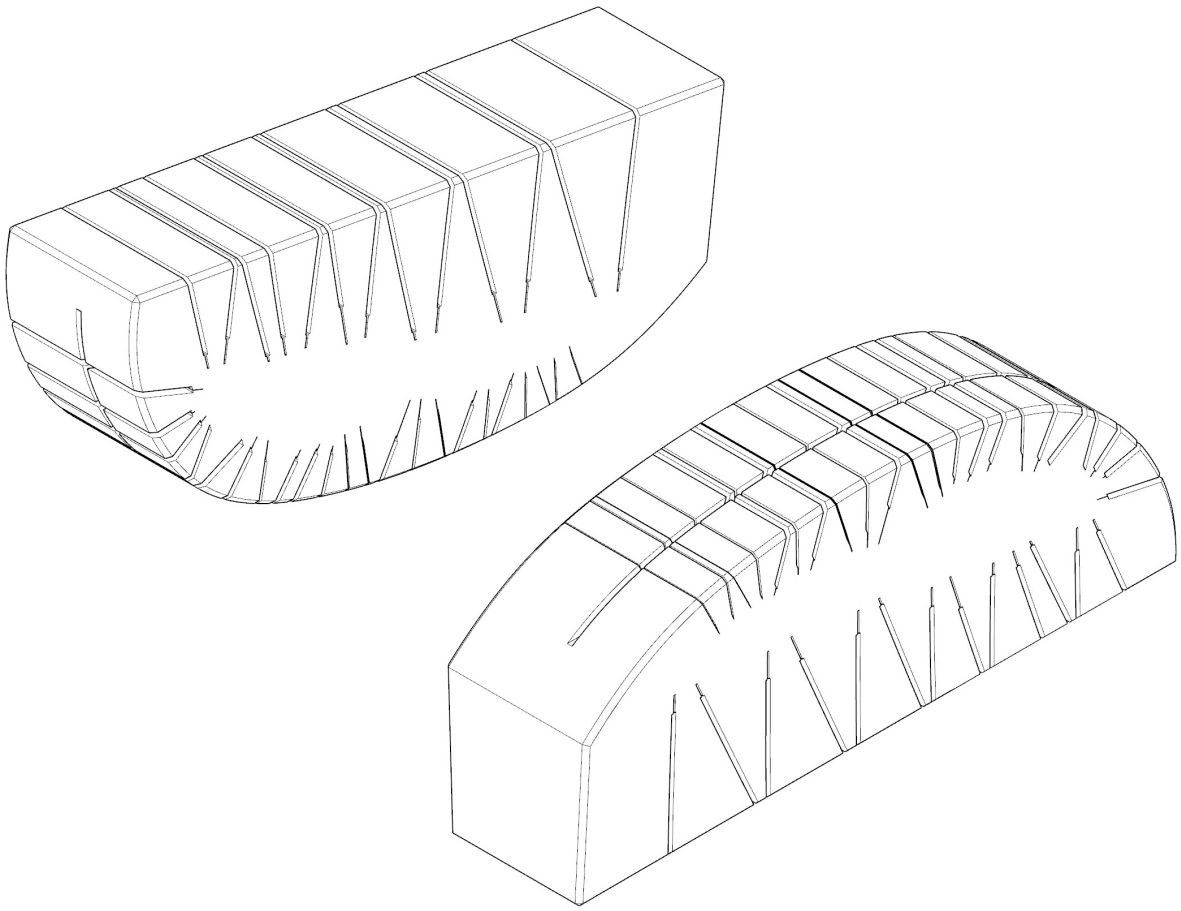

Figure 19: 3D model "X-Ray" of the boat. The offset kerf of the center yields two sides to the treble register, a second apart.[86]

[86] Femi Shonuga Fleming, Abrasson Rendering, 2024.

Tuning the instrument took much, much longer than I had expected. The bass notes didn't seem to resonate well. Testing in the shop is rather hard—the sawdust keeps interfering with everything, and I was using water instead of hand crème or rosin because I didn't want to make a mess. So, I kept making the pitches lower. I stopped tuning as the kerfs began to run closer to each other—if I kept tuning lower and lower, I would cut the instrument in half. As it turns out, the tongues simply needed the right amount of rosin—after varnishing the instrument and putting a few coats of liquid rosin on, the instrument started to sing easily.

At first the pitches on the curved side of the instrument were too similar—too many repeated notes, and the two sides weren't really in tune with each other. If I kept making the notes lower, they could snap—and also I felt less excited about the lower octaves I was ending up with. Is woodworking truly subtractive? At some point, it occurred to me that I could fill up the kerf of an arbrasson with material. The notion developed collaboratively. A daxophone customer of mine, Jonathan Kawchuk, had asked to buy an arbrasson—of course, I refused, bound by my contract, so he ended up building his own and figuring out some aspects on his own. He sent me a video of slots of wood jammed inside the tongues, which raised the pitch of the arbrasson key like a capo. I quickly went to work building a bundle of my own wedged capos and was shocked to discover each key has almost an octave of tunability. In a fundamental sense, the arbrasson tines are tunable because they are lamella. In this way, they are daxophones, too. Realizing this, I began to retune the treble side, adding superglue and sawdust into the kerf to raise the pitch, and adjusting with a few strokes of the saw until the treble and bass side interacted with each other like the two sides of an accordion. I

set up the instrument, finally completed, with some capos, and took a picture. It struck me: I had made my own boat.

1.7 Making Music with the Arbrasson

After taking the time to build my own arbrassons, I had to discover my own way to record and compose with them. In a way, the recordings of Le Piez are similar to Hans Reichel's famous daxophone operettas— they demonstrate the possibilities of the instruments through harmony and layering. While no doubt virtuosic, this approach is like a diet consisting solely of plum pudding—it leads to a kind of sonic malnourishment I am all too aware of. Processing the arbrasson or looping and using the computer seemed promising, but I didn't progress with it. It was important for me to find a new format for utilizing the arbrasson.

Eventually, I found a strategy for presenting the arbrasson in a wholly different light. The album, *Your Ol' Toolbox Smells Good,* is a work for tape, utilizing daxophone, two arbrassons, and 8-track tape loops, developed collaboratively with Aaron Dilloway, an artist of tape music, formerly of the seminal noise act, Wolf Eyes. We met randomly, in fact—I was in his village of Oberlin, Ohio, performing an event for the solar eclipse with my solar-powered sound installation, *Solar Sounders*, and so I had a lot of time to unwind between rehearsals and before the eclipse, and I went to his record store, thinking we might get along. Very shortly after meeting, we made plans to play music, and I discovered that my instruments interfaced well with his setup—I could just plug right in, and all I needed to do to amplify the arbrasson was to rest it on top of a daxophone tongue, its vibrations transferring immediately.

Working with tape is different from working with the computer. Unlike the computer, which offers “limitless” potential, manipulating tape offers a limited palette. But it is physical, tactile—you can pull on the tape, change speeds, cover up the erase head with masking tape, press pause while recording. In fact, one of the things that initially drew me to the arbrasson was that it reminded me of sped-up tape. Is it a coincidence that this French instrument sounds like French tape music? Yes. But this is also supported by a shared legacy of the acousmatic—both tape music and the livika are a phenomenon of sound unseen, an “instrument” hidden from view, allowing its sound to conjure up memories and feelings. The livika was always played hidden in the trees, secretly guarded from ritual attendees. Meanwhile, tape music has longstanding traditions of the acousmatic; it seems nearly all scholars and practitioners of electroacoustic music know the legacy of Pierre Schaeffer or the seductive words of Michel Chion.

In this composition, I present the arbrasson in a new context—in its *own* jungle, which does not sound like a real jungle that indexes trees and nature. This is the most notable difference between my work and the instrument’s inventor: rather than show the arbrasson clearly, I am trying to create new ways to listen. With its mysterious music, buried in tape hiss and distortions, I invite the listener to comb through the vines on their own.

Working with Dilloway spanned two days of casual improvisations—much time was spent getting to know each other and trying out equipment. I found it was possible to amplify the arbrasson simply by leaning it casually against my daxophone soundboard. This effect was necessary to get the sound of the arbrasson into Dilloway’s

rig, which is essentially comprised of many tape loops on 8-track players and simple mixers. The first piece, *A Long Sparse Seeping,* represents a classic approach to tape based composition: an 8-track tape has four “sides” which represent different “tracks” that can be filled up with content—just as a 4-track cassette tape recorder is populated with material. Playing carefully with the tape running at different speeds, we improvised, filling up the tape with material at different octaves. The extended composition is a condensed version of a much longer process of playing through the material sequentially, improvising almost imperceptibly on top of it. The resultant composition evolves slowly, as different speeds reveal different characteristics of the material.

A more spirited composition, *Your Ol’ Toolbox Smells Good,* showcases rhythmic loops for daxophone and arbrasson. This piece takes the same concept as above, but the tape is sped up to maximum speed, so the loops become rhythmic gestures, which were recorded in isolation. But rather than creating a continuous improvisation, this is a studio composition, edited painstakingly to suture a composition around the joyous discovery of rhythmic material. Layers “in time” are created by combining different loops that may or may not synchronize. A few defining characteristics of this composition bear mention. One, the daxophone plays a central role, utilizing tape saturation and distortion as a compositional element around which the arbrasson hovers. Second, I was aided in collaboration by yet another musical instigator: Zack Villere, a producer from the world of pop and hip-hop music whom I enlisted for a day of mixing, to make sense out of the disparate material I had recorded with Dilloway. His contribution opens the middle section of the piece to mechanisms of tonality, in which the daxophone is sampled via Ableton Live and pitched to equal temperament. The concluding section of the piece

reveals the melodic swirls of the arbrasson, pitched up, in an unvarnished, raw state. Combining many methods of production may be commonplace in 2025, but my intent to bring different actors together under the umbrella of this instrument is irreducibly political. Under oath to not sell the arbrasson, yet committed to its sonic delights, I seek news ways to bring its music forward in the world, placing it in dialogue with disparate collaborators who may otherwise have no acquaintance or even shared aesthetic prerogatives. Thus, the meaning of this instrument grows wider.

Conclusion

Consider this approximate timeline of encounters: I was born in 1986; the daxophone was invented in 1987; the arbrasson was invented in 1996; I discovered the daxophone in 2005; I invented my own daxophone soundboards beginning in 2015; I discovered the arbrasson in 2023. 40 years of friction idiophones! In some way, my encounter with the arbrasson is synecdoche for my entire creative project of composing musical instruments. The arbrasson, which I discovered in 2023, caused a tectonic shift in my creative process. Armed with years of training, both technical and aesthetic, I was able to digest it, make sense of it intuitively in a short period of time, and adapt it for my own creative projects. As such, I have marveled that this instrument is simply a literal reification of the concept of *kerf*, which had been a creative, philosophical topic through which I had wondered how my interests in hearing damage and instrument building might overlap. Yet in many ways, my research into the arbrasson is simply tempered by polite patience. In other words, I'm aware that by exploring this instrument, I intersect with other longstanding cultural traditions that have nothing to do with my positionality. I

also engage with the creative livelihood and invention of a particular designer. The research I have conducted in this chapter on one level is free of the worry and depth of "doing this subject justice"—in other words, the arbrasson is simply a beautiful instrument, worthy of study. And through my creative and analytical apprehending of it, I simply hope to dial into that, to understand its beauty.

In making this instrument, I have taken a raw piece of nature-born object, the tree, and I have cut into the log. The space left by the saw blade has transformed the object and as I deepen these cuts, the notes grow louder and clearer, and lower in pitch. But the process isn't so simple. For, finally, after I cut into the log, I must inspect the cut, and I decide to blow into the kerf (the cut), and in doing so, sawdust flies out into the room, hovering around me. Am I wearing my dust mask? Or do I breathe in, and does this instrument's dust then take root in my sinuses for a few hours, or my lungs, for a few years? To take this metaphor out of the literal sense, in exploring this instrument, I have dug up a host of issues regarding authenticity, composition, community, invention, and culture, and these questions now hover in the air, surrounding me as I think. We bring these issues forward now, as we consider another character in my instrumentarium, one that has been much closer to me for many long years: the daxophone. Read on.

Chapter 2: Cutting Daxophones

2.1 In the Shop: Norm's Wood

Tuesday morning comes around, and I check the mailbox to find another box of Norm's Wood has arrived. I open the USPS medium flat rate box and inspect its contents, about 18 pieces of 14" long blocks of wood of various thicknesses. I've never worked with many of these species before—some of them I haven't even heard of: Greenheart, a piece of Boxwood full of voids, Curly Ash, Chechen (what's that?), Sapele with a special pattern called "pomelle", Bocote (I hate the smell), Leopardwood, Paudao from the Philippines, Wormy American Chestnut (now decimated by blight, most material today is rescued from Amish barnwood), Chakte Viga, Red Lancewood, Rambutan, Bloodwood, Leadwood, Wenge and Purpleheart (I know these species—great daxophone stock), and a piece of Quilted Honduras Mahogany from a famous specimen in the world of lutherie known as "*The Tree.*"[87]

I had spent my last shop day tuning the bandsaw, and I outfitted it with a blade with the narrowest possible kerf, so I am ready to slice up these blocks into thin strips—daxophone blanks. It takes a while to get the fence and sawblade calibrated for this operation, but I take my time, and if I don't mess up the cut, I can get, on average, four blanks of 5mm thickness from each piece. So, this box of 18 pieces of wood might yield about 70 pieces of veneer. I regularly charge $80 per daxophone tongue, but a lot of

[87] Smithsonian Magazine and Ellen Ruppel Shell, "The Legend of the Music Tree," Smithsonian Magazine, accessed March 30, 2025, https://www.smithsonianmag.com/arts-culture/the-legend-of-the-music-tree-180979792/. ; see also "The Tree: The Most Notorious Tonewood in the World," accessed March 30, 2025, https://www.stewmac.com/video-and-ideas/online-resources/reference/the-tree-the-most-notorious-tonewood-in-the-world/.

this wood is valuable and possibly deserves to be classified as a “premium” tongue, which I will sell at an increased rate of $120 for grain-worshipping customers who want an extra bit of magic in their quiver. If half of this box becomes premium stock, and nothing breaks along the way, maybe this box of wood is worth $14,000. I bought five boxes of wood from Norm for about $200, each containing around 18-20 pieces of wood. From a bird’s eye view, this project is tantamount to a year’s salary. But that assumes everything cuts well, sounds good, and customers are buying daxophone like loaves of bread, rather than art objects. I don’t sell that many daxophone tongues at a time—maybe 10 a month on average. So, this woodpile will take a few years or longer to burn through. But Norm spent his entire career assembling this collection of wood, so I am not in a rush to use this material and will steward it cautiously.

Norman Sartorius is an American Woodcarver, active since the 1970s. After abandoning a career as a psychiatric social worker, he became an artisan, selling wooden spoons at craft fairs as he refined his aesthetic and skill. Sometime in the mid-80s, he began to create “non-functional spoons, […] not spoons to stir the soup but spoons to stir the soul.”[88] His singular focus is the category of spoons, and his unique sculptures take advantage of distinctive grain patterns in the wood that influence the final shape and concept of a work. Sartorius’ work became something of a phenomenon on the Craft scene, and his spoons are now displayed in serious collections around the country, such as the Smithsonian and the Renwick museum among many. In 2024, PBS profiled his work and studio process in their *Craft In America* Program.

[88] Craig Edelbrock et al., *Spoons to Stir the Soul: The World of Norm Sartorius* (The Center for Art in Wood, 2022).

Figure 20: Falling Water (Amboyna Burl), Norm Sartorius, date unknown[89]

I ended up meeting Norm Sartorius after his retrospective exhibition at Philadelphia's Museum for Art in Wood in 2021. I learned that a persistent back injury had slowed his carving career, and that he had begun to sell off wood he had been collecting for over 40 years, and I reached out to him to discuss the possibility of buying some of this wood for my daxophones. Despite being two generations and perhaps entire disciplines apart, it's easy for people who are obsessed with wood to find common ground. The boxes Norm would later send me contained wood lists that read to me like an impossible

[89] Woodwork Magazine, *Woodwork A Magazine for All Woodworkers April 1999* (Ross Periodicals Inc, 1999).

poem: Pear, Tambootie, Texas Ebony, Holly, Oysterwood, Striped Ebony, Honduras Rosewood, Cocus, Teak, Pao Rosa, Pao Ferro, Jamaican Dogwood.

I didn't dare ask Norm where he got all this wood—I hate being asked myself, because it's an impossible question to answer. But Norm began collecting his stockpile in the early golden years of American Woodcarving, before Brazilian Rosewood had been driven to near extinction, before the CITES appendix[90]. I know Norm was a member of the Rare Woods Society for a long time, and it's basically the case that people with a special interest in wood just seem to find each other. Some wood artists find their voice in a single material, like Christian Burchard's extensive exploration into Pacific Madrone, or Christian Becksvoort's fifty-year career, which mostly focuses on Black Cherry. More common to the craft is to spend your whole life roving from material to material, harnessing the spiritual and material qualities of particular species, best exemplified by Bob Stocksdale's legendary bowls. Stocksdale never titled a piece, but his signatures on the bottom of his bowls always featured the name of the wood he used, as well as the country or state where he had procured it. Norm's spoons follow the tradition of a manifold gamut of woods, but his pieces are always figurative—the titles, *Ditch Digger*, *Airhead*, and *Spoon from a Forgotten Ceremony* echo their formal design suggesting themes and stories from the maker's life and imagination.

[90] The CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) appendices are internationally recognized classifications that regulate trade in endangered species. Appendix I prohibits commercial trade of the most endangered species, while Appendix II regulates trade of species that could become threatened without proper controls. Appendix III includes species protected in at least one country. Many prized woodworking species like Brazilian Rosewood (Dalbergia nigra) are listed in Appendix I due to overharvesting, making their acquisition and transport across international borders heavily restricted or illegal without proper documentation and permits. The CITES treaty, established in 1973 and now with 184 participating countries, has significantly impacted the availability of exotic woods for artisans and collectors. "The CITES Appendices | CITES," accessed March 30, 2025, https://cites.org/eng/app/index.php.

Figure 21: Spoon from a Forgotten Ceremony, Norm Sartorius

I often explain how the daxophone works by comparing it to the mechanism of plucking a ruler off the edge of the table. But in truth, its closest real world analog is not the ruler, but the spoon. Reichel himself suggested this, observing its "resemblance to some kind of kitchen utensil - a cake slicer, a spatula used for frying potatoes, a wooden spoon…My first daxophone was indeed a genuine German pea-soup-stirrer. Or, to put It in another way: There is probably a daxophone hidden away somewhere in every normal household."[91] This metaphor of the spoon recurs in the daxophone universe. In his laudation at the award ceremony for the Art Prize of the Stadssparkasse Wuppertal to Hans Reichel in 1999, Bert Noglik describes the economic uncertainties of those making experimental art: "These are hardships that people with a secure income only go through in their nightmares. Those who are not prepared to go through thick and thin with such music and to put up with the inhospitable stops on the outsider's music trails on the way to venerable concert halls should carve wooden spoons, but not build

[91] Reichel, "This And That About This Thing."

daxophones."[92] While it's not clear to me that spoon carvers can in fact have guaranteed economic success, the ubiquity of a quotidian object such as a spoon or chair guarantees the possibility of universal recognition. For this precise reason, Sartorius is attracted to the spoon. He uses the spoon as a symbol: "It's an instrument, a tool of nurturing that is universal in the human experience."[93] Norm's spoons are deliberately *nonfunctional*—they inspire internal reflection on the meaning of nurturing, but you'd never actually use one of these beautiful objects to eat cereal. The sculptural move of his spiritual spoons is to port the quotidian object into an aesthetic space. Yet to carve a daxophone blurs the meaning of function, as Norm defines it. On one hand, the daxophone is decidedly nonfunctional. It is an alien object, even if you apply the standards of musical instruments. The curves of any daxophone shape can be derived experimentally or aesthetically—with no knowledge of the sonic results, you can carve different shapes or facets, or you can follow the woodgrain for a purely visual piece, to make a daxophone shape. Yet these decisions must lead to an instrument that *works*—I do not make (and could not sell) conceptual daxophones meant to hang on the wall. Any daxophone I make must sound good. It must have a whole world of music inside it. It also must withstand the rigors of flexure; it cannot fly apart under pressure—so the wildest figuring on a piece of wood that would attract Norm as a spoon carver could result in an instrument that cannot survive musical performance. Yet music *itself* is non-functional. Musical experience is one of those "nonessential" things that came

[92] In summer of 2024, *Daxophonie*, the first real monograph on Hans Reichel was published by Wolker Verlag, which collected many previously unpublished photographs and documents from Reichel's prolific career. Sabine Hesseling, ed., *Daxophonie* (Wolke Verlag GmbH, 2023).
[93] "Norm Sartorius – ZoneOne Arts," accessed March 30, 2025, https://zoneonearts.com.au/norm-sartorius/..

unraveled in the wake of Covid-19 lockdowns. Music is not a public utility; it is higher up on Maslow's hierarchy of needs. Music is not like food. For what music provides is a *spiritual* nourishment—just like Norm's spoons. Thus, carving daxophones is a perfect paradox—a nonfunctional praxis that nevertheless must work.

2.2 Risk and Certainty

After resawing through Norm's box of wood, I take my pile of 72 daxophone blanks upstairs, where I cozy up to my desk and begin laying out my designs. I have a stack of printed daxophone tongue templates that I have designed and printed out on A3 legal paper. Making these templates starts in VCarve Pro version 9.0, the CAD/CAM[94] program that I use to design shapes and toolpaths for all rough cuts for everything in my daxophone business. But some of these pieces of wood are too small to be used comfortably on my CNC machine, so it's just as easy to print out the templates and cut by hand on my scroll saw. With larger pieces of wood, taking the time to set up the CNC is worth it, for if I can get 4 or 6 tongues out of a single cutting job, it only takes 10-15 minutes to make $400, and I have earned back a lot of my time. But the daxophone is not a utilitarian instrument—customers seek it out for something *special*, and it helps for the wood to reflect that visually. Many customers who come to me personally cannot help but buy an extra tongue from the "premium" pile because they are simply struck by the beauty of the grain. I suppose I, too, worship the grain.

[94] CAD/CAM stands for Computer-Aided Design and Computer-Aided Manufacturing. It refers to software that allows craftspeople and manufacturers to design objects digitally (CAD) and then translate those designs into instructions for computer-controlled cutting and shaping machines (CAM). In the context of daxophone making, I use VCarve Pro 9.0 as my CAD/CAM program to design tongue shapes and create toolpaths for their CNC (Computer Numerical Control) machine, which automates the cutting process for larger pieces of wood.

Some of these rare pieces of Norm's wood come from tiny little flitches never seen at the lumberyard, like Oysterwood, Cocuswood, Texas Ebony, or Jamaican Dogwood (also called "fish poisonwood"). I start to glue-stick the paper templates onto the wood. If the wood has simple grain, I can just glue on the template and call it a day. But more often than not, this is a dance of agonizing iteration that often ends up including a fair bit of hairpulling. If I really squeeze two designs together, or modify them somewhat, I might get two tongues out of a blank. But sometimes that means compromising a particular pattern between heartwood and sapwood that would make for a great design. My own standards as a craftsman and my own joy in carving a beautiful tongue can sometimes thwart the bottom line, though in 2024 that may be changing, if I can figure out a market for even more particularly beautiful and amazing-sounding daxophones.

The scroll saw is perhaps the most romantic tool in the pursuit of making daxophone tongues. Though my more recent explorations into the CNC have rewarded me in terms of precision and speed, there is something immediate about the simple scroll saw. I don't need to clamp anything down, and I can change my idea in the middle of working, if the wood starts to tell me something. The scroll saw offers an almost impossibly narrow kerf—perhaps half a millimeter. And, unlike the CNC machine or lasercutter, the edge it produces is nearly perfect—the extremely small kerf and fine precision of most scroll saw blades offer a finished cut that is very smooth, almost burnished. If I've done a good job on the sawing, I hardly need to use hand tools or sandpaper to perfect the shape.

The furniture maker and craft writer David Pye coined the oft-quoted terminology "workmanship of certainty" and "workmanship of risk"—to describe the range of activity

between the handmade and the mass produced, the small-shop and the large factory.[95] Risk, for Pye, is when "the quality of the result is not predetermined, but depends on the judgment, dexterity, and care which the maker exercises as he works. The essential idea is that the quality of the result is continually at risk during the process of making". In contrast, the workmanship of certainty is "always to be found in quantity production and found in its pure state in full automation. In workmanship of this sort, the quality of the result is exactly predetermined before a single salable thing is made."[96] So much of woodworking is about certainty—jointing and planing stock so its faces are parallel, maintaining proper fit for joinery, cutting to precise dimensions as they are marked, etc. You line everything up before cutting, and if you've measured correctly, it works out. In some ways, the furniture is already designed before it is cut, and skill in craft is about proper execution. But in woodturning, even if you have a design you're trying to produce, each time you approach the material with the gouge, you are taking a risk—you don't know what is going to happen, what's inside the wood, or whether your body will do what you intend it to.[97] According to Pye, "in principle the distinction between the two kinds of workmanship is clear, and turns on the question: 'Is the result predetermined and unalterable once production begins?'"[98]

In the daxophone craft, the bandsaw is a machine of certainty—its job is to produce thin veneers that may only need a minor leveling with the thickness planer. I am not using the bandsaw to express anything—all my work goes into setting up the

[95] David Pye, *The Nature and Art of Workmanship*, ed. Ezra Shales (London: Herbert Press, 2008).
[96] Pye.
[97] I am indebted to the great wood artist Mark Sfirri for delivering this lovely comparison verbatim, in the summer of 2016.)
[98] Pye, *The Nature and Art of Workmanship*.

saw, perfecting the tuning of the fence and the blade-guides, and feeding the stock so I can do the job accurately. I would *never* use the bandsaw to cut a tongue—the set on most bandsaw blades is too wide, and inevitably leaves pronounced marks in the wood. (I admit a certain fondness for the look of these splintery marks, and sometimes leave them as part of a final surface instead of sanding them off). Yet on the edge of a daxophone tongue, these splintery marks are unacceptable. It's a similar dilemma with the other tools of certainty, like the lasercutter (a perfect cut, but burned edges and the bow hair…seems like a smelly situation full of bad chi), or my beloved CNC machine, which produces a frazzled, chipped-up edge, whenever it cuts against the grain.

The scroll saw is a woodworking tool that is full of risk. You can improvise with it. You can doodle with it. Sometimes, I notice that I may have gone outside of my marked line, but if I just keep the movement of my fingers fluid, I will retain a smooth curve despite my deviation from the template. I'd rather have a perfect cut that swerves slightly away from my intention than fix it later with sandpaper or a spokeshave. In this way, I never end up making the same tongue twice, and I delight in the variations of this handwork. Conversely, the CNC machine is a tool for certainty. You design the daxophone tongue on the computer, affix the wood to the table, and it will be cut just the way you designed it. This is not to say that the CNC is a tool of *absolute* certainty—there are all sorts of things that can go wrong, and there is an untold quantity of skill in keeping the machine well-tuned, understanding its limits, using it creatively. But if it's working correctly, it should produce products that are *certainly* the same each time.[99]

[99] Indeed, my CNC breaks all the time and the fine-tuning that goes into finishing each piece by hand, as well as the tactics of wood choice, does in fact guarantee something irreducibly hand-made for each final piece.

Back in the shop: I take my pile of templated veneers back downstairs to the machines. This pile of wood represents an hour or more of absolute tactics—following the template line with the scroll saw, drilling holes, and making tricky decisions as I work. It often takes a while to get psyched up to do it, because of the tremendous concentration involved. If I'm holding a piece of wood with an especially large value (like these blanks of cocuswood, which I got for $25 from Norm, but which shockingly retail for hundreds of dollars, even for small dax-sized pieces), I will delay cutting for days or weeks until the moment is right. I have held onto some pieces of wood for many years. In reality, each of these tasks is its own world: resawing, laying templates, freeing the shape from the blank, refining the edges, and finish-sanding—each of these tasks could take a day, on a day that I don't have that much time between the daily duties of parenting, dissertating, and adjunct teaching, or emailing customers. There are a thousand little tasks in the life of a freelance music technologist that are out of step with the woodshop. Using the scroll saw, too, is like playing an instrument—the more you use it, the more in tune it becomes; or rather, more tuned you are to it.

Tuning to the machine: in 2017, during my Windgate Fellowship at the Center for Art in Wood, I was very serious about using my time in the woodshop, because these times of uninterrupted focus are always rare. I had set out to make 100 tongues that summer, though in the end I had underestimated myself, and I had only been able to make 73. I had my own scroll saw set up in my studio, and I was constantly toggling between it and the CNC, where I was conducting my own John Henry vs. steel-engine experiment. At the end of the residency— the last afternoon hour before heading to the celebratory banquet, I suddenly had the impulse to make a tongue or two, as fast as I

could. I grabbed two pieces of veneer, traced two finished dax shapes with pencil, added a few stylistic deviations, and cut them both on the scroll saw in five minutes. A few strokes with the spokeshave, and they were done—ready to perform. These moments can happen if you're in a long flow state. But when anyone asks me, "How long does it take to make a daxophone?" (another question I love to hate), the answer is never "five minutes." The answer is: "It takes 20 years."

This style of writing, these circuitous thoughts: I've been searching for ways to describe what goes through my mind when I'm making instruments. Sometimes a phrase, a rhythm, a chant, an incantation will pass through my mind endlessly, like I'm stuck writing in the Overlook Hotel. Sometimes I'm thinking about nothing. Better to have the mind blank. I fear I've painted too rosy a picture of the experience of cutting these instruments free hand on the scroll saw. Another way to put it is to take the word "romantic" literally, in that it expresses an *idealized* vision of what working by hand means. Truth be told, cutting these tongues is a ton of work. That's why the CNC has another kind of spirituality, wherein the work flow of making instruments can reach platonic ideals, where you see the instrument in its entirety in your own mind, working hard not to *measure* the instrument as a set of cut list coordinates but to experience it before it exists, in an almost tactile way—as tactile as turning the veneer with your hands on the scroll saw. Then, when you finally go to cut the design with the CNC, you get to relax. But again, most of these woods are new to me, so better yet that I touch the material, flex it, and understand it before retreating into design abstraction. I notice the Oysterwood tongue has a heady scent like burning cinnamon as I cut into it.

Occasionally, I meditate on Hans Reichel, his inventions, the poetry of his designs, and the force of his craft. I never learned to make tongues with Hans. In that week we spent together in Wuppertal in 2006, we worked so hard on the soundboard, and together we made an entire setup in the classical Hans Reichel tripod mode—everything but the tongues. By that point, I had already made a few tongues and my own primitive soundboard with my instrument-building mentor Mark Stewart, and had been playing daxophone extensively throughout college. Maybe I should have asked more about the tongues, but at the time, it wasn't on my radar, because I wasn't trying to be comprehensive or a historian—I just wanted to play the daxophone, and I felt I had already figured out how to make tongues. So, even though I was the only apprentice Reichel ever had—the only person to make a pilgrimage to Wuppertal to study daxophone lutherie—many of these discoveries about making the tongues specifically are my own. Since he died, I've been able to play, repair, and sometimes possess tongues that Reichel made directly. In these material ways, I'm still in conversation with Hans Reichel, when I trace his designs, when I embellish them with my own ideas, when I fix a broken tongue for a friend—but more on that later, because I just realized that I've made a big mistake. I've cut too close to the template and must pay attention or else the instrument is over.

2.3 Flight of the Daxophone Starship

Spend ten years making daxophones, and never ask why; you could cut the same shape again and again, but you know that every iteration would sound unique.[100]

[100] Blasser, "Stores at the Mall."

The earliest years of my daxophone lutherie were characterized by sonic curiosity and a lack of interest in traditional handcraft values—I would find or inherit planks of construction lumber and utilize them for the soundboards, focusing all my attention on carving tongues from different planks of exotic lumber that I found everywhere I looked. I didn't use glue or varnish. These initial years were defined not by acquiring the skills of basic carpentry via making tables or chairs, but by making objects of musical expression. I should emphasize that these initial experiences were not production items—I sought to build machines that would be useful for my own music-making, not instruments I could/would sell to customers. Through crafting these wild prototypes, I sharpened my own aesthetic goals. But a task remained, as I grew to consider myself a composer: what would it be like to make instruments for other people? Early on, I knew that building instruments was for me a kind of para-composition—a way to be deliberate about sonic parameters, a way to create a way of interacting with a system. And so, I knew that eventually I'd have to explore ways for other people to play my instruments, whether they be my collaborators or customers, a string quartet commission, or an expression of brotherly love for a band.

Towards the end of my master's degree at Wesleyan, I received a great gift from my friend Peter Blasser: a huge pile of mulberry and catalpa planks, which he had collected in Connecticut. It was the excess wood in his larder, for he was preparing to move cross-country to the West Coast of Portland, Oregon, and transporting kiln-dried planks of raw lumber would not be cost-effective (better to travel light to save on gas and truck space, and re-stock on local wood). Though to concretize Peter's gift of encouragement and generosity as mere pragmatism takes all the color out of the

photograph. Working with Peter so closely over the previous two years had done a lot for my creative workflow, on a spiritual and a craft level. On one hand, having worked diligently in circuit design on my own, confronting a designer like Peter, whose mastery of circuits was on the level of Robert Moog or Don Buchla, revealed to me my own limitations in that medium. I could never make my *own* sounds with circuits the way these inventors do. On the other hand, seeing the way he did woodworking was stimulating for many opposite reasons. I realized that, despite not knowing how to use the CNC machine at the time, indeed those ten years of working with the daxophone had imbued me with feeling for wood on a sonic basis, as well as a real proximity to the material. Wood, I realized with clarity, was actually my medium all along. I remember one evening, sitting on the back porch of Blasser's house, drinking beers in the sunset, and sanding the thin pressure-sensitive bars of black cherry on a synth kit he had given me, the Sidrazzi Organ. Blasser sanded to 220 grit and stopped, whereas I continued with 320, 400, and finally 600 grit.

"Why," I asked, "did you stop sanding when you did? It looks dull."

"Because," Peter replied, "the customer will use the instrument, and it will become dented; the imperfections become valuable with time."

This is, of course, a half-truth. Indeed, the application of a rubbed oil finish does create a *lensing* effect that restores the *chatoyance*[101] of curly wood—even wood that is

[101] "Chatoyance refers to the luster you see in the wood's surface that is similar to the cat's-eye effect in a glass marble. The chatoyant effect is created by light rays entering the surface of the wood and bouncing back to your eye. Curly and quilted wood surfaces maximize this lustrous effect more than straight-grained surfaces because the fibers undulate through the material like a serpent. The radiance you experience is the culmination of light rays bouncing off all the rising and falling fibers at the same time." David Ellsworth, *Ellsworth on Woodturning: How a Master Creates Bowls, Pots, and Vessels (Fox Chapel Publishing) Over 400 Photos, Step-by-Step Directions, Techniques, Expert Tips, and Troubleshooting for Your Lathe*, First Edition (Fox Chapel Publishing, 2008).

been dulled by sanding, and not sliced with a hand plane. But I'd made a few tongues out of cherry, and I knew they always looked better if sanded to 600 grit.[102] As I pondered the surface of Blasser's production items, I realized I had different ambitions for my own designs. I could take the sound of wood much further. After all, synthesizer *enclosures* do not affect the sound of an electronic instrument. The daxophone, being wood, always sounded different, depending on the wood or the grit, or if I opted for a hand plane instead of sandpaper.

At the same time, I considered my own limitations, as I had not made production items. I realized that what Peter had achieved was informed through a process of iteration—by optimizing aspects of the instrument based on customer demand, the instrument gradually evolved. I saw that I could make dozens more instruments, perhaps hundreds, if I finally began to make daxophones for *other people*, and that this would expand the category of *daxophone* itself as a thing in the world.

And so, in those last months at Wesleyan, I began to sketch in my holographic vision what a new daxophone would look like, upon a canvas of laminated walnut, mulberry, sycamore, hackberry, sassafras, and catalpa.

2.4 Designing the Starship

As Hans Reichel wrote in the liner notes to Shanghaied on Tor Road: the World's First Daxophone Operetta, the daxophone "is essentially made up of four parts, two of which are joined together mechanically, and two of which are not."[103] These parts are:

[102] Later research confirmed this. Christian Becksvoort explains that cherry always looks blotchy, despite wax or varnish, if only sanded to 220 grit. Christian Becksvoort, *Shaker Inspiration: Five Decades of Fine Craftsmanship* (Lost Art Press, 2018).
[103] Reichel, "This And That About This Thing."

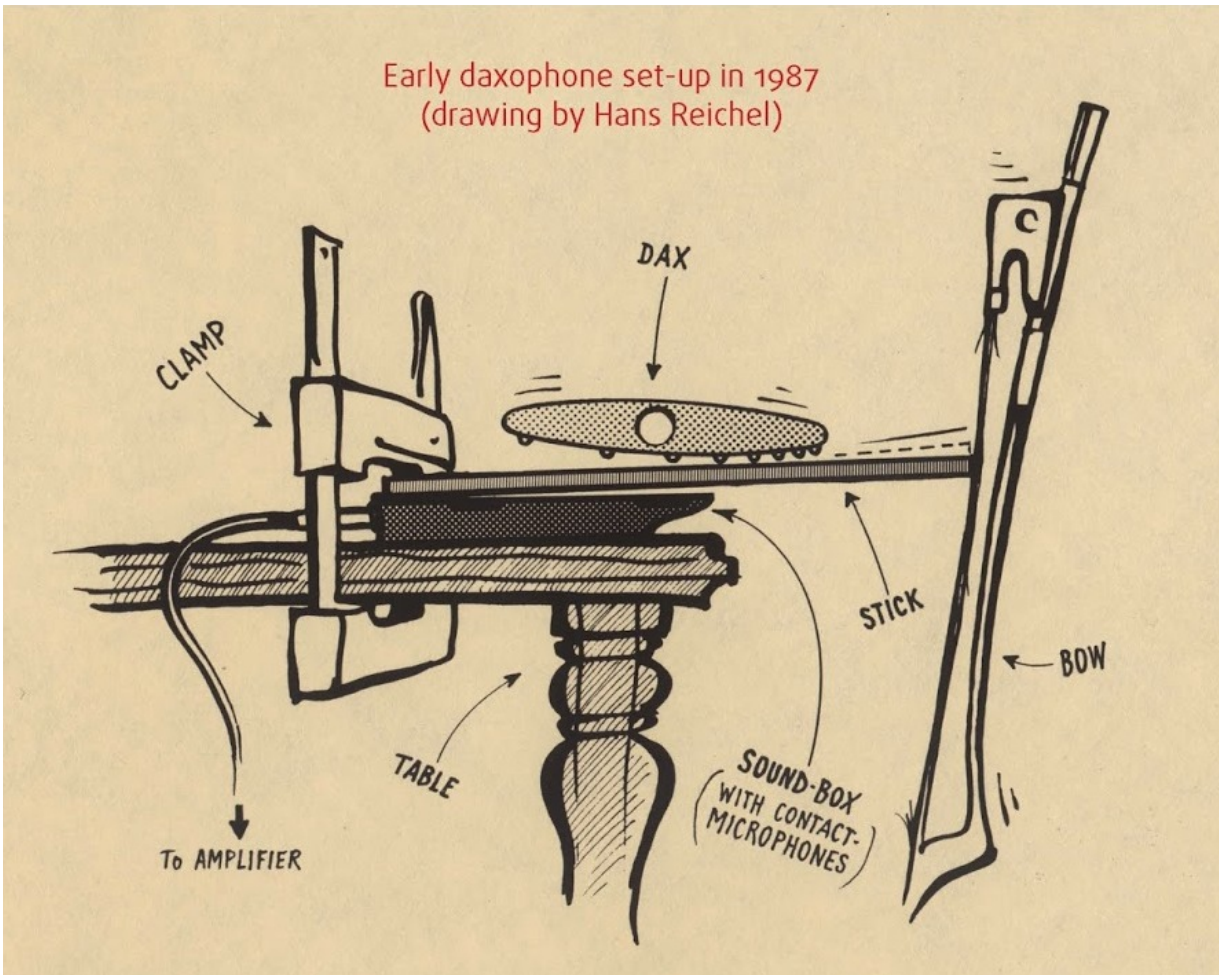

Figure 22: Hans Reichel's early diagram for assembling a daxophone[104]

1) The Tongue (the thing that vibrates)
2) The Bow (the method for resonating the tongue. A pencil works, too. Really, anything can be used as a percussive or semi-percussive tool to get the thing to sing.)
3) The Dax (the method for changing the pitch of the tongue)
4) The Soundbox (the method for both anchoring the tongue and subsequently amplifying its vibrations)

[104] Hans Reichel, "Some Information on the Daxophone," accessed March 19, 2011, http://daxo.de/download/DaxInfo.pdf.zip.

The soundboard is one of the most specific design challenges for this instrument. On one hand, the daxophone must be held absolutely stable, or else fast bowing techniques will cause excessive force against the tongue, ruining its rhythmic clarity. On the other hand, the tongue must be placed in an ergonomic position to facilitate comfort. Hans Reichel's earliest soundboards were simple devices clamped to tables, but his homemade tripod setup, developed sometime in the '90s, is the final state of his elegant portable configuration.

I did build a tripod with Hans Reichel directly, in 2006, but I had already been obsessed with daxophones before meeting him, and had built my own setup, under the mentorship of my first daxophone teacher, Mark Stewart, electric guitarist of the Bang-on-a-Can All-Stars and Paul Simon, and a prolific instrument designer in his own right. In my first few lessons, Mark helped me build my own daxophone, which was a variation of his design, the "butt daxophone." I built several of these soundboards over the years, all made from scrap wood. While they were easy to set up, these butt-daxes were not so comfortable to sit on for long periods. On the contrary, the tripod daxophone is exciting to have set up in a studio for long periods of time; like a drumkit, it's easy to simply pull your chair up to it and practice without the burden of setting it up. In my experience, however, I found myself playing this "butt-dax" more often, simply because I could play it at any gig with a minimum of setup time. Also, I found my instrument was louder, for reasons I did not understand at the time.

Figure 23: Daxophone Starships, Daniel Fishkin, 2017, Photo by Ben Tran

To create the starship, I expanded the proportions of the 2x6 to build a comfortable platform upon which to perch and play. My first design decision was the seat. Most kitchen chairs have an approximately 16 inch wide berth, but I milled a few different paddles, and it was clear that I could get away with a much narrower seat of 10

inches. By thinning out the saddle, the plank of wood became much more comfortable as a hardwood seat, with no shaping needed. The next step was carving the flare down to roughly 3 inches wide, for the soundboard top to comfortably rest between a player's thighs. Finally, after these basic proportions were determined, I sculpted sensuous curves, blending rough edges until I was left with a shape that didn't really seem as utilitarian as I had intended. Its christening came from Blasser himself, who remarked that it looked like the Starship Enterprise from Star Trek. "Enterprise" was an unlikely but truthful metaphor for the beginning formation of my own budding entrepreneurial venture!

In comparing my starships to the Reichel tripod, you can immediately see a difference in design philosophy. The Reichel soundboard is completely minimalist—there's only as much wood there as needs to be. My approach is larger. In a way, it is excessive; you could say it is "American"—yet the sculpted curves and wood laminations are meant to be a treat for the player to enjoy. Put another way, my daxophones are phallic—a huge plank of wood shoots out from between the player's legs. This obsession goes far back for me—I used to carry around a plastic sword in my pants as a child. The blade of the daxophone may fulfill that chthonic function, in some way; in any case, I've learned that you must cite your sources, or they will cite *you*.

Figure 24: Daniel Fishkin in concert, Pig Awards, Denmark, 2021

One aspect of my soundboards that they do not require setup, as the Reichel Tripod does. I've played enough door gigs to know that I can't often predict the surface of the floor—carpet is notoriously difficult to tape the soundboard feet onto. Another problem is that once the daxophone is taped down, it cannot move. With the starship,

you simply sit on top of it, and you are ready to play. And, you can move around the room during the performance, or roll on a chair with wheels, or even use it on the floor, lying down. A more critical aspect of the soundboard is ergonomics. The Reichel tripod has this perfectly right, setting the instrument at a fixed height and positioning the tongue at a precise 39º angle, which is nice for the position of the bow arm. The first starships were flat, so this posed immediate difficulties for ergonomics. After I had made a few starships, I noticed that this ergonomic dilemma also made it hard for audiences to see the instrument from the stage. The pictures I had seen from my concert documentation didn’t look as impressive or interesting to me, because you couldn’t really see the tongue. I had even read reviews suggesting that my Consort had been playing violin, not daxophones! So, I got to thinking about ways to improve the situation for performer and receiver. Eventually, I designed a new version with a wooden hinge, braced by two metal plates that can be locked by a wooden clamp. This articulated hinge is so stable that it can even be adjusted in performance to accommodate certain extended techniques that only work with a flat soundboard, such as balancing a feedback transducer upon the tongue. This is not to say, however, that there is a problem with the flat soundboard. Two of my close collaborators who actively play daxophone, Ron Shalom and Cleek Schrey, do not yet possess the hinged daxophone at the time of writing. I have discovered, since gradually building my business, that time is money. I simply haven't found a way to "upgrade" them to the hinged model, though I have made one or two sales to customers who are willing to pay premium prices. Nonetheless, they are still discovering interesting music and techniques with the original instruments I gave them in 2015.

Figure 25: Close up of Daxophone Starship doubleneck soundboard. Photo by Ben Tran

Another key distinction in the Starship is that it is a doubleneck. Since I began performing on the daxophone, audience members would occasionally ask me, “why don’t you make a soundboard that holds multiple tongues?” Another question I hated to answer. I liked to quip for a long time that I started building doublenecks as a way of shutting people up. But later I realized that the doubleneck has a funny resonance with Hans Reichel’s traditions. Hans Reichel never made a daxophone with two soundboards on it, but he did make a few doubleneck guitars that have incredibly distinctive features, facilitating a range of extended techniques like two-handed tapping and playing on the “wrong side of the bridge”. Having a daxophone with two

soundboards allows a plethora of extended techniques, most notably two-handed bowing, which allows one to play chords on a traditionally monophonic instrument, or to use two bows percussively, throwing them against the tongues like drumsticks. It's also just nice to have another tongue "ready" on the soundboard for any sort of playing.

At this point, I should re-emphasize that I wasn't making these starships to sit on the shelf for nobody to play. After making a few prototypes, I quickly went to work building another four starships for a daxophone ensemble of my friends. In 2016, I gave three of these starships to Cleek Schrey, Ron Shalom, and Dina Maccabee, forming the **New Perplexity Daxophone Quartet**. As trained string players, they were able to learn the daxophone rather quickly, developing unique voices on the instrument, reflective of their own sonic curiosities. After a year or so, Maccabee left the band, and the trio continued as **The Daxophone Consort**, forming an ensemble sound with a shared aesthetic. The Consort has gone on to commission pieces from composers such as Alvin Lucier and Gelsey Bell, as well as transcribing existing pieces not written for daxophone, such as John Cage's *Ryoanji* and some motets by Guillaume de Machaut. The Consort also improvises and stages theatrical performances, often in collaboration. Finally, it is a platform for our individual compositions. I shall explore the contributions and evolution of The Consort at a later point. One can't build a business from zero—I had in mind the idea that someday, I could sell these starships, and by giving these instruments to my friends, it would be a way to create something that looked like endorsements. Yet through concertizing with them, I could create the culture I wanted to see directly, and this could be something somehow in my control. I invented the starship in 2015, and only later, in 2018 or so, was I able to begin formally selling daxophones

through my online web store. Only after creating the cultural model for this instrument from scratch was I finally able to sell starships to customers.

2.5 Back in the Shop: Composing Instruments

At this point, I have a pile of tongues that need shaping and sanding. These rough instruments, cut free from their templates, might need a minute of work, or maybe an hour, depending on how well I did in the cutting. If I just finish one tongue to the end, I will be able to hear it sing soon. But that's not such a strategic use of my time, so I continue with my commitment to batch processing yet again, dividing the workload among the whole quiver of instruments to minimize setup tasks. It's crazy how much time I can save this way. The seconds add up to minutes. And 15 of those minutes is a real chunk of time for a working dad like me, when I'm only able to grab 1-2 shop days a week between dissertating and childcare. But as the batch tasks pile up, I start to wonder how far away I am from the end of this process. How long before these tongues are able to speak?

A lot of hard work-play awaits me now—I have to shape the edges. This is a twofold process: I begin by "fairing" the curves, so that the shape is continuous and not a collection of connected lines. I often use a miniature spokeshave for this task. I have a bunch of them: each is set to a slightly different angle and blade protrusion, so I can usually find the perfect tool for the wood or curve in front of me. For woods that don't cut well, I'll use a file or sandpaper, especially for fairing interior curves. Next, I use the same tool to carve at an angle, smoothing or beveling or "chamfering" the edge of the tongue, eliminating the harsh right angles that could damage the bow hair—what James

Krenov called “friendly” edges. But I’ve skipped a step: before I shape the playing edge, I have to sand the top surface—the part of the tongue that glimmers in the light, that everyone sees. Some woods shouldn’t be sanded: soft woods like catalpa or walnut, or tricky woods like curly maple. If you sand them, you will dull the fibers permanently, so you should plane or scrape these with a very sharp blade. Other woods love sandpaper, like rosewood or ebony—I can burnish these to a glowing luster. I have refined my finishing methods over the years. Using the right sander, the right dust extractor, or the right sandpaper can help. Sometimes, I pre-plane a sheet of wood before cutting the tongue to eliminate some steps. Other times, I’m just standing there, swaying to the siren song of the sander’s moment. Somehow, this seems like the least poetic moment of shop time to discuss.

I learned a lot about how to avoid excessive sanding from David Ellsworth, who also posited the following reflection in his book, *Ellsworth on Woodturning*[105].

> “I wonder what other people think about while sanding a piece of wood. Every woodworker sands at some point in his work, but unlike with cutting and carving, no one I know actually enjoys it. I have talked to a number of woodworkers about it and received a range of interesting answers. For instance, some people do simple mathematical problems in their head, like addition and subtraction. Several furniture makers have told me they envision the details of assembling the individual parts that will make up the finished desk or chair. One man said he practices birdcalls while he’s sanding. Another said he thinks through the unpleasant episodes that occurred with his first wife.”

[105] Ellsworth, *Ellsworth on Woodturning*.

When I sand, I hope my mind can go to the zero place, the zen place. Like everything, it's fine when you actually start doing it, but preparing to begin sanding is the worst. Setting up the tongues, getting the grits of sandpaper ready, putting on the earplugs—and then the gun muffs—and then the dust mask. It's all so loud. This is a moment where I actually miss playing the daxophone. All this time I spend building instruments, but not playing them. Sometimes, I long for music in the woodshop. A line from this Hans Reichel interview stands out to me—it even haunts me a little bit: "I'm not a hobbyist, I'm a musician." I suppose Reichel, who never planned to sell his instruments commercially, is trying to distinguish his interest in guitar making from the guitar hobbyist who spends all his time building instruments without making interesting music with them. A similar problem awaits me in the cottage industry of friction idiophones; when I dreamed of having a business building and selling daxophones, did I foresee how much of my time that would chew up? And as my "production items" grew more successful, I would become more beholden to my customers? In a weird way, this speaks to the terrible problem of desire—to get what you want is to get what you wanted. The aphorism goes, "Love what you do, and you'll never work a day in your life," but anyone who's tried to love this way knows that if you're not careful, you'll end up hating what you love. What type of life would I live if building daxophones became just another job?

Back on planet earth, all that this means is that I have to work efficiently. Someday soon, I will have apprentices. Someone else can do this sanding for me, and my holographic vision can cut new forms from nothingness, forging unseen machines

that make people want to buy them. Or just work faster. But my customers can wait, so I can work slower, if I want. So, I go upstairs and check my email.

Norm Sartorius suggests, “I have a recliner in my shop. I consider it a tool. Taking a break is like clicking the refresh symbol on my computer. I return to work with a clear mind and focus is easier. A short walk, visiting the garden to pull a few weeds, getting a phone call from our son, even doing dishes or cooking serves the same purpose.”[106] Back upstairs, my laptop awaits at my cozy chair, but email is just another chore. Nothing good. Some job rejection letters. I scan those for any shreds of humanity, then archive. “Revolution is coming!” says Onefinity CNC, some company I bought router bits from, once. Curious subject line, in view of the recent presidential election. A lot of CNC companies have a MAGA libertarian bent—the idea (that they try to sell you) is that you can make your own business to be free from the rat race with the CNC. Delete. What else? Democrats want more money? But Kamala already lost. Delete. I spend a long time responding to prospective customers. I don’t have a “buy it now” option on my website—every customer relationship begins as a personal inquiry that unfolds over epistolary exchange, resulting in a customized instrument shaped for the customer’s needs. I finish my emails, and I open Instagram.

Just last night, I played a show, so some people are posting videos of me playing daxophone, and others are commenting. A new friend of a friend, Sylvain Souklaye, a French Caribbean performance artist, came to the concert, documented it thoughtfully, and sent me all the videos. I write to him, but I’m not expecting our conversation to venture into the introspective space it quickly assumes.

dfiction: Thank you so much for coming and for documenting !!!

[106] “Norm Sartorius – ZoneOne Arts.”

sylvain.souklaye: I had only saw videos of Daxophones, and not the best quality. It was a privilege to experience it. Ps: semantic question as a maker, would you say that you are playing or sculpting the instrument?
dfiction: the frame [sic] that always come to mouth is "composing an instrument"
dfiction: the phrase*
dfiction: i've thought a lot about the semantics though. i'm not sure it's that poetic in reality, as building the instruments is a lot of work and sometims makes me miss playing music
dfiction: but conceptually i think building instruments is a para-composition or a "pre-composition"
dfiction: because i've already made choices about timbre, range, notes, rhythms, form....before i make the sound
sylvain.souklaye: Thank you, I was wondering because I assume it is a unique perception because you are at the beginning and the end of the process. Let me know next time you have a live experience, Erika (my wife) would to be there.
sylvain.souklaye: My cat died on Monday. I spent the last 15 years writing, composing and living with him. The three of you gave me a much needed break. Thx
dfiction: wow. that's so heavy. my childhood cat lived for 21 years...i never got another one after he died
dfiction: so sorry for your loss, they are such deep creatures.
dfiction: i'll just say i don't think i am at the end of the process. kevin [Ramsay, a customer and collaborator and friend], for example, is at the end of the process. the customer is someone i am always thinking about. for the customer joins a worldwide community of people who are **expanding** the definition of the instrument. for me making instruments has no longer been about making things for myself but making these machines that can withstand what other people put them through—they have to be durable and, to some degree, anarchic, letting other ideas inside and through them. and sometimes that means that i get ideas from my customers about how to play them, what new things they can do

Conversations like these remind me of going on a date with a stranger, the way you can activate a state of confessional veracity so quickly. And, unlike writing (a dissertation, for example), speaking to another person can disarm your own arrogant assumptions about yourself, the pompous “artspeak” you’ve built up over a hundred grant applications or artist statements you’ve had to write to get money for your experiments. Take, for example, the following manifesto, submitted to the Jefferson Foundation in application for the prestigious Jefferson Fellowship, which funded my dissertation research for two years between 2021—2023:

Making Instruments, Building Relationships

> When composer Helmut Lachenmann famously quipped, "Composing means building an instrument"[107], he meant that composing should be the invention and discovery of an imaginary structure inside of which a very specific music shall take place. The invention of new musical techniques and the enumeration of their parameters leads to a kind of para-language (in his words, a "syntactical blueprint"), through which the composition "communicates".[108]
>
> *My* musical imperative is precisely the reverse: building an instrument means *composing*. Building objects—real objects in the world, made from wood and wire, leads to the discovery of distinctive musical parameters, their sonic syntax governed by the mechanics of the system itself. This composed instrument should not have a universal logic, permitting any music in the world to be performed on it. The universal instrument—the clarinet, the guitar, or the piano—can be wielded to produce any melody in any genre or language. The composed instrument percolates through culture, bringing along with it its *own* language made from its acoustic fact and its inventor's intentions. In any musician's loving hands, it retains a sonic signature that cannot be reduced, only conversed with. This language is not vernacular, but thetic—the composed instrument creates a music that cannot sound through other means.

In comparing these statements, I find myself saying something new about building instruments to Sylvain.[109] Both theses incorporate the idea of *another person* playing my instruments. But the statements vary in terms of affect: one thesis simplistically imagines this relationship with the other as purely "loving," whereas the more recent perspective (perhaps more well-informed with respect to customer aesthetics and demands) has an almost Viennese formulation: "making machines [that can] withstand what other people put them through." The earlier statement imagines the inventor as a figure of supernatural powers. It's clear the conversational statement is more realistic

[107] This maxim by Lachenmann, oft-repeted throughout his life, was introduced in Helmut Lachenmann, "Philosophy of Composition : Is There Such a Thing?," in *Identity and Difference: Essays on Music, Language, and Time*, ed. Jonathan Cross (Leuven University Press, 2004). The notion has also been discussed more colloquially in Max Paddison, *Contemporary Music: Theoretical and Philosophical Perspectives*, ed. Irene Deliege, 1st edition (Farnham, Surrey, England Burlington, VT: Routledge, 2010).
[108] Take, for example, his piano tour-de-force *Guero*, which builds its entire musical vocabulary with the imitation of the Latin-American percussion instrument, as the pianist scrapes his fingernails against the ivory keys, never pressing a note.
[109] Coincidentally, sylvan means, "of the forest"!

and specific about *how* people build the world of the daxophone alongside me. In 2025, I've had over 75 customers consisting of contemporary music ensembles, pop musicians, and sound designers for films and videogames. Some of my customers have become my friends. I've also had bands that have come and gone, friends who have played my own music, and I've played other people's music on the daxophone. I've even commissioned daxophone pieces from composers like Alvin Lucier. This collage of cultural hacking represents the unknown future of Daxophone. I never imagined any of this when I first set a price tag on an instrument. It is a future that Hans Reichel never imagined, either. There's a kind of humility involved in accepting that these pieces of wood have their *own* lives outside what I imagine they might do.

I close my computer. It's time to go pick up my son from daycare. After that, I go home and watch Pinocchio.

2.6 A New Geppetto Story

In her ethnographic portrait of guitar builders in America, Katherine Dudley uses the metaphor of *Geppetto* to describe the motivation and social status of the artisan in contemporary society. In fact, this metaphor comes straight from the imagination of one of her interview subjects, William Cumpiano, a thoughtful luthier from Puerto Rico:

> **"**I must have fallen prey to the romance of the guitar and to the Geppetto story. If you think about [it], what is it but bringing the wood to life? It's almost godlike to think that somebody could do that—you know, that the work jumps off the worktable and becomes something more than what the builder intended. The guitar is like Pinocchio, I guess you could say. People who master the guitar—

and any musical instrument really—have great power. So you can go behind the curtain, and somehow I'm providing the tool that makes that possible."[110]

The concept of Geppetto is not purely romantic in an idealized sense, however. Reading it will harmonize with many of the tensions I've already described in the early pages of this chapter: "As a 'godlike' figure who 'brings wood to life,' the kindly old woodcarver in Pinocchio dramatizes the satisfactions of artisanal labor and its dangers. Geppetto may be his own boss, but he lives in poverty. He is out of step with the Industrial Revolution, but he has the skill to turn a willful piece of wood into an object that possesses special powers [….] To say that one "falls prey" to Geppetto's dream is to express ambivalence about its real-world implications". Dudley goes on to detail the financial hardships that await artisanal builders who must prove their worth on the open market—surely, no easy task.

I have had Dudley's book on my mind for a few years, and in selecting *Pinocchio* to watch with my son Lou, who will be enraptured by its virtuosic animations, I'm *birdstoning*[111] research and parenting. I'm aware there are other versions of the fairytale. I want to know how deep I can take this metaphor, which Dudley uses primarily to describe the luthier's desire and journey towards economic freedom in an industrial age. Dudley suggests that Geppetto's dream can only become true, "when the artisan's work leaves the marketplace and lives on as an inalienable possession of someone who cherishes it as a member of the family."[112] Would it be the aesthetic talent or the entrepreneurial mettle of the guitar builder that would allow this journey? In other words,

[110] Kathryn Marie Dudley, *Guitar Makers: The Endurance of Artisanal Values in North America* (Chicago, IL: University of Chicago Press, 2017).
[111] E.g., killing two birds with one stone.
[112] Dudley, *Guitar Makers*. Page 289.

must the guitar (if it is Pinocchio) be "brave, truthful, and unselfish"—or is it in fact the luthier (Geppetto) who must preserve their artisanal values in the industrialized economy, remaining "honest" in the face of capitalism? But we have a different sort of dilemma, if Pinocchio is a *daxophone*, and not a guitar. For the daxophone to become "real," it must not merely become someone's possession. The saga of the daxophone is not merely the story of *individual* tongues roaming through other people's homes, but of the instrument proving itself on the world stage. The daxophone must become a real instrument, not a gimmick, not a toy, not a sound effect.

I start up the movie on my computer screen.

> *JIMINY CRICKET: Cute little fellow. [knocking on PINOCCHIO'S head] Ding, ding. Going up? Good piece of wood too.*[113]

The setting of Geppetto's workshop is so familiar to me, right down to the European-style workbench with its oversized work-holding screw clamp. In fact, this dusty basement full of wood, toys, clocks, and dolls is a little *unheimlich* to me. I invoke the German translation of the word *uncanny* to suggest Freud's definition, "a class of the frightening which leads back to what is known and long familiar."[114] But in this case, the frightening leads into the future, too. I don't want to become Geppetto: this poor old man, lonely enough to pray that his little doll would become real. I don't want to end up standing there, sanding forever in a dusty basement. And yet it's so comfortable—a little cricket sleeping inside a violin—that I can't imagine it would be that bad. Geppetto carved Pinocchio from a log of pine (Pinoli) wood; maybe he was pining for company.

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[113] *Walt Disney's Pinocchio* (Walt Disney Productions, 1940).
[114] Sigmund Freud, "The Uncanny (1919)," *The Complete Psychological Works* Vol. XVII (1955).

But as soon as I hear Jiminy call his abbreviated name “Pinoke,” I can’t help but hear “Pin Oak”: the same tree from my parents’ backyard in Bala Cynwyd that I had slabbed up with a chainsaw and dried for years. I have been making daxophones with it.

> *BLUE FAIRY: To make Geppetto’s wish come true will be entirely up to you.*
> *PINOCCHIO: Up to me?*
> *BLUE FAIRY: Prove yourself brave, truthful and unselfish, and someday you will be a real boy.*
> *PINOCCHIO: A real boy!*
> *JIMINY CRICKET: That won’t be easy.*[115]

Now I understand my problem with Dudley’s metaphor about guitar builders. If we follow her logic, it’s up to Geppetto to make Pinocchio a real boy—that it’s up to the maker of the guitar to imbue it with humility and grace, rather than capitalistic zeal, so it can find a real home in the warm embrace of a loving family. That’s simply not how the story goes. Pinocchio must prove himself on the world stage. In fact, it’s striking how little parenting Geppetto does—as soon as Pinocchio is “born”, he enters society all alone. He must go to school and fend for himself. Is it a stretch to say that all of Pinocchio’s problems come from his absent mother and well-meaning but hands-off father? This parallels the journey of my instruments when they leave the shop. Indeed, I must fix my heart in the right manner, and avoid the easy temptations of quick sales to make a buck. But it isn’t only up to the inventor to be true—the success of the instrument depends on where it goes, what musical journeys that await it outside the house of Geppetto.

> *PINOCCHIO: [loses his balance and falls clatteringly to the floor.]*

[115] *Walt Disney’s Pinocchio*.

GEPETTO: [startling from bed] Who is there?
PINOCCHIO: It's me!
GEPETTO: [relaxing] It's me.[116]

Watching the film, I've been wondering if I am more like Geppetto or Pinocchio. If Pinocchio is a daxophone, I must let him go out into the world alone, and I cannot intervene with his saga. And yet, I wonder. I wonder if by building such an animal, recalcitrant instrument in the first place, I've already created a bias for Pinocchio's future. As Etienne suggested to me earlier, I might *be* a *daxophone*, figuratively or literally. As I make daxophones in the workshop, day after day, I become a daxophone maker. I compose *myself.* My daxophones talk back. Like Pinocchio, they are convincing mimics, able to imitate the sounds I hear in improvisation. The daxophone tongue, the source of its sound, is essentially as varied and individual as a human voice—all are alike, and yet none the same. This confrontation, quickly resolved, reveals how quickly the invented instrument bears the traces of its maker, and how Geppetto's entire sense of himself is wrapped up in the marionette strings that he uses to dance with his wooden creation.

PINOCCHIO: [singing]
I've got no strings / To hold me down
To make me fret / Or make me frown
I had strings / But now I'm free
There are no strings on me[117]

There are no strings on a daxophone. To be an instrument removed from history means the daxophone is free, possibly, from aesthetic bias, and from the burdensome

[116] *Walt Disney's Pinocchio*.
[117] *Walt Disney's Pinocchio*.

traditions that predefine aesthetic expression. One could say, simply by virtue of its newness, that there is no "classical" technique for a daxophone. There is no repertoire. Here I am, again, as daxophone: as Pinocchio. I *had* strings, when I was a teenage bass guitarist. But now I'm free—there are no strings on me.

> *ALEXANDER: Please, please! I don't wanna be a donkey. Let me out of here!*
> *COACHMAN: Quiet! (He cracks his whip) You boys have had your fun. Now, pay for it.*
> *JIMINY CRICKET: (horrified) Boys? So that's what... PINOCCHIO!*[118]

But what freedom is this? John Cage famously talked about the consequences of unfettered freedom, represented by the musicians who premiered his famous *Concert for Piano and Orchestra*, littering it with cavalier quotations from Stravinsky and fart noises: "I must find a way to let people be free without their becoming foolish. So that their freedom will make them noble. How will I do this?"[119] I realize the real dilemma for young Pinocchio—no one is there to save him from Pleasure Island. If he's not careful, he'll turn into a donkey, and he has to figure this out by himself. A similar fate awaits the daxophone in music history. If I am not careful, the daxophone, too, will turn into a donkey, and be sold away to a salt mine or sent to the circus. I know the daxophone is capable of untold beauty—I must help it become a *real instrument.* And not "Disney Real™!"[120] If I can't, the daxophone will be reduced to a novelty or gimmick, and thus

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[118] *Walt Disney's Pinocchio*.
[119] John Cage, *A Year from Monday: New Lectures and Writings*, First Edition (Middletown: Wesleyan University Press, 1967).
[120] A year earlier, I had visited Disney World with the family. I was amazed, during the African Safari, to see a baobab tree, a stout, gigantic tree with that looks like almost like an elephant, or a swollen strawberry. I marveled to the tour guide about the tree, for I could not believe it was real—how could they get a baobab to Southern Florida? She responded, "It's *Disney Real."*

doomed to make sound effects in Hollywood. Already some of my customers have been using it this way.

> *Blue Fairy: Perhaps you haven't been telling the truth, PINOCCHIO.*
> *PINOCCHIO: Oh, but I have! Every single word! Oh, please help me! I'm awful sorry.*
> *Blue Fairy: You see, PINOCCHIO, a lie keeps growing and growing, until it's as plain as the nose on your face.*[121]

Pinocchio can speak—he has a tongue. But everybody knows Pinocchio for his nose, not his tongue—his famous wooden nose that grows when he lies. According to Iakov Levi, in Carlo Collodi's original telling of the Pinocchio story, "As soon as Pinocchio begins moving, his nose grows. We know from psychoanalytical research that the nose is a male phallic substitute. If Pinocchio's nose grows, it means that he has an erection. Byzantine emperors, when they wanted to prevent a relative from ascending to the throne, cut his nose, meaning they castrated him."[122] This version of Pinocchio is always getting into trouble, always misbehaving, and his nose grows as soon as he is animated, before he can speak. This nose is synecdoche for Pinocchio's life force—his libido—and his capability for mischief represents his ability to make his way through the world as an independent actor. The phallic daxophone, a long piece of hard wood protruding from between one's legs, asserts itself on the world mischievously, permeating through culture.

Later on, the nose grows as he tells lies to the Blue Fairy. Yet lies are an index of one's creative powers—one's ability to play with reality. In the Disney movie,

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[121] *Walt Disney's Pinocchio*.
[122] Iakov Levi, "Pinocchio. The Puberty Rite of a Puppet," *Dialegesthai* 4 (July 26, 2002), https://purl.org/mdd/iakov-levi-02.

Pinocchio's nose grows only when he "lies." But when he replies to the Blue Fairy, who comes to rescue him in a cage where, he has been locked by an evil puppeteer, everything that he says is true. As Adnan Bey observes, Pinocchio did meet two monsters—Honest John, the fox that sells him to the evil Stromboli, who locks him in a cage (Pinocchio says, a sack), and threatens to chop him into firewood if he can't make any money (Pinocchio, panicking, says he *was* chopped into firewood).[123] Even though the daxophone is a mischievous soundmaker, perhaps it tells another truth about the world of sound altogether. Psychoanalyst Monroe Street writes:

> "A delicately designed "tongue" of wood clamped to a wooden soundboard, the daxophone is ultimately this: the sound of wood on wood, regardless of whether this tongue be bowed or tapped by other utensils. The look of Daniel's daxes is slick: on his website, they appear in crisp digital photographs as though items in an upscale interior design catalogue. But the visual fanciness of the daxophone as an object may be little more than a fetish, a visual screen that smooths over the abrasiveness of the instrument's extreme timbres. In fact, the daxophone is not the least bit radical as a designer object, whereby its aesthetics are easily assimilated into yuppie life; its real politics, however, are to be found within its fundamental enharmonicity, its refusal to be corralled within the frame of discrete tones, modes, and chords characteristic of traditional Western music."[124]

Maybe I am the liar, smoothing over the sonic ruptures of the daxophone with satin finish and sandpaper, hiding the rawness of its sound with a sculpted image, insinuating

[123] Adnan Bey, "The Darker Corners of Pinocchio," June 20, 2014, https://the-artifice.com/pinocchio-darker/.
[124] Monroe Street, unpublished correspondence.

it throughout culture, selling it to sound designers and film composers. And as I lie, my tongues grow longer.

> *PINOCCHIO: I'm going to find him.*
> *JIMINY CRICKET: Pinoke, are you crazy? Don't you realize he's in a whale?*
> *PINOCCHIO: I've gotta go to him.* [125]

Pinocchio's willingness to provide for his father, thus devoting himself to unselfishness, creates a feedback loop wherein he becomes a real boy.[126] I realize I haven't considered, in wondering whether I am Geppetto or Pinocchio, who the customer is. For what is my unselfish devotion to the bottom line if it isn't simply trying my hardest to bring my customer the same amount of wonder this little instrument has brought me? I realize that I've taken this metaphor to the limit, for there is no daxophone customer in this film.

> *PINOCCHIO: A fire! That's it!*
> *GEPETTO: Yes, and then we'll all eat again.*
> *PINOCCHIO: A great big fire! Lots of smoke!*[127]

Wood—it burns. I want to keep the fire burning. The daxophone is a recent invention. When the daxophone's inventor Hans Reichel died in 2011, I wondered about the instrument's future. I still fear that it might disappear if I don't build and play it. I want this instrument to become a household name. I wonder, then, if Hans Reichel is the real Geppetto here—the absent father and inventor who created the daxophone with no real

[125] *Walt Disney's Pinocchio*.
[126] Thomas J. Morrissey Wunderlich and Richard, "Death and Rebirth in Pinocchio," *Children's Literature 11*, 1983, 64-75.
[127] *Walt Disney's Pinocchio*.

plan to sell it or to promote it in the world, besides creating his own deliciously beautiful music with it. Then perhaps, this whole time, I've been Pinocchio, trying to become *real*, trying to catch up to the beauty and seriousness of Hans Reichel's craft, trying to build up my lutherie technique until one day, I can create an instrument as alive as a daxophone. But perhaps that would be a completely different instrument. Maybe I already have made it.

2.7 The Student Model

One problem that I had encountered early in my daxophone "business" was that there was no market for such an instrument. The daxophone is just as alien for a classical cellist as it is for a modular synthesist. Both musicians will face a separate difficulty. The cellist, if they can manage to get the hang of the underhand grip that I've adapted from viola da gamba pedagogy, may have ingrained biases against strange sounds, and though they may have an edge in their bowing technique and pitch control, their attempts to "control" the daxophone may be thwarted by its animal nature. The synthesist at first may appear more conceptually open-minded than a classically trained musician but, lacking technique, cannot play the instrument in tune. Unlike a synthesizer, where they can simply twirl knobs, stand back, and listen to its unfolding behaviors, the daxophone has no resonance and reverb—every sound must be made in the present moment. In a funny way, both edge cases may have the same perplexity regarding this instrument. Indeed, during the first two years of working with my daxophone quartet (from 2015—2017), I didn't really imagine I had a business at the time—I was just building instruments to test out with my band, and we were actively

involved in a process of composing for each other and improvising. It had dawned on me that the time it took to make these instruments meant I had to sell them for prices most neophytes could not afford. I wanted to make a simple daxophone soundbox quickly and sell it for a reasonable price.

I christened the “Student Model” daxophone during my residency at the Center for Art in Wood in 2017, inspired by the form of bandsaw boxes I had seen in many woodworking collections during my summer fellowship. Truth be told, Hans Reichel had, of course, explored this concept early on in his career as a daxophone maker, as depicted in the diagram featured earlier in this chapter, as well as in the designs Reichel had published in his singular essay with Guitar Player magazine. Some of these tongues, without their notch to fit inside the wooden clamp Reichel would later develop, look resolutely spoon-like.

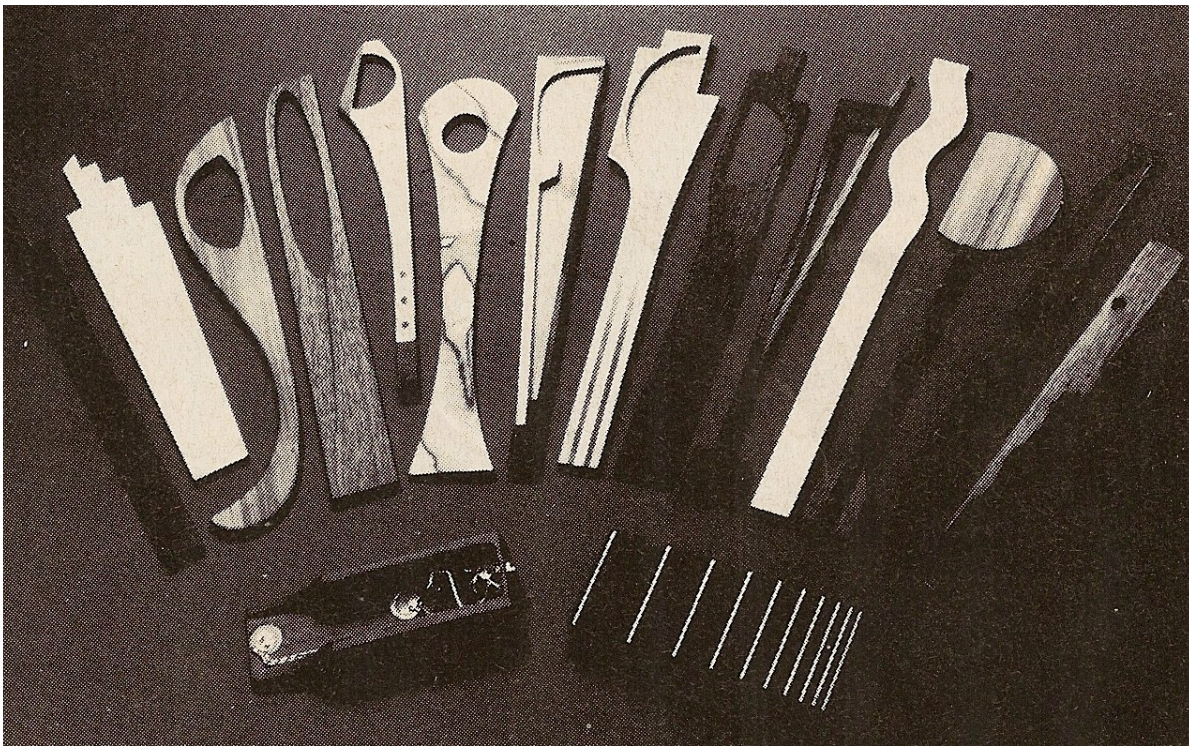

Figure 26: Early Daxophone Setup by HR from Guitar Player Magazine, 1987[128]

I remember holding this box in my hand when I visited Reichel in 2006. It was four pieces of wood with mitered corners and joined by glue—the bottom was open, revealing the hollow cavity for the electronics. Thinking about it in 2017, I realized that there was a design problem with HR's first daxophone soundboard: the pressure of the clamp could cause the box to bow and give way. I got to thinking about it. I realized that the soundboard needed a rock-solid clamping surface, or else the instrument couldn't survive the rigors of performance. But, it didn't need to be a box at all. I realized I'd only need two pieces of wood: a thin veneer for the piezo, and a carved-out interior for the electronics and output jack, which I could do on the bandsaw in 60 seconds.

[128] Hans Reichel, "Crossing the Bridge," *Guitar Player Magazine*, 1989.

Figure 27: Four Student Models from 2017

I hadn't intended the student model to be a product, truth be told. I built four of them, and clamped them to a wooden table that I cut from a piece of wet oak lumber, shaped into the shape of an X and ebonized. The whole point of this table was to make a "please touch" exhibit for the installation—a set of rough, working instruments that could show gallery visitors what a daxophone sounds like, in addition to the fancy, elegant instruments that were not on display to be handled. During the opening, I performed upon this table with my Daxophone Quartet, rotating around the table in performance to demonstrate different tongues.

During the end of residency exhibition, I listed my sculptures for sale in the CAW Gallery. Perhaps my prices there were too high. It's also possible that the spoon-and-bowl collecting community for wood artists couldn't really fathom an experimental instrument like the daxophone. But my setup was proudly displayed in the glass windows of the museum for 4 months, and one day, an experimental musician in town for a show walked by and wrote to me directly on Facebook, asking if he could buy a

daxophone. Thus, my business began. It wasn't long after this that I put up a "store" page on my website, finally armed with a product that could appeal to hobbyists.

Truthfully, I felt a little dismal about selling something so similar to Hans Reichel's original invention. Was the only thing creative about this soundboard my impulse to sell it—Creative Capitalism? A year or so after I had "invented" the student model, I had to forge some sort of ethical release from this tension. So, I published extensive plans on how to build one on the web journal for the magazine *Popular Woodworking*. My intention was to show, as Hans did in his own publications, that making a daxophone is something anyone could do, and if they didn't *want* to do it, I could simply do it for them. I wrote: "The "student model" is not an original idea, nor one to rush off to the patent office. It's a riff on a concept I rescued from the margins of Hans Reichel's many innovations. There could be hundreds of ways to imagine the daxophone. But this one should get you started."[129]

[129] Daniel Fishkin, "How to Build a Daxophone Soundbox," *Popular Woodworking* (blog), August 10, 2018, https://www.popularwoodworking.com/editors-blog/how-to-build-a-daxophone-soundbox/.

Figure 28: The New Perplexity Daxophone Quartet plays the Student Model table, featuring Ron Shalom and Dina Maccabee

I sold so many of these daxophones. Some of my customers would buy this instrument, and I'd never hear from them again. Others eventually became serious daxophonists, sometimes swapping out this soundboard for another type I had designed, or modifying it to fit with a camera tripod or wooden clamp. It was the perfect entry-level model, priced at $500, which was an attractive price point for anyone who just wanted to buy a daxophone so they could hear the instrument. After 5 years of commissions, I had sold over 30 student models to customers worldwide. These models were all hand-carved and hand-sanded, featuring unique experiments in shape and angle. This process was revelatory at the time, but by 2023, hand-carving all aspects of the daxophone had become burdensome. The introduction of the CNC machine into my business practice made it possible to achieve high standards of precision, both to offer an important upgrade for customers, while automating some aspects of my design

practice. Finally, there remained a practical and aesthetic problem that I needed to solve: the lack of a wooden clamp.

Figure 29: A variety of clamps for Starship Daxophones

Neither HR's tabletop model nor my own student model features the iconic wooden clamp. This always bothered me; even though I knew that the hardware store clamp is universally accessible, I have long known that this clamp is fundamental to the physical design language of everything we know as daxophone. For it represents the simplest possible taxonomy any builder can exert upon any piece of wood: cut the notch, and turn any tongue blank, ruler, spoon, veneer, clipboard, into a daxophone. Everything else is design—the notch is intention. It is standardization. It shows you that you *aren't* looking at a ruler. It shows you that you are looking at a musical instrument. It's also

simply practical—there should be a separate device to fix the tongue and to stabilize the soundboard. I knew I needed to rescue this idea for future designs.

Figure 30: 18 tongues, note the notch. The Zebrawood tongue, third from left on top, will star in an upcoming anecdote, photo by Daniel Fishkin

2.8 Talking to Hans

I have already written extensively about my 2006 visit to Hans Reichel's workshop in Wuppertal, Germany, published on my website dfiction.com as well as the webzine "Prepared Guitar" for all to read since 2015.[130] In this picture-essay, I wanted to annotate the many pictures I took on my digital camera to demonstrate the step-by-step process of building a daxophone tripod with Hans, and also to cover the entire experience in a narrative way, encompassing the fraught, youthful emotions that I was processing at the time. During that fateful stay in Wuppertal, Reichel spent almost 10 days with me, toiling long studio days in his woodshop together to build my own tripod soundboard in the classical Reichel style. Years later, I have met many of Reichel's colleagues who have commented on how singular this pilgrimage was, in fact. To my knowledge, there are no other luthiers who Reichel brought into his workshop the way he welcomed me. During our time together, Hans answered any question I had for him. After I left, we never talked at length again, and Reichel died five years later. When I wrote my blog post in 2015, I attempted to sum up the loss thusly: "I sometimes feel that old wound, especially now, after Hans is gone, and there's no chance to add more to our story together." But I didn't realize back then that our story would continue to unfold, through posthumous correspondences not with spoken tongues, but through daxophone tongues themselves.

The first correspondence happened in 2015, when I met Reichel's close friend Kazuhisa Uchihashi. Uchihashi is an accomplished daxophone master in his own

[130] Daniel Fishkin, "Building a Daxophone with Hans Reichel (2007)," June 26, 2016, http://web.archive.org/web/20160626003519/http://dfiction.com/blog/.

right—he has been playing since approximately 1996 and gradually integrated the daxophone as the other component in his live improvisational instrumental array alongside the guitar and copious effect pedals. Uchihashi, like Reichel, can play the daxophone soulfully and in tune. He is also the steward of all of Reichel's instruments. After Reichel's possessions were dispersed post-mortem, Uchihashi inherited Reichel's 409 daxophone tongues, soundboards, and guitars, and has since mounted several international art exhibitions under the moniker *Listen to the Daxophone*,[131] allowing public audiences to witness Reichel's sonic approach to design during gallery hours. In 2015, I was visiting Berlin and had brought along the first prototype of my Starship soundboard. Having been in touch with Uchihashi over social media for several years, I pushed to make time to visit him and play some music together.

We met in his studio, set up our daxophones, and played. I was struck by the soul and power of his playing—it was amazing to collaborate with someone who had been playing the instrument for a decade longer than I.[132] After we played for a while, we began sharing daxophone tongues, testing out each other's quiver of instruments. I have always found this type of thing very natural for daxophonists to do. I was eager to share my best work with Uchihashi, to receive feedback, to see if any of my tongues could measure up to Reichel's. Playing Hans' tongues again was almost a holy experience. It had been about a decade since my last fateful meeting with Reichel, and this was my first time since hearing them in person. Back in 2006, I had the opportunity to play all of Hans Reichel's "A-team"—his favorite tongues—but that was such an early

[131] "Mysterious Instrument… Hans Reichel x Kazuhisa Uchihashi 'Listen to the Daxophone,'" accessed January 15, 2025, https://shrimpupper.com/archives/5630.
[132] Incidentally, the Daxophone was invented in 1987, only a year after I was born.

moment in my student years that I wasn't sure what I still remembered from the moment, besides being struck by the variety of shapes and sounds. Years later, more serious and more experienced, I was still overwhelmed by the diversity of material, but paid more careful attention, taking notes in my journal, observing edges that had been rounded and beveled, tracing shapes, making measurements. Then, I noticed something. I held one of Uchihashi's tongues, made from zebrawood. I turned it over and noticed that I remembered the shape of a swirl of grain on the bottomside of the tongue. In a few moments, my synapses exploded, and I was back on the train from Berlin to Wuppertal. I remember this moment so uniquely because I photographed it—it was the first photograph in my essay about working with Hans. In fact, one of Reichel's tongues, one of the ones Uchihashi had been touring around the world with for five years, was one I had made and given to Hans as a token of my affection and respect.

Figure 31: A Picture from 2006, five daxophone tongues wrapped in daxophone silkscreened fabric. Photo by DF

Accompanying this picture I wrote the following description: “I selected 5 of my daxophones to give to Hans as a gift. I thought this gesture would mean a lot from one daxophonist to another [...] Hans was bewildered to receive this gift. I wondered if he ever played them (unlikely).” Reichel was a perfectionist who was never, ever satisfied. At the time, he commented disparagingly on my gift, suggesting I could have improved them, such as beveling this edge here, widening the hole there, etc. I assumed that these tongues would end up in the dustbin along with so many other tongues of his I had found, imperfect or failed experiments. But I underestimated how much this gift might have affected Hans. He was clearly so bothered by my inexpert carving that he made time in the shop to improve my daxophone, beveling the edge on the back for the bow’s contact and widening the interior hole to a graceful conclusion.

I looked up from my reverie to Uchihashi and said, “I made this tongue.” To clarify Kazu’s surprise, I related the approximate reverie above. Then I took out a tongue from my bag, a miniature tongue made from a scrap of the very same zebrawood. It’s extremely rare for me to play tongues this small, but I had always liked the sound of it, and its presence in my quiver reminded me that anything *could* be a daxophone, if you cut the notch. I put the tongues together to show Kazu the grain ran continuously through them and that the kerf of one tongue matched the other precisely. I flipped over the tongues to show Uchihashi that the characteristic grain swirl in the zebrawood was present in both tongues. I couldn’t have forgotten this tongue, this piece of wood. Though I’d like to assert territorially that, as the “father” of hundreds of daxophones and countless other instruments, I could always recognize one of my children, the reality is that I forget instruments I have created, and I am surprised when

they return to me, when a collaborator shares an old instrument, or when a customer returns one for repair. But this piece of zebrawood was iconic, for it came from the first batch of veneers I had purchased in college to whittle away my own fledgling daxophones, and this very shape I had traced from my teacher Mark Stewart's collection of original Reichel tongues, in 2005.

Figure 32: The two Zebrawood tongues side by side in 2015. Photo by DF

Figure 33: Comparing the two zebrawood tongues side by side, with grain matched to show position in the blank, 2025

Figure 34: The blank from which both tongues were cut, upon my dorm room bed, 2005.

Uchihashi handed me the tongue and said, “It’s yours again. Hans was just borrowing it.” Overwhelmed, I spontaneously handed Uchihashi a daxophone tongue of purpleheart, an original shape that was the one in my quiver he had been especially excited about playing.

The five tongues I had received from Reichel back in 2006 were kind of strange gifts—I had found them around the shop, in the trash cans, and I had asked Hans if I could have them. He begrudgingly agreed. One or two of them sounded good, but the others, not so much, and I had to work on them with sandpaper to get them to sing the way I wanted. Hans must have given them to me because they didn’t suit his sonic and visual standards, and I took up the challenge, sanding and polishing them until they sang for me. But this tongue had passed his own production standards. Evidently, he was satisfied enough with it that he graduated it to the stage. Out of the 409 tongues

Uchihashi had access to, he also deemed it a noteworthy instrument. This was the first time I had ever been gifted a “real tongue” by Hans Reichel. Or was it? After all, we made it together.

Was Hans thinking about me when he worked to perfect this tongue? Well, he didn’t tell me anything directly. But he was talking. I didn’t hear him at the time. Later I realized, looking at the PDF he had assembled on his website, “Some Information on the Daxophone,”[133] that he had included this very daxophone tongue in one of the picture galleries showing noteworthy shapes and colors. My tongue was there—with his modifications to it—in plain sight. I didn’t get the message at the time. But it was there waiting to be seen and heard. Now, when I play this tongue, I am talking with Hans again, speaking in our *Muttersprache*.

[133] Reichel, “Some Information on the Daxophone.”

Figure 35: Page 13 from "Some Information on the Daxophone", Tongue detail. Note the highlighted tongue of Zebrawood, photo by Hans Reichel, annotation by DF

Yet this was not to be the last time that I would commune with Hans Reichel's tongues. As the years passed, I kept up my friendship with Uchihashi, inviting him to Philadelphia to play a concert in tandem with my daxophone installation at the Center for Art in Wood, and connecting with him whenever I was in Berlin for a jam session or gig. Somewhere along the line in our conversations, he mentioned to me that he had a growing pile of broken daxophones. "Why don't you repair them?" I asked. "You can't fix

a daxophone tongue—it's impossible." Well, I had repaired so many of my own tongues over the years that I knew this to be false. I had even glued one of the Reichel tongues from the dustbin back together—it had cracked in half from a vigorous session, but I was able to wood glue it across the grain, no problem—it sounded better than ever. Little cracks with the grain are common, and they can be repaired easily with superglue—as long as the crack is fresh and the wood was dry enough that it hasn't warped since breaking, it's almost certain you can get enough glue in there and figure out a way to clamp it somehow. Whether repairing Hans Reichel's instruments might trouble their archival status is another question entirely. But Kazu and I—we play these tongues actively. They are a living archive—not meant to accumulate dust in a filing cabinet somewhere. So, over the years, I began to insist that Kazu should give me a chance to repair the broken tongues. One day in 2023, he relented, and a few weeks later, a weathered *kiri* box of 13 broken original Hans Reichel tongues arrived at my doorstep.

The tongues were surprising shapes. Many were exceedingly delicate. A few of them contained failed repairs by Kazu himself, a mess of superglue and tape. Many were hairline fractures that I knew would be easy to fix. Some tongues were broken into many pieces. I decided to take my time with the repair—only one tongue a week, giving myself plenty of time for testing and experimentation. The last thing I wanted to do was fail and ruin a priceless artifact. I ordered over seven different types of superglue and began some stress tests on scrap wood to see what would hold up over time.

The basic structure for the repairs that I decided on was a combination of several methods. I used "flexible" superglue from Bob Smith Industries—this would ensure that

joints would yield when flexed without cracking as superglue is prone to. Beyond that, all I needed was a table, a Teflon mat (to prevent accidentally gluing tongues to the table), glue accelerator, and a razor blade. But superglue is a heroic approach that demands instant accuracy—drying in a matter of seconds, mistakes are not allowed.

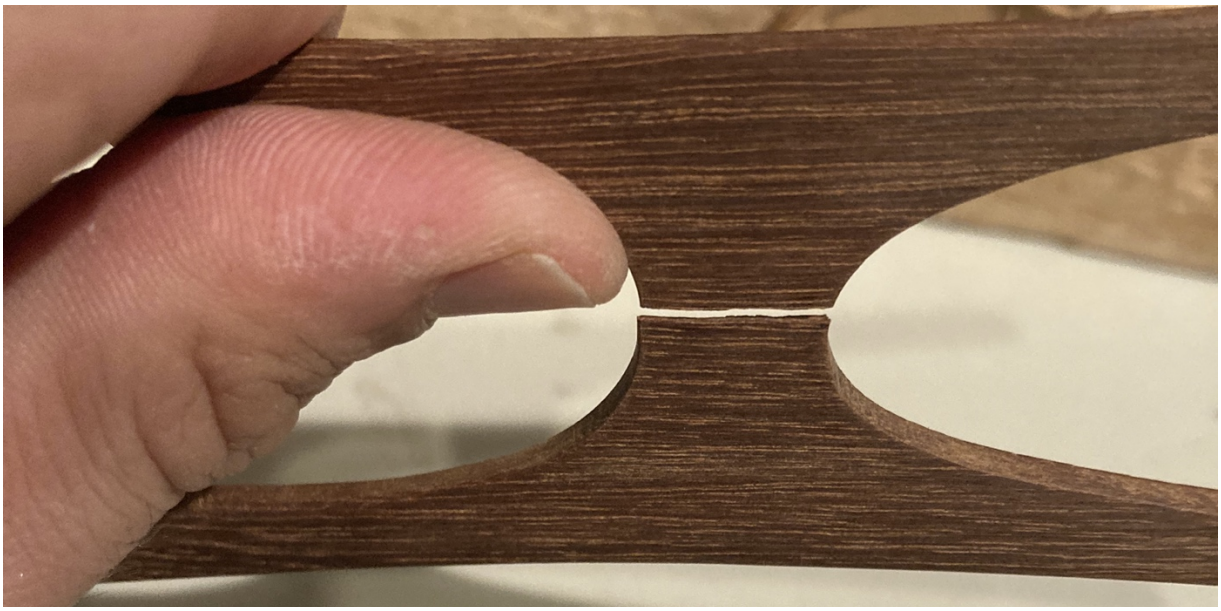

Figure 36: a broken daxophone tongue made by Hans Reichel, before repair.

The above picture shows the typical break, one that's most common to daxophone injuries—the wood splits cleanly along the grain. This repair is a blessing, because the wood fits back together with almost no coaxing needed, as evidenced by the next picture, wherein the repair had not yet been completed (yet looks perfectly glued). With a minimal air gap and the structure of the break solid, glue could easily penetrate both sides for an efficient and simple clamping method. The table provides an important registering surface—by holding the tongue against the table, the break closes naturally. The secret, after holding the tongue in position against the Teflon mat with glue, was to spray glue accelerator on the surface of the tongue, not on either side of the glue surface. Due to wicking action, a miniscule amount of the accelerator is pulled

into the joint, and within seconds, a perfect joint is formed, which must cure for 24 hours. Afterward, the tongue is ready again to sing. Excess glue can be cut away with a razor blade, held perpendicular to the work for scraping action.

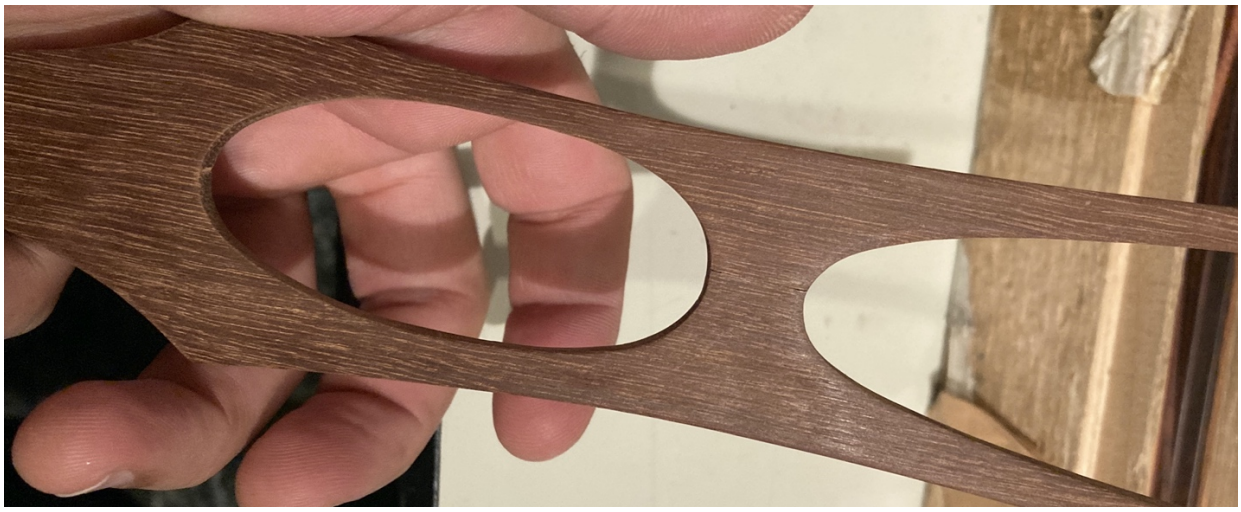

Figure 37: the tongue above tongue after repair, in clamping position.

Figure 38: cedar tongue with more traditional clamping method applied

In some cases, tongues were badly fractured and needed gluing in many places at once. For these tricky repairs, I used liquid hide glue, a traditional and reversible glue

much more common in instrument design. Accordingly, I used the traditional clamping method of weaving a daxophone in string to provide general, gentle clamping pressure.

Some breaks were extreme, of course. The following padauk tongue had been completely broken across the grain, bisected. Such a catastrophic break is not the emergency it appears to be. These breaks still offer a key fit between parts, and plenty of surface area for glue to take hold.

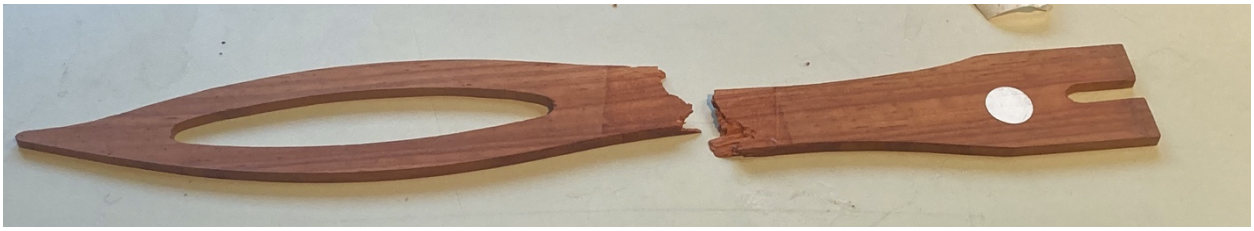

Figure 39: A Reichel Tongue before repair

I had a good hunch that these daxophones were built over a long range of time—some of them must go back to the ‘90s, for they are featured on the cover photo of Reichel’s daxophone operetta, *Shanghaied on Tor Road*. The tongues themselves represented such a surprising approach to building techniques. Often, the back side of the tongue was not fine-sanded, and bore the rough marks of lapping against a coarse grit. I remembered how often Hans would prepare glue joints by taping sandpaper to a marble block and sanding by hand—and many of the pictures in *Daxophonie* show the impressive piles of wood dust on Hans’ workbench. I could see all sorts of facets and bevels on Hans’ tongues—apparently, he would often sharpen an edge just by grinding it against the disc sander, and would not even try to remove the sanding marks. More “modern” tongues from the batch would inevitably be sanded on both sides, but the “top surface” of the tongue would always be shinier. Some curves and proportions were impossibly thin. One snakewood tongue measured only 2 mm at its thinnest point!

I learned a lot from spending times playing these tongues and correlating their unique design approaches to the sounds they produced. At the end of the repair, I finally returned these 13 tongues to Uchihashi, their steward for the future, who would return them in turn to the stage. And I, far from empty-handed, have taken the material lessons of these tongues into every daxophone I have built since.

Figure 40: thirteen original Hans Reichel daxophones, repaired to playable condition, 2023.

2.9 Back in the Shop: The CNC

Today, I am in a different shop. I'm in my garage in Ridgewood. I've relocated my home studio here as we've moved my son Lou into his own bedroom, so the resistor sorting bins, hand tools, soldering iron, junk bins, breadboards: all must go onto shelves in the garage to eliminate splinter risk or lead contamination from the site. No temperature controls here—it's cold. The other studio has basically everything that I need, but a studio at home is a place where you can use the little unplanned minutes of your day wisely, soldering circuits for a few minutes between Zoom meetings, for example. Here, I have the CNC machine. After many years of shuttling planks of wood back and forth from university woodshops, communal woodworking spaces, and even friends' studios, I finally have my own setup: a DIY affair rescued from Craigslist. My CNC is made by an unknown manufacturer in China, but they all share similar specs: a heavy beige gantry, a water-cooled spindle, an aluminum bed, with stepper motors on ballscrews. It's called a "6040" CNC because of the rough dimensions of the bed in centimeters. In practice, the cutting area is somewhat less: around 585 mm × 385 mm. I have it configured to run wirelessly on an ESP32 microcontroller which runs the open-source software FluidNC, a hobbyist project to make a low-cost CNC software that runs to industry standards. I can set up a block of wood with a 2-hour-long cutting job, put on my gun muffs, and work on this dissertation while the robot makes instruments for me.

A "blank" for the CNC looks a little different from the type of wood I might bring to the scroll saw. These materials don't have the specific lineage and story like the wood I've gotten from Sartorius and Brown. A certain degree of precision is required: daxophone tongue stock is milled to 5 millimeters, or the soundboard block is

approximately 26 millimeters. I do this by sending the wood through a thickness planer—one of the most useful tools for a daxophone maker. To cut shapes from these boards, they are clamped rigidly upon the table, and after setting the XYZ origin of the machine, I run a design file that sends the spindle flying across the spoilboard. The CNC is usually fast for tongues—setting up the job is what consumes the most time. Once I know what I'm doing and have prototyped thoroughly, it can be advantageous to run multiple "jobs" out of a single piece of wood. Industrial CNC machines use vacuum clamping to hold down material, but in my case, I use screws to attach material to the CNC's spoilboard made from medium density fiberboard. This means that certain pieces of wood are too small to bring to the CNC—wood that I could easily stabilize by hand on the scroll saw can't be utilized. In order to make my time on the CNC more efficient, I typically glue together smaller pieces of wood, resulting, for better or worse, in a butcher-block aesthetic seen in my starships, though I have begun to phase out that concept for "vertical lamination" of using different woods from top to bottom.

I want to get some thinking done. I take a block of 26 mm thick soundboard stock, drill four holes in the corners, and then screw it down into the spoilboard. It's about 500 mm long by 220 mm wide. It will take almost two hours to cut, but I can get about nine soundboards out of this one block. Plenty of time to sit down and write, and the CNC cutting operations will form a droning ostinato of rhythms and undertones as it chisels out each soundboard. So far, in writing this chapter, I have tried to take the reader inside the process of making instruments, which means to explore fully the present moment, showing my passing thoughts and distractions, my tactics, and my mistakes. This mode of writing, however, cannot fully encapsulate the years-long saga

of trial and error and iteration that is also a significant part of the design process. That kind of reverie demands I reach further from the present moment, years, even. What follows is a less introspective account of revising several inventions and “products,” which synthesizes the twofold goal of ease of production and added features.

2.10 The Apprentice Model Daxophone

The problems of the student model that I discussed earlier led me to theorize a more sophisticated way of making a tabletop daxophone. I had several goals in mind: the instrument must use a wooden clamp to affix the tongue through the classical notch, first and foremost. Next, the method of securing the daxophone to the table must be more carefully considered.

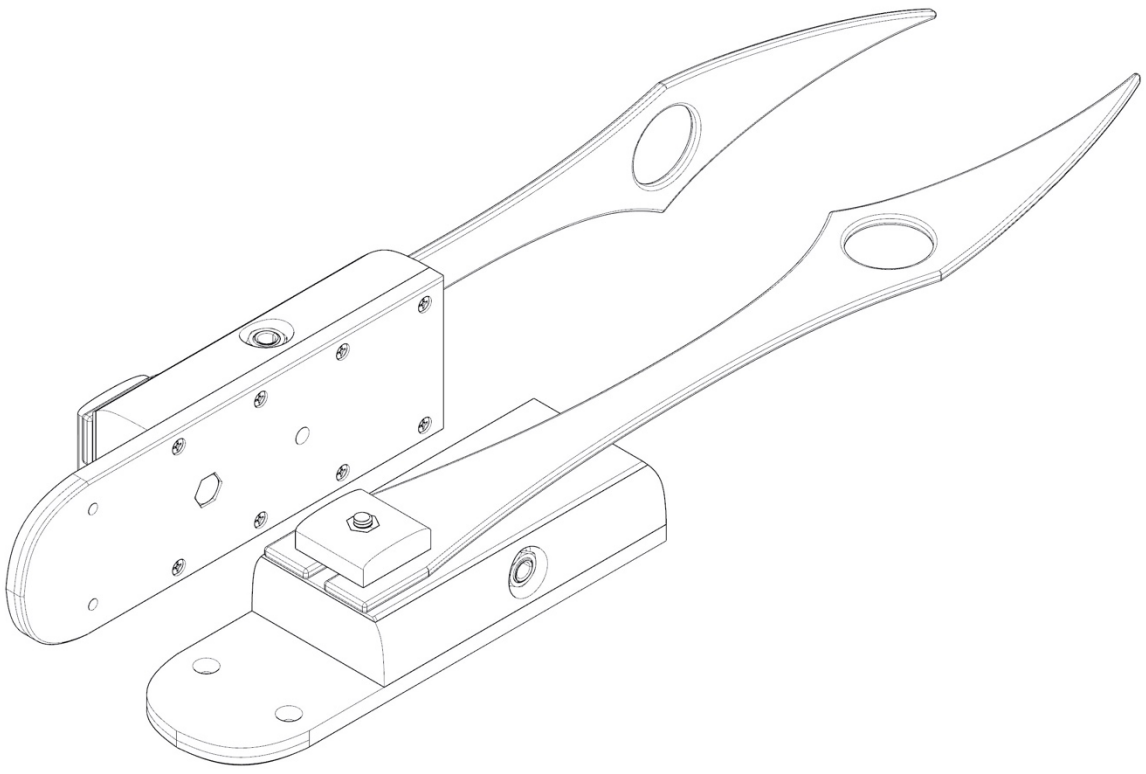

Figure 41: The Apprentice Model Daxophone (3D Rendering by Femi Șonuga-Fleming)

I reasoned that I could create a wooden “duckbill” for a clamping surface that would offset the metal C-clamp out of playing position, so you’d never knock into it while playing. I sketched several versions of this instrument using the bandsaw, and they achieved my design goals perfectly. However, they took even longer to assemble than the student model. Thus, I knew that if I could port these designs to utilize the CNC, the instrument could offer a competitively reduced price point for the consumer and reduced production time for the builder.

Figure 42: The Apprentice Model: soundboard with tongues and dax, photo by Femi Ṣonuga-Fleming

The simplest construction of this revised daxophone soundboard merely adds material to suit its goal: upon the top of the instrument, a wooden clamp, and on the bottom, an 8 mm thick bottom that forms a clamping platform. Mind you, the student model always had an “open bottom,” so it was a natural extension of the design to enclose the electronics with a functional piece of wood, rather than a purely visual

control cover veneer. The addition of the clamping duckbill added a new surface for functional and aesthetic features. First of all, I had space to include a threaded socket for a camera tripod mount, which would allow the player to not be shackled to the table. Many customers had already asked for this upgrade as a custom modification with their instrument, so I reasoned it must be beneficial to include it in my production models for an added fee. Next, I saw the duckbill itself as a site of experimentation. I added two countersunk screw holes for permanent mounting via two #8 screws. Using these, one could just drill two drywall screws into any surface and temporarily mount the daxophone upon it. This addition could eliminate the need for a wooden C-clamp, which always seemed to me to be the clunkiest part of the design. The screw holes instigated a suggestive pareidolia, or anthropomorphic quality, to this surface, suggesting that the daxophone is looking back at its player.

Figure 43: 8 apprentice models in a pre-sanded state, photo by Daniel Fishkin

In some ways, the apprentice model became a perfect product: it became an immediate substitution for the student model, enhancing my customers' experience, adding to my bottom line, and decreasing production time. I increased the sales price by 50% and added an extra tongue—customers would now get four tongues with their dax kit. It sold and continues to sell. In every corridor of design, through utilizing the CNC, I optimize material and time spent during construction. For example, the soundboard top has routed out 28 mm circles (no deeper than 1 mm) into the bottom of the veneer. This improves volume on the instrument and makes gluing up piezo contact mics a breeze, because the glue fills around the indentation of the microphone and locks in the corners, resulting in perfect adhesion. Also, the apprentice model's wooden clamp is carved from the *inside* of the soundboard's cavity. Despite adding machining time to the process, this reduces waste. Also, it creates the possibility of using identically matching wood for the soundboard and the instrument's top, creating an appealing "perfect fit."

Figure 44: back of an apprentice model, showing matched grain, photo by DF

Figure 45: Kevin Ramsay playing an apprentice model in concert

A few words on setup: the apprentice model can be clamped onto a surface in two ways: through the aforementioned screw holes, or directly with a wooden clamp upon the duckbill. But it can also be attached to a camera tripod. I learned this design challenge the hard way: customers kept asking me about a solution like this for the student model, so (with some reluctance) I worked this option into the apprentice model, offering it at a premium upcharge. Above, Kevin Ramsay showcases this setup in action. Though I do have my misgivings about this setup option, as any tripod is "incidental" and not "designed" by the builder, there is no doubt it is practical and pragmatic, for any tripod with a ¼"/20 machine screw thread can be used, and the soundboard can be angled freely.

The mission of the apprentice model was always to seek “low-hanging fruit”—to make easy-to-produce instruments that rewarded the customer on every level. But essentially, I am not Leo Fender, and so it’s also common to find customers who want something extremely customized from the daxophone encounter—a commission. One customer insisted on sending me wood from Canadian coniferous forests, insisting that I only make an instrument from his own source of local, sustainably harvested and eco-acoustically situated tonewood. Another such customer, Daniel Lopatin of the popular electronic band Oneohtrix Pt. Never, wanted a version of the apprentice model that featured a clamp built into the body of the instrument itself out of wood[134], with the daxophone tongue angled at 39° for easy bowing. This instrument could not be CNC-produced (or, wouldn’t be worth the time it took to design, given how few customers asked for this modification), so this particular soundboard was all hand carved from over 25 pieces of wood glued together. This single sale, a time-intensive commission, resulted in an instrument that has toured the world relentlessly, sometimes featured on live projection on jumbotron, spreading dax lore throughout the world. I dubbed it “the Seaplane model,” but in truth only two were made: a left-handed model for the customer, and one to keep on hand for shop demonstrations.

[134] I built the clamp section nearly exactly from Canadian woodworker John Heisz’s sketchup plans for the “ultimate wooden clamp” John Heisz, “Ultimate Wooden Clamp Plans,” *IBUILDIT.CA* (blog), accessed March 30, 2025, https://ibuildit.ca/plans/ultimate-wooden-clamp-plans/.

Figure 46: The Seaplane Model Daxophone, photo by Daniel Fishkin

2.12 The Daxophone Tripod

Eventually, I decided to fully re-create Hans Reichel's traditional approach towards a daxophone tripod. I realized, almost two decades later, that since I had learned this approach directly from Reichel himself, I could offer a traditionalist perspective alongside these other radical soundboard inventions in my daxophone store. Also, customers would ask me from time to time if I could build this style of instrument, so I finally decided to oblige. A Reichel tripod differs significantly from a camera tripod. It uses fitted legs from aluminum rods, with matching wooden feet that are taped to the floor with gaffer's tape. For a serious player, this works and feels important—it functions better and doesn't look like a found object. Though I endeavored to preserve Reichel's approach, I maintained two salient differences. First, I added my signature touch, making the soundboard a doubleneck, so the player can feature two tongues at a time. Then, I modified the legs to break apart and stack together, so that the instrument could be packed away in a small case. The double-neck tripod's interior is cut on the CNC, but all its exteriors are hand-carved and painstakingly drilled.

Figure 47: A double-neck Daxophone Tripod, Summer 2023

The tripod featured below is played by Joyul, a young daxophonist based in South Korea. A small cadre of daxophonists developed in Seoul, based around a new builder's MFA thesis project in Seoul: Tomyeong Lee, Jiyoung Wi, and Joyul. From this group, Joyul remained very interested in the daxophone, and continued to play it internationally. She wrote to me, having played on a more amateur, less well-crafted instrument, and described her needs. In the end, we decided collaboratively that the doubleneck tripod was the right instrument for her. I found that crafting this instrument for a serious daxophonist came with extremely personalized challenges. At one point, Joyul requested to pick daxophone tongues by their shape and color. I responded that it's typical for me to pick instruments personally, since after all, as the builder, I know what they sound like, and want my customers to trust me as a curator of their sonic

quiver. Joyul's response to this surprised me. She said, "The daxophone is my main instrument—shouldn't I know what tongues are best for me?"

I disagreed with this at first. The important thing, I maintain, is listening to the tongue first and not judging it by its appearance—to let the sound lead. Yet I became aware that this new daxophonist, who represents a completely different cultural valence and artistic approach, and indeed a different generation than me, might have a very personalized relationship to the idea of *daxophone* and thus an opinion worth considering. Also, I respected her self-assured passion. So, in the end, we collaborated. I sent her many pictures and asked her to choose her favorites and made suggestions as well.

It should not go without saying that the new generation of daxophonists might be very different from mine in all sorts of ways. Besides these women based in South Korea, two other serious daxophonists, Yumiko Yoshimoto and Kyoko Tsutsui, based in Japan, continue forward in their own idiosyncratic ways. Yet these Japanese women are students of Kazuhisa Uchihashi, and thus they bring forward a historically situated approach to the daxophone while nonetheless adapting it to their personal musics. I should note that Kyoko and Yumiko are not my customers, but musical collaborators. In 2024, I visited Japan, and we performed as a trio, though I gifted each of them a very special tongue I had made and brought with me, in order to build dax family.

Figure 48: doubleneck tripod played Aeri Song (aka JOYUL), South Korea.

2.13 The Minimal Daxophone

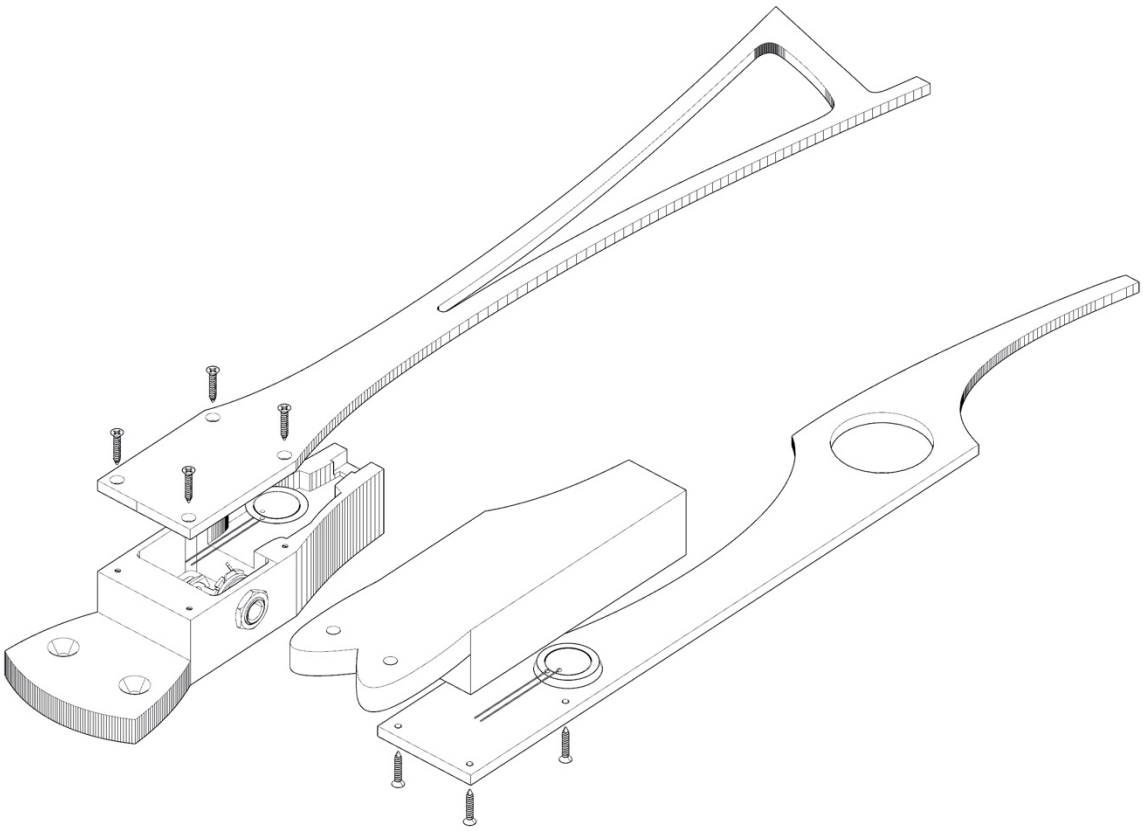

Figure 49: Minimal Model Daxophone, 3d rendering by Femi Șonuga-Fleming

While the apprentice model has become a fully-fledged production model, I did experiments earlier with some of these concepts to create a “minimalist” daxophone that represented the smallest possible assembly of wood, next to clamping a ruler to a table. The minimal daxophone was meant to utilize the CNC to make an extremely simple product to build and sell for cheap. The simplicity of the minimal daxophone does away with the modularity of the daxophone— the tongue is permanently affixed to the soundboard via four screws, and the contact microphone is glued to the tongue directly, inside the soundboard. The fact that it is self-contained—no differentiation between

soundboard and sounding element—makes this instrument extremely pure. Also, the piezo glued to the tongue directly produces a very loud, hot signal. This design experiment resulted in a library of soundboard shapes designed to accommodate the different geometry of Hans Reichel's tongue taxonomy—one flat on both sides, one curved on both sides, and two combinations of flat plus curved. I differentiated these "curve families" by designing four distinct "duckbill faces" for each style of tongue. Going about this work considerably increased my technique in "2.5D" milling and advanced my design awareness.

Figure 50: four minimal model soundboards, each "shape family" represented by a unique duckbill face, photo by Femi Ṣonuga-Fleming

I was able to simplify the dax, too, for production. Instead of fretting the dax with guitar-style fretwire, I created a vertical profile for the dax that used nine or ten segments of straight lines on one side. The meetings of these straight lines form subtle, almost

imperceptible notches. By sanding this cut template against the disc sander, I was able to sharpen the edge even further, which registered against the tongue as a notched scale, just like the traditional metal-fretted counterpart. The flat ridges of the wooden dax actually produce a quick portamento, and the sound is different since it utilizes wood against wood. Thus this wooden dax was not only much simpler to build, but unique in tone as well.

I found out, however, after building up a library of shapes and releasing the instrument to market, that I had encountered a marketing problem. I was able to sell one or two of these instruments, but ultimately all the energy I put into this instrument reduced my bottom line. It seems to me that people who are interested enough in the daxophone to bother paying for it will actually invest *more* into the instrument in order to justify the expense. The loss of modularity (i.e., swapping out different tongues) may be a considerable downside—the endless expandability of all other soundboards is itself attractive—like expanding a modular synthesizer or guitar pedalboard, a serious daxophonist can continue to develop their sound by adding new shapes and woods ad infinitum. A customer may simply build their own tongues to find new sounds. This modularity is also a boon for a daxophone luthier, who may look forward to continued business from happy daxers in the future. The minimal daxophone, while altogether cool, may not be a saleable product. And the daxophone's notch is gone! It wasn't the first time. As I discussed earlier, the lack of a notch may indeed signify another instrument entirely. I took this model "off the market" and boxed away some twenty minimal daxophones for their next moment.

2.14 The Daxophone Trees

Figure 51: The Daxophone Tree (Deeper Closer Warmer), photo by Richard Termine

The upside of this R&D experiment is that, for a composer of musical instruments, different “products” can find a creative application, even if they promise no immediate market demand. In spring 2023, I embarked on a theatrical collaboration with my ensemble, *The Daxophone Consort*, and the twin puppeteers from Puerto Rico, *Poncili Creación*. This took place in March 2023 at HERE Arts Theater in SoHo, with a run of 12 performances and satellite shows in other locales along the eastern seaboard. Our work, *Deeper Closer Warmer,* was an ambitious undertaking that melded the sonic aesthetic of my wooden daxophone band with the visual language of their group: foam marionettes, abstract storytelling, and characters. At the same time, the Consort has had our own intentional visual aesthetic including costumes, jumpsuits, masks, theatrical lighting, and darkness. It was paramount that we did not want to become “hired guns” for the collaboration—musicians had to be an equal part of the performative action, on stage, masked, in the narrative, not stuck in the orchestra pit. The physical dimensions of my starship daxophones, the mainstay instruments of the Consort, embody this dilemma: they are essentially seated instruments. While ratchet-strapping them to customized, neon green spray-painted chairs allowed us to whirl our instruments around stage and reposition according to different lighting cues, I feared that audiences might not see the daxophone.

I decided to compose another instrument for this situation, so I took my minimal daxophones out of storage. Erecting three large columns in the theater in the center of the audience, I drilled the minimalist soundboards upon them vertically, like totem poles. Each soundboard had at least four, sometimes six, unique minimal tongues implanted on it, run through a satellite mixer to the house system. These instruments, daxophone

“trees,” could be called site-specific instruments, for in fact the locations of the pillars were three vertical trusses that were architectural supports for the building. But what was different about them is the manner in which they compelled us to play them. Twirling around them from front to behind, playing with two bows, plucking open tongues, standing, kneeling—the trees produced an almost ritual style of playing that had everything to do with our dancerly body language as we engaged with the structures. Some modules on the soundboard produced shrill squeaks and others resonant moans, but the demands of our theatrical run meant I couldn’t fully inspect and perfect each totem pole—we had to figure out each tree as an imperfect instrument and utilize it to produce its own ideal idiom.

Figure 52: A Daxophone Tree at Oberlin College, photo by Fae Ordaz

The daxophone trees even proved to be a portable instrument concept: for a workshop and concert at Oberlin Conservatory in 2023, we erected four ad hoc stations in the audience for TIMARA students to play during a composed section of the concert at Fairchild Chapel. These impromptu rigs, simply composed from 1 × 6 lumber clamped to church pews, proved the mettle of this instrument concept. For the finale of the concert, a group of students joined the four daxophone trees in the audience, combining with the Consort to form an ensemble of nearly twenty daxophones playing in harmony. The TIMARA students had been exposed to the sounds of the daxophone through a curious student, Eli Rosenkim, who had built his own daxophone setup and played it in improv settings at the Conservatory. However, most had never played the daxophone. Therefore, the players of this instrument had a purely sonic introduction to the daxophone through the performance of the Consort. This sonic gesture was in some way aligned with other heritage compositions in the history of electronic music, such as Lucier's *I am Sitting in a Room* or Reich's *Come Out*, in that the composition itself contains a pedagogical aspect: it teaches you *how* to hear it as you're hearing the composition. The daxophone tree, an extremely limited set of possibilities, notes, gestures, and angles, teaches you how to play it.

Having staged The Trees at Oberlin, I knew this form had aesthetic potential outside the scope of their original theatrical installation. However, I had yet to solve an issue of portability and practicality. I could not assume that every venue had austere church pews or pillars for clamping. The Trees had to be mobile. I have solved this issue before. My instrument, The Lady's Harp, went through several architectural incarnations before I finally built a freestanding and modular structure that allowed me

to construct it without drilling into walls, floors or columns. After considerable thought and wistful pining, one day I stumbled upon a set of boutique, six-foot-long maple sawhorses at Materials for the Arts, a free art supply warehouse next to my studio in Long Island City where I often go “shopping” for instrument material. I have found many cables, speakers, cases, and raw materials for construction there over the years. And when I saw the sawhorses and considered their modest yet structurally sound angles, I realized I had stumbled upon a rough and ready version of The Trees that wouldn’t require architectural installation. This sawhorse would form the tree trunk, mounted vertically, on top of which many minimal daxophones would shoot out like branches. A blank page can be as good as locked. Creating out of scraps is easier, depending on the project.

I got to work with a hammer and drill and broke down the sawhorses into lumber. The maple was nice, and it was held together with simple pocket-hole joinery—a big no-no in fine woodworking. But screws are removable—the essence of modularity and portability. In collaboration with my apprentice Femi Shonuga-Fleming, I started to imagine what form the tree trunk would look like.[135] I decided that the basic “A”-shaped triangle of the sawhorse was the dimension to preserve, and by combining two ends of the sawhorses with a simple lap joint, I could make a tripod that preserved the sawhorse’s structural stability and extended that into another dimension, to bear the vertical load of the tree trunk. But daxophones need to be rigid to withstand the force of bowing. All daxophone tripods and clampable setups usually use a “duckbill” of sorts for

[135] I have recently taken on young apprentices in my instrument building studio. The exchange is far more spiritual than a mere internship: I share my techniques and secrets with them, help them with their projects, and in exchange, they aid in the more minute tasks of shop time such as sanding, as well as lending their original thoughts and inspiration to projects I could not complete alone. This

attaching a clamp or standing upon. So I simply made a wooden platform and screwed it to the three legs for a performer to stand upon while playing. This design was conceived with basic concerns for portability in mind—using a drill, I could dissemble the two pieces easily for transport.

Figure 53: Daxophone Tree (with Femi Shonuga Fleming), photo by Cat Beckstrand

I look at this simple tree and consider its austere and pragmatic form. I have sanded and polished it, and chamfered over every edge, so it is friendly and splinter-free to the touch. Yet what I've made bears the trace of its original form. Returning to the dimensions of a 2×6 for source material, I consider that what I've created doesn't have the same elegance as my curvaceous soundboards. Yet I'm comfortable with the impact of these plain geometries, these rectangles and triangles: they are unpretentious, and they are reliable. It occurs to me that this is the first time in a long time I've widened the sculptural scale of my daxophones. Like the Lady's Harp (but possibly less unwieldy), the Tree is a big machine—taller than I am—that needs to be assembled on site prior to the gig. Scale means something for audiences in how they encounter the instrument. And not only has scale been changed—adding ten different minimal daxophones to both sides of the tree has created a polyphonic instrument "for two," in which merely playing the instrument is now a choreographed duet. Without a doubt, much of my focus in this chapter concerns the notion of craft: considering woodgrain, shop time, and marketability does not (necessarily) give way to the creative limitations that delineate musical material. Yet "craft" could also be considered "technique," and like musical technique, one nurtures it to build up a reservoir from which to draw, to achieve particular and varying goals.

Through my gun muffs, I hear the CNC machine break from its predictable motions—the rhythms that I've gotten so used to over the last two hours suddenly cease as the spindle lifts from the block and returns to x0y0z30. Like a sleeper who wakes up as soon as the radio static is switched off, I emerge from my technical and historical reverie like a dream and rise to check the cutting job. Everything worked out

as I had intended: there are about six apprentice soundboard middles—I couldn't quite squeeze three on each row because the blank wasn't wide enough, so off on the end of each row, there's a different minimal model chub. The apprentice models will take lots of sanding and gluing and screwing before they're ready, but they have inherent monetary value—my customers are waiting. The extra minimal model pieces wink back at me from the CNC bed, daring me to build them, to create culture with them, seeds for me to plant more Daxophone Trees.

I have colloquially described these Daxophone Trees as "totem poles" for their imposing verticality and the personality of their tongues, in shape and sound. The term "totem poles" isn't right—I know this. I have no connection to indigenous traditions, and the colonizer's casual appropriation of sacred terms sits heavily in my mouth. Still, I keep coming back to it. While the carvings on "totem poles" can have multiple meanings, inevitably central in their utility is the function of commemorating of ancestral lineage. Indeed, a totem is simply a sacred object, and the centrality of the daxophone suggests that for my chosen tribe, these shapes are simply that: sacred forms. I could stretch this metaphor further. In his controversial book, Totem and Taboo[136], Freud proposes a psychoanalytic theory of totemism that centers on the primal father and the origins of social organization. His controversial thesis connects totemism to the "primal horde" theory and the Oedipus complex—the sons' ambivalent relationship with the father figure they both revere and wish to surpass. I realize, from a psychoanalytic perspective, these totem poles symbolize my "family tree," musically speaking. The daxophone, as a raw, unrefined sound maker, provides the appropriate voice for this

[136] Sigmund Freud, *Totem and Taboo*, trans. James Strachey (Routledge & Kegan Paul, 1950).

primal instrument's sonic register. Hans Reichel, the father of the daxophone, haunts these towers through their basic vocabulary—the curved edges, their resonant wood, the essential physics of friction. Yet by transforming the daxophone, both by the invention of my own soundboard designs as well as by converting this seated instrument into these vertical structures, I simultaneously honor his invention and claim new territory.

I know there are limits to these metaphors. What's going on here is not really an expression of ambivalent succession. As I build and play daxophones, I communicate with my ancestors, using the woodgrain as a conduit to send and receive messages through the tracheae, those tiny tubes that used to carry life and moisture through the plant. This communication is ritual, but it is also technical. When Hans Reichel died in 2011, I mourned the fact that we'd never get to talk again, that he had taken so many secrets of the daxophone to the grave along with him. As the years pass and as my tongues grow manifold, I've been able to decipher some of these secrets on my own—sometimes, even from Hans' instruments directly. As Steve Albini once sang, "This isn't some kind of a metaphor—this is real." I've seen the end grain up close. I've looked at Hans' tongues under the microscope, and I've studied his toolmarks.

2.15 Conclusion

At some point in the shop, my work is done. When I finish tongues, I play them to see if they sound good, and I put them aside, unsorted. When I sell an instrument, I take a finished soundboard and dax, and I pick out some tongues from the pile, looking for the right balance of shapes, colors, wood species, and character for my customer. It

takes time, playing them again, and curating the ensemble. Sometimes a customer will have requests, like “very bassy” or “melodic” or “crazy.” I try to oblige. Many times, while trying them out, I find a tongue that sounds special. The discovery is nearly instant—as soon as I put a new tongue on the soundboard, I begin playing and immediately begin to resonate with the tongue, finding the notes and patterns on it that sound good, its creaky distinct utterances. It’s as if the tongue has been waiting to sing, and all I am doing is capturing that moment of discovery. Sometimes I want to record these “first impressions” of a new instrument because they are so powerful. Yet they are anarchic for me—I never know how to put these tongue songs into a compositional context or philosophy because the moment of discovery is the piece—the instrument is the composition, already. I used to hoard these special instruments for myself, but more recently I have been selling my best efforts, to arm my customers with the most incredible instruments I can make. I don’t feel that it’s necessary to keep them anymore—I am always making new ones, and anyway, it’s better that these tongues go out into the world and find their own way.

And, like Pinocchio, hopefully they can become *real*, if my customers use them to make real music. I’ve long witnessed how my customers can make such different music than I could have imagined making. It’s so funny to hear my daxophones pop up in the most surprising places. But that is the reality of the craft, the craft of Composing Instruments. The following chapter will represent but one iteration of what my daxophones can go on to sound like, and one particular case for which I utilized the mimetic potential of the daxophone to represent something with sound. I am just one person, and I have my own compositional prerogatives that I follow when it’s time to put

pen to page. But before all that, I always go through this long, sustained process of inventing and perfecting my pens. This process is not orderly—it encompasses the very wild and untamed encounter of working with a raw material in one of the most direct sonic means one can imagine. As such, building instruments is not para-composition but composing itself. As such, the process itself is its own study of limitation, of ordering sounds in space, of experimentation, of making critical choices that will determine what will be heard, and when, and how.

Chapter 3: Masking Songs

3.1 Tinnitus Journal

It's March 2022, and I'm listening to my ears ringing in a silent room.

I am in the Cooper Union Vibrations and Acoustics Lab, which houses what is reportedly New York City's only anechoic chamber, a fact often touted by tour guides at the school yet disputed by those in the know. These silence-loving experts might be right, or they might be confused, thinking of somewhere else: the gorgeous anechoic chamber at Nokia Bell Labs, Murray Hill campus. Of course, all anechoic chambers are special, but the Bell Labs Chamber is particularly memorable for its gigantic size. However, it is not in New York, but rather, New Jersey. In New York, the biggest city on the east coast of the USA, everything is small—where you could fit a midsize orchestra in the silent room of Bell Labs, Cooper's anechoic chamber can hold an intimate duet. Yet all anechoic chambers are special—they are veritable rumpus rooms for sounds to dance about without reverberation, a sandbox for composers to prototype music experiments—well suited as a realm of contemplation.

I'm sitting on an old piano bench, in front of a computer running a simple Max Patch, where I'm adjusting bands of noise to match the ringing sounds in my ears. My routine in the chamber is simple—I begin by listening to nothing. After about 5 seconds or 10 minutes (depending on the day), from the silence emerges a curious harmony that only I can hear. The human hearing range is logarithmic, spanning 11 octaves, and it is in these last two octaves where my tinnitus is most active. Its swirling sound is not exactly a clear tone, but a kind of pitched noise, a hissing sibilance very high into my

hearing range, between 8 and 14 kilohertz (kHz), though occasionally reaching as low as 6.5 kHz, or as high as 15kHz. After listening for a while, I try to figure out the frequencies by trial and error. I use filtered noise to try to match the ringing sound—and adjust the filters to match the coarse ranges that happen to be ringing that day. Sometimes it's a specific note that I can whistle, and other times it's a wide cluster, a band of frequencies that seethe indiscriminately.

I write down my findings, and convert the frequencies to musical notes, which I then notate on a musical staff, placed accordingly on a measure representing a 24-hour day. Today, between the hours of 5 and 7 pm, I heard the frequencies 10k and 12k very clearly, with 9k emerging by the last hour, so I notate the harmony in the third beat as a D-F# dyad, with the dissonant C# tied over to the next note. Just before leaving the chamber, I hear very clearly 7.6k, but I didn't have time to write it down. But I hear it at my apartment later, so I jot down A# as the last beat, 10pm. It will be a completely different harmony the next day.

This project is called *Tinnitus Journal.* I want to continue it for a year, and use the pitch journal as source material for music I want to write down, on paper. I've had tinnitus since 2008 or so, and I dreamed of this specific project as early as 2010, though I didn't have the listening chops or technical skill to pull it off. Instead, I composed music inspired by my tinnitus, and built musical instruments to accompany it—for the better part of a decade. These instruments were different versions of the same principle: I used very long piano wires, which I amplified with guitar pickups, and a novel feedback system I invented by connecting tactile transducers to wooden bridges and sending the sound of the string back into itself until it vibrated and swelled of its own accord. I called

it Lady's Harp. You can do lots of things with an instrument, but every time I played this instrument, it seemed to me that I was pursuing a very particular piece of music— certain ways of playing the strings didn't work with this internal directive. Gradually, through testing it, I started to listen more and more to my ears ringing, and felt I had stumbled upon an instrument, finally, that I could set in dialogue with my hearing damage. Or, an instrument I could play that would not be out of tune— conceptually, acoustically—with my tinnitus.

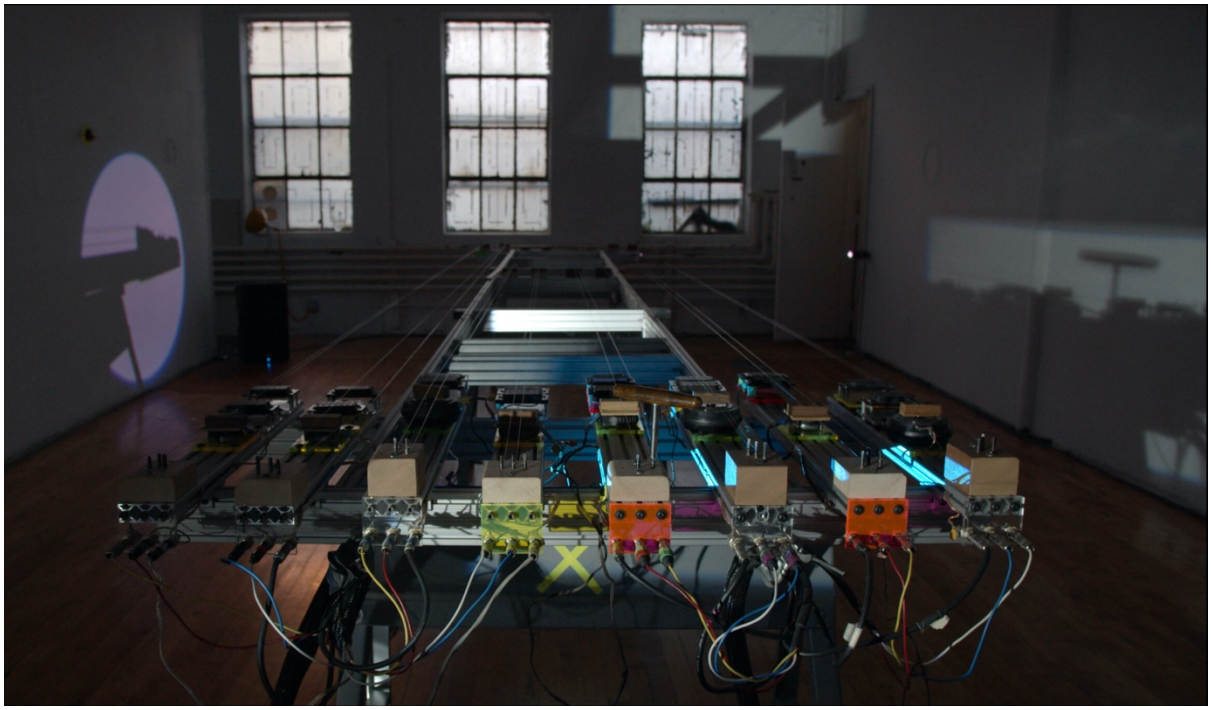

Figure 54: Excerpt from Composing the Tinnitus Suites: 2020. Detail of Lady's Harp

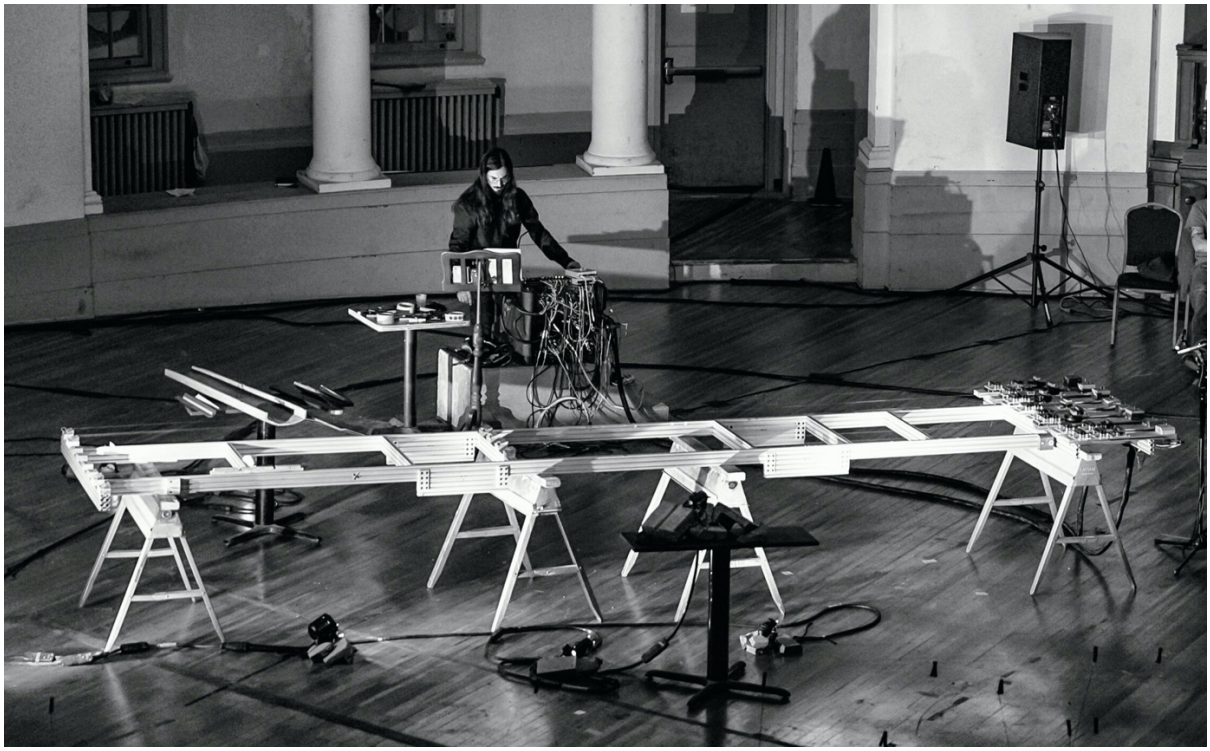

Figure 55: Excerpt from Composing the Tinnitus Suites: 2016

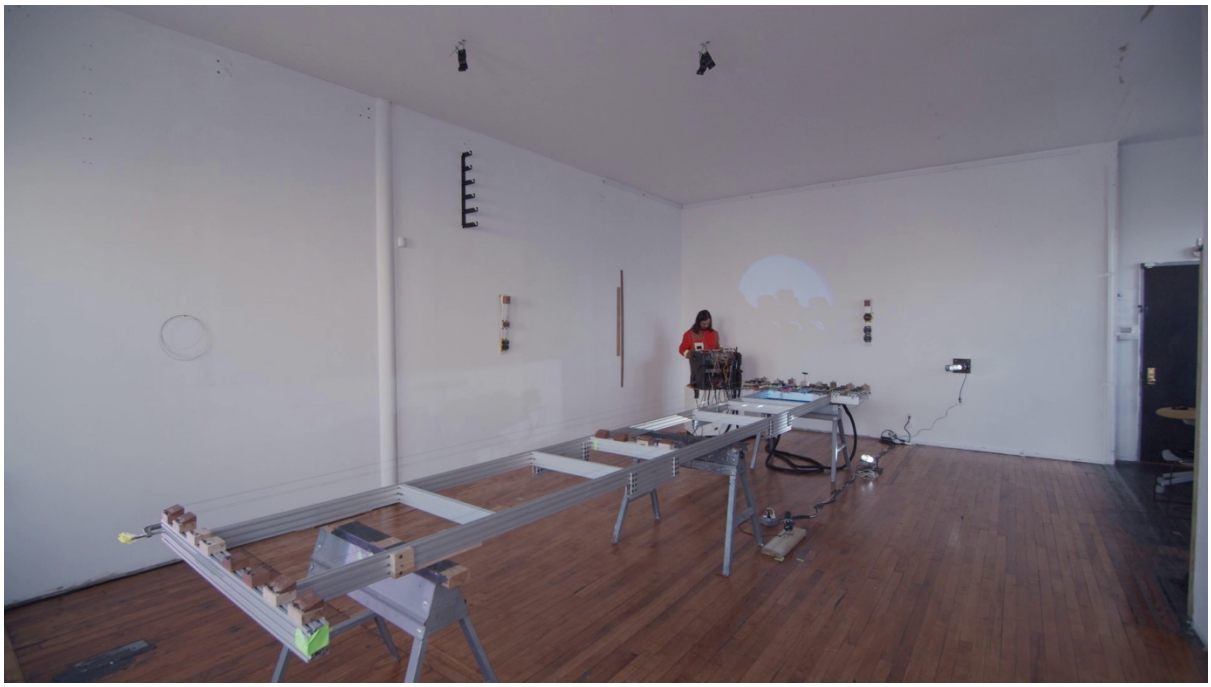

Figure 56: Excerpt from Composing the Tinnitus Suites: 2020

Figure 57: Excerpt from Composing the Tinnitus Suites: 2020. This was the last time I played the Lady's Harp.

This project, *Composing the Tinnitus Suites* (and my 20-foot-long Lady's Harp), took up a lot of space in my life, figuratively and literally. It was loosely conceived as a yearly evolution of everything I did with the Lady's Harp, as long as I could stage it so an audience could think about the *poetics* of hearing damage when confronting the work. The *specifics*, though, seemed out of reach at first. At the time, I couldn't imagine a literal transcription of my tinnitus—it seemed like a logical fallacy, because I knew that my tinnitus was not, in fact, objective, but a neurological hallucination.

Just yesterday, or perhaps it was last chapter, I was in the woodshop. I was cutting daxophone tongues and soundboards, which are a very different kind of instrument, which I sell online to customers around the world. Those instruments have no intrinsic relationship with tinnitus. I do not hear my tinnitus there.

The whirring of the machines—the dust collector, the table saw, the sanders—is loud and enveloping, yet with my earplugs in, I am safe from the sound outside and the sound inside. Sometimes, it gets really, really loud, and I am careful, so I double up, wearing my noise-isolating headphones ('gun muffs') on top of my custom-molded earplugs. I have no idea how much sound this is actually blocking. The custom earplugs have 25-decibel (dB) filters, and the headset is rated for 30-dB cut, but that's not how noise reduction works. I do know, though, what happens, if I turn the machines off and forget to take off the headphones, too. My tinnitus will come to visit me. It's predictable—and it must resemble what happens in the case of severe noise-induced hearing loss. The brain, deprived of auditory stimulus via damaged stereocilia or excessive sound dampening, 'turns up the volume' to compensate for missing signals. But this will disappear when I take the earplugs out, and nourish my auditory cortex with sound again. So, I have no fear.

Back in the anechoic chamber, though, I hear my tinnitus—it just happens without mediation. There are countless articles and videos about anechoic chambers online. They are all the same. They have clickbait titles like 'Can Silence Drive You Crazy?[137]' They warn equally of the dangers of gradual noise exposure, which is revealed by one's tinnitus inside a chamber—and of the fearsome qualities of silence itself. I hate these scare tactics with a burning passion. Indeed, if you spent 45 minutes doing *nothing* in the Orfield Laboratories anechoic chamber of Minnesota, with its -9.4 dB background noise threshold, you might begin to hear your tinnitus, perhaps for the first time. But creative listeners can go to these places and do magical things. During

[137] *Can Silence Actually Drive You Crazy?*, 2014, https://www.youtube.com/watch?v=mXVGIb3bzHI.

my first visit to Bell Labs, a cellist named Laura Cetilia was recording there. As soon as I walked in, I was struck by her quiet sound, which both saturated the silent room yet remained fragile and delicate, like a ghost revealing its earthbound secrets. I stood all the way across the room, and it sounded like my ear was right next to her soundboard. Give a creative musician the powerful tool of the silent room and they will make music with it.

This anechoic clickbait suffers from a lack of imagination. This type of philistinism offends me because it programs a conditioned response—if you expect to be afraid of silence, of your tinnitus, it will scare you. In fact, anyone is liable to hear their own signal in the quiet chapel of the chamber. This was proven at least twice: first, by John Cage's famous experience in the anechoic chamber[138], where, when searching for silence, he found none, and thus confronted its impossibility; next, by the noted Heller-Bergman experiment of 1953, which placed one hundred "normally hearing" people in an anechoic chamber, and asked them to describe the sounds they heard[139]. Over 90 percent of the subjects reported hearing "buzzing, humming, or ringing sounds." The study suggests that tinnitus—the perception of sound without acoustic origin—is a basic property of our hearing system.

Media Scholar Mack Hagood investigates this phenomenon carefully in his landmark 2019 publication on media and "sonic self control," *Hush*. He conducted several in-depth interviews with the leading tinnitus researcher, Pawel Jastreboff, who

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[138] I have discussed Cage's experience of silence (or perhaps tinnitus) at length elsewhere. See my essay: Daniel Fishkin, "SAM :: SAM Bulletin - Volume XLII, No. 3 (Fall 2016)," *Society of American Music Bulletin* XLII, no. 3 (Fall 2016), https://cdn.ymaws.com/awww.american-music.org/resource/resmgr/docs/bulletin/vol423.pdf.

[139] M. F. Heller and M. Bergman, "Tinnitus Aurium in Normally Hearing Persons," *The Annals of Otology, Rhinology, and Laryngology* 62, no. 1 (March 1953): 73–83, https://doi.org/10.1177/000348945306200107.

suggested to him: “The auditory system needs sound like the body needs food—when it is deprived of sound, hearing becomes more acute.” Hagood also unpacks the evidence in his own words:

> “Known as “automatic gain control” (AGC), this compensatory sensitivity in the auditory system creates a strong association between reduced auditory input and tinnitus, as sound-deprived individuals are more likely to experience the normal, random neuronal firing of auditory neurons (which might be thought of as “a code for silence”) as sound. Tinnitus, then, is a phenomenon comparable to turning up the volume on a weak signal and amplifying the amplifier’s inherent noise—the aforementioned random firing of synapses.”[140]

But tinnitus clearly is also a condition from which many people suffer—painfully. Hagood suggests that the ‘clarifying power of fear’ is an important mechanism by which tinnitus moves from being perceptual residue to diagnosis. A tinnitus sufferer can worsen the perception of damage by focusing on it and by worrying about it. In other words, having tinnitus is not just hearing your ears ringing, but fearing your ears ringing.

I practice *Tinnitus Journal* for a week, going to the chamber as much as I can manage. I am trying to become inspired again by my tinnitus, to play with it. When I began *Composing the Tinnitus Suites*, my manifesto at the time was: ‘I don’t want to get used to my hearing damage; I want to use it’ (Fishkin). In fact, since making Tinnitus Music, I suffer much less from my hearing—it provided a way to reinscribe my relationship with tinnitus in a productive way. Turning up the volume of the Lady’s Harp’s amplifiers seemed to turn down the volume of my Tinnitus, in the long term. I

[140] Mack Hagood, *Hush: Media and Sonic Self-Control*, Illustrated edition (Durham, North Carolina London: Duke University Press Books, 2019). Page 57

also live differently—I don't play loud rock music. And, as a result, sometimes many weeks go without me noticing it. And when I do notice it, it's like an old friend saying hello, or like divine inspiration. Today, I could say that using my tinnitus got me used to it. This is not to say that I don't have profound moments of confusion, auditory dysphoria, semi-truck-horn-induced hyperacusis, coffee-cup-clinking-induced misophonia, unexplainable rage from someone whispering into my right ear, and, of course, frequent disasters resulting from a lifetime in electronic music. But rather, that I take these moments in stride, and that I see them on a larger continuum of engaging with listening itself.

And, thinking about the continuum of listening, I am reminded of all those ways that the ear and brain experience sound: it listens, and it hears. Pauline Oliveros often writes of the superiority of listening over hearing. For Oliveros, listening is hearing plus attention. This indicates that listening is a distinct and deliberate break from the passive experience of hearing in which we are continually, ceaselessly entrenched. While her early career contributions to American electronic music are vast, Oliveros broke artistic ground with her landmark Sonic Meditations, a collection of text scores meant to be performed by anyone, regardless of musical pedigree. These pieces collapse the boundaries between performer/audience—they take place in the listening ear of the performer, who then hears the piece herself. Take, for example, her piece, Native, whose entire score reads, "Take a walk at night. Walk so silently that the bottoms of your feet become ears" (Oliveros 1974). Sonic Mediations led Oliveros to formalize the practice of Deep Listening:

> "I began with myself. I started to sing and play long tones, and to listen and observe how these tones affected me mentally and physically. I noticed that I could change my emotional state by concentrating my attention on a tone. I noticed that I could feel my body responding with relaxation or tension. Prolonged practice brought about a heightened state of awareness that gave me a sense of well-being."[141]

For Oliveros, the direction of her attention is critical to extend the passive process of hearing into its active form. However, the restorative sonic healing praxis offered by Deep Listening might not be attainable for all ears. Curiously, if a person with tinnitus, hyperacusis, or misophonia attempts to do the work of deep listening, the meditative sonic spotlight resultant from active listening might simply amplify what's wrong with their hearing. In other words, Deep Listening to tinnitus might drive you crazy!

The active state of listening, once practiced diligently, gives way to involuntary perception—one "hears" things easily after practiced attempts to listen to them. Think of musical ear training. At first, the harmonies of different intervals are mysterious and seductive—what do different notes do? As this student begins to index the names of each interval, they begin to perceive their different flavors: the openness of a perfect fifth, the close beating of a minor second. This student must then associate the name of these intervals with their sound quality, to encounter any two notes and instantly be able to identify them correctly. This process takes time, practice, and diligent listening. And yet, eventually, the student simply can identify the name of the interval immediately—

[141] Pauline Oliveros, *Deep Listening: A Composer's Sound Practice*, 1st edition (iUniverse, 2005).

they do not have to try or guess, they simply *hear* it. Listening *gives* way to hearing. As the cliché goes, once it heard, it cannot be unheard.

Working on *Tinnitus Journal* has a completely different character from composing with the Lady's Harp. I don't see it as a piece of music in itself, but like a found object, a dead sea scroll that I can mine for information. I find my head full of harmonies instead of focusing on the strings in front of me. I think of this time-period as a rehearsal, to borrow a phrase from durational performance artist Tehching Hsieh, whose incredible pieces lasted a year at a time. Describing his process for 'Rope Piece', in which he was bound by lead-sealed rope to performance artist Linda Montano for a whole year, Hsieh explained:

> I do not feel that the piece is dangerous. I have to know my limitations in a piece. So I do a rehearsal for a week to see what happens. I don't want to do a piece that I feel is too risky—30% risk is okay. Accidents are possible in this piece, so we have to be very careful.[142]

Accidents, for Hsieh and Montano, might be an elevator door closing on the rope between the two, for example—which did happen, and only by chance did it open again, sparing their lives. I'm in the middle of my rehearsal for my own year-long performance, and I'm figuring out the limitations.

And the dangers. After working on *Tinnitus Journal* for about a week, I began to hear my tinnitus in my apartment every night, suddenly all over again. I could hear it while having normal conversations with people—I found myself losing the thread of

[142] Allyson Grey and Alex Grey, "The Year of the Rope: An Interview with Linda Montano and Tehching Hsieh," *High Performance*, Fall 1984, https://pennfnarfoundationsfall2015.wordpress.com/wp-content/uploads/2015/11/tehching-hsieh-linda-montano-interview.pdf.

conversation, wondering what pitch it is. I could even hum the notes, octaves below, every time I heard it. I shouldn't have been so careless. I began to feel a little unhinged. It can happen that the situation with my ears can get out of control—if I blast myself with a squall of feedback while working, I'll deal with symptoms of tinnitus and sound fatigue for days, weeks even. But now the *silence* has gotten out of control—it's the first time in a while that I feel trapped by my tinnitus. It seems that my experiment in the anechoic chamber unlocked an echo chamber in my head. But, what did I expect would happen? I shouldn't be surprised. I knew that attention would train my powers of audition—and intensify the conditioned response of tuning into my tinnitus. I didn't know, though, how quickly I might feel like I was "locked in" with my tinnitus all over again—how quickly that smile of my little tinnitus friend would turn menacing, and how sharp its tee-ee-eeth.

March came and went. Six months later, *Tinnitus Journal* is waiting—not yet begun, perhaps unfinished… perhaps a terrible idea in the first place. But I want to believe there's a way for this project to breathe, a little more lightly. Some people hear the same notes every day with their tinnitus—I don't. There must be a way to play with these daily harmonies, to understand them without them invading my perception, without them running wild. In a formal sense, there's nothing objectionable about my tinnitus as material. I love sine waves and pitched noise; and I *love* long durational music. And I'm not the kind of person who thinks certain dissonances should be avoided—any constellation of changing chords could delight me. And the harmonies in my tinnitus sounded good! If there's anyone who could do this, who could be *captivated* by their tinnitus on a daily basis, it would be me. But I cannot do this project if it means losing control of the off-switch.

Tinnitus doesn't exist—in the real world, that is. Like the shadows of the kerf left in the sawblade's wake, it is an absence that seems real through our perception alone. It is not a physical vibration. You can't touch the kerf—you touch nothing until you touch the wood that remains. If you try to focus on this negative space, the act of perception gives way to a kind of maddening autopoiesis, grasping at shadows, thinking about thinking, hearing *hearing*. But surely something is there, right? My ears are real ears, hearing real sounds, and their inability to hear certain sounds at certain volumes was affected by other sounds at particular volumes.

I wanted to find my tinnitus—if my brain was a movie set, I wanted to zoom into close-up onto my stereocilia and see which of my hyperactive hair cells were twitching in the wind. And zoom further, until the grain of these pixels began to cluster like large clumps. And, finally, to understand the grain direction of my ears—so I can figure out which way to cut them.

3.2 Writing the Masking Songs

Gradually, for very real and very personal reasons, the Lady's Harp became less and less central to my creative practice. In fact, its last flight happened very close to the beginning of this dissertation, in 2020. To some degree, this had to do with the Covid-19 Pandemic Lockdown. I had just put the finishing touches on a significant installation, *Composing the Tinnitus Suites: 2020*, and then was separated from my Lady's Harp indefinitely. During that time, I began to actively ideate on my writing practice, both in notating music and in analytical writing, to find a way to analyze the tinnitus, hyperacusis, and misophonia of other composers or music makers. In fact, that was the

original idea of this dissertation: to study the tinnitus of others. The Lady's Harp, which for me was an extremely personal thing, would have to be displaced, at least temporarily. And then the lockdown happened, and many of the mechanisms which made it easy to access the Lady's Harp were temporarily suspended. As such, I found myself exploring other facets of listening, and tinnitus, which is how my project in the anechoic chamber got started. I also dreamed of making a miniature Lady's Harp, as well as a collapsible folding version of the Harp. As I made several attempts to build this frame, my ideas and interests shifted.

Eventually, I found a way to put my tinnitus down on paper. In doing so, I began to deal with a very different type of grain. *Masking Songs,* begun in 2019 and only perhaps concluded in 2024, is a collection of notated, graphic, and text scores that represent my curiosities around the way Tinnitus makes us hear the world, in a most direct and specific way. Unlike *Composing the Tinnitus Suites* and virtually all of my previous experiments with the Lady's Harp, wherein intuition and invention guided my processes, I was looking for a new way to work, so I began with material I found in articles and journals on Auditory Neuroscience. The score outlines these concerns for its interpreters in its introduction:

> "*Masking Songs* deals with the principle of auditory masking, in which the perception of a sound is affected by another sound. In lieu of a medical cure for tinnitus, auditory masking/suppression is one of the means for attenuating the perception of phantom sound. However, depending on what one is trying to mask, from the sounds of the acoustic world to the phantom sounds of tinnitus, the means of sound occlusion are formally distinct. Obfuscate and discover the

conscious music-making activity of other players. The primary goal is to achieve suppression and "unveiling" of sound you create."

I discovered the principle of *Suppression* through reading Pawel Jastreboff, famed researcher in the field of tinnitology. On the whole, the principle of auditory masking is explained by the "critical band" principle, a psychoacoustical concept which describes ranges where sounds can interfere with each other. However, in people with hearing damage, critical bands are shifted or absent. This phenomenon is emphasized with tinnitus, which after much experimentation, has been proven to not respond to the critical band principle, unlike all sound in the acoustic world. Jastreboff explains this critical revelation as follows:

> "Contrary to the masking of external sounds, it is possible to abolish the perception of tinnitus sounds by pure tones of a similar intensity regardless of their frequency (Feldmann, 1971). This proves that "masking" of tinnitus does not involve a mechanical interaction of basilar membrane movements, does not depend on the critical band principle and, therefore, has to occur at a higher level within the auditory pathways. Consequently, the elimination of the perception of tinnitus by another sound should be labelled suppression rather than "masking," as is commonly used. Unfortunately, Feldmann's fundamental discovery has been widely disregarded, resulting in focusing attention on masking rather than suppression and in producing tinnitus instruments tuned to the dominant perceived pitch of tinnitus."[143]

[143] Pawel J. Jastreboff and Jonathan W. P. Hazell, eds., "Introduction," in *Tinnitus Retraining Therapy: Implementing the Neurophysiological Model* (Cambridge: Cambridge University Press, 2004), 1–15, https://doi.org/10.1017/CBO9780511544989.002.

In fact, the players of *Masking Songs* confront this preceding quotation of Jastreboff on page two, as an introductory text, before the music begins (if they make the time to read it, that is). The entire score is meant to be something to get lost in, from the quotations to the text poems, including the graphics, and finally the score, it's designed to encounter its players, with the hope that they might think differently about hearing in general after engaging with it. Jastreboff's fundamental idea—that tinnitus itself is fundamentally different and thus unreachable by sonic means—is a revelation for a composer like myself, seeking to scarify the tinnitus directly through feedback or sonic remediations. The notion of "producing tinnitus instruments" has a poetic and personal tint to it that I cannot ignore. When I invented the Lady's Harp, I was of course also unaware of Feldmann's fundamental discovery. If I were to invent it after knowing this—how would it be different? Or, what would a more appropriate *tinnitus instrument* look and sound like?

In *Masking Songs*, I applied these principles of neuroscience to a variety of notation techniques and improvisatory strategies. The effect is a constantly shifting state of foreground and background, in which instruments in the world of the piece veer from signal to noise constantly. I had been working with tinnitus for a long time, but I began to feel that the twofold principles of masking and suppression were related, though distinct in both the acoustic and perceptual realms, and I grew very curious about creating musical situations where these sensations could be dealt with in a very plain way. As my concerns were becoming less personal, it seemed to me very appropriate that at least in the onset of the work I should create open notations that could create a variety of tinnitus situations—and at the very least that would confirm to me later whether I had

succeeded, if it felt like tinnitus music nonetheless. Thus, in *Masking Songs,* the original concept for the group of pieces was for any assemblage of instruments.

I began to compose a series of text scores. These short poems were meant to be structures for improvising, for example, *Simultaneous Masking* and *Suppression*, in which players would express sounds as they would in normal improvisation, but also use the content and volume of their music making to conceal and unveil the sound-making activity of other players. My first efforts revealed dynamic marking was critical for this piece to work. Restricting volume to a maximum level of *mezzopiano* meant that it was quite possible to create a sensitive space—the louder players played, the less likely they could observe minute changes in sound making intention. I noticed, however, as I was composing these little text prompts, that I didn't know whether or not I could control my performers' attempts to embody the spirit of the composition. I hoped to guide my performers to think about the experience of masking, and to put it into their music. Could I be sure that they were improvising this way? I could not tell, and though it seemed that different players took away an intellectual residue from my pedagogical attempts to explain the piece, this wasn't the way I liked to sit down and improvise with other performers. I also noticed that many of these pieces seemed formally similar. Possibly, each new section may have a single parameter altered from another previous prompt—for example, "the cocktail party effect", shares the seat placement arrangement from the previous piece, "contralateral masking". In each piece, seating arrangement creates micro groups in an ensemble that occludes and engenders particular groupings of sound.

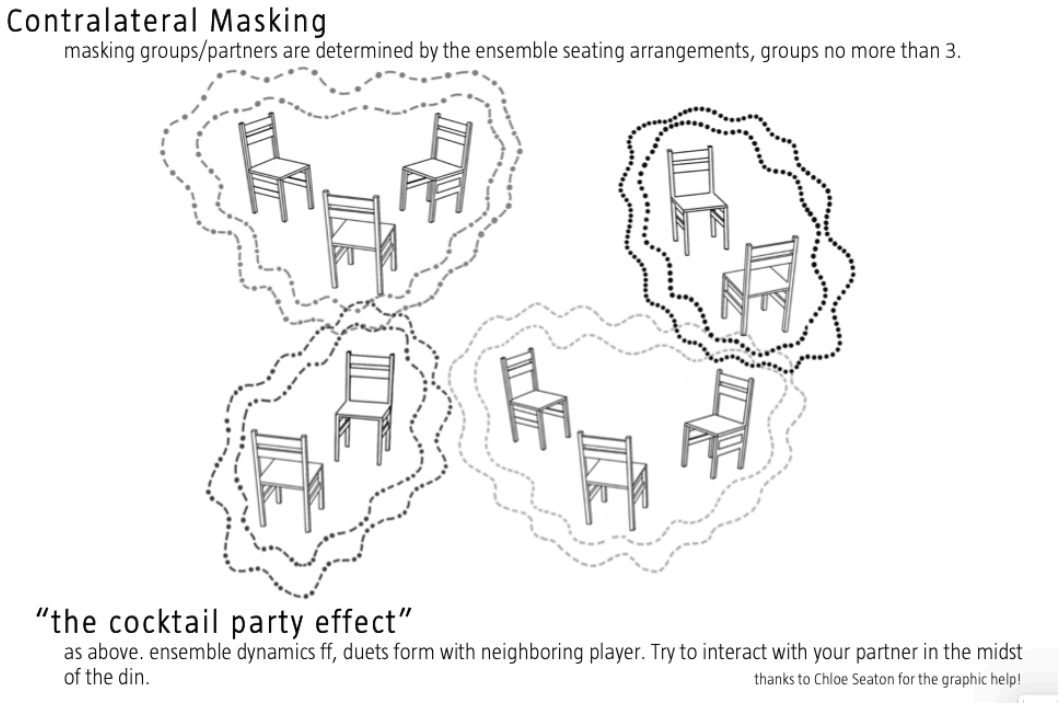

Figure 58: Excerpted selection of Masking Songs

The total collection of Masking Songs abounds with these little text scores. Like the historical text scores of the avant-garde, I imagined these suggestions to be more like prompts for improvisation, and couldn't really imagine staging these works without performing them myself, alongside other musicians, who would take my provocations about listening to heart. Furthermore, I didn't conceptually require that my performers had tinnitus, per se—In fact, my intention and curiosity was to musically explore *suppression* and *masking* as a way of covering up sounds with sounds. Tinnitus happened to be a place where "rubber meets road" in experiencing these audiological concepts, per se. But I was beginning to include the perception of tinnital sound into a larger class of perception of sound in general.

My attention to the threshold of perception led me to research another historic avant-garde work. *Threshold Music*, composed by Richard Teitelbaum in 1973, is a

series of works in which the performer(s) examine the limits of sound perception. The score, also a series of text prompts, reads, “Listen to the environment you’re in and attune yourself to it. Long sustained sounds on an appropriate instrument…play the environment until it plays you.”[144] Teitelbaum also revisited this piece later in 2013 at a concert series called Relevante Muzik in Berlin supported by the DAAD foundation, organized by Volker Straebel—excerpted below are some relevant program notes from the presentation:

> “I started doing Threshold Music in 1973 while living for a year in the remotest, and quietest place in which I've ever stayed. I was teaching in the northern suburbs of Toronto at York University. About 30 miles further north, in the township of Guilford, there is a flat valley, two miles wide by three miles long, and our small cabin was located near the center of this quasi-parabola, which seemed to focus the sounds around down towards our home.
>
> Several miles away to the west was Highway 400, the main 4-lane road heading due North. On those long, cold, winter nights the sound of the cars and trucks on that road would come to us very faintly, filtered by the low lying hills around the valley, and I would listen to that gorgeous threshold of sounds for many hours. Gradually I would try adding other sounds to it, matching the loudness level of the distant road as closely as possible so it was often impossible to identify the road sound separately from what I was playing. Often I used a largeish bowl-shaped Japanese temple bell, rolling faintly on it with soft mallets. Sometimes I

[144] Richard Teitelbaum*, Threshold Music*, 1974, Teitelbaum archives, (unpublished)

played my Moog modular synthesizer, tuning the oscillators and filter to match the waveforms of the distant auto motors."[145]

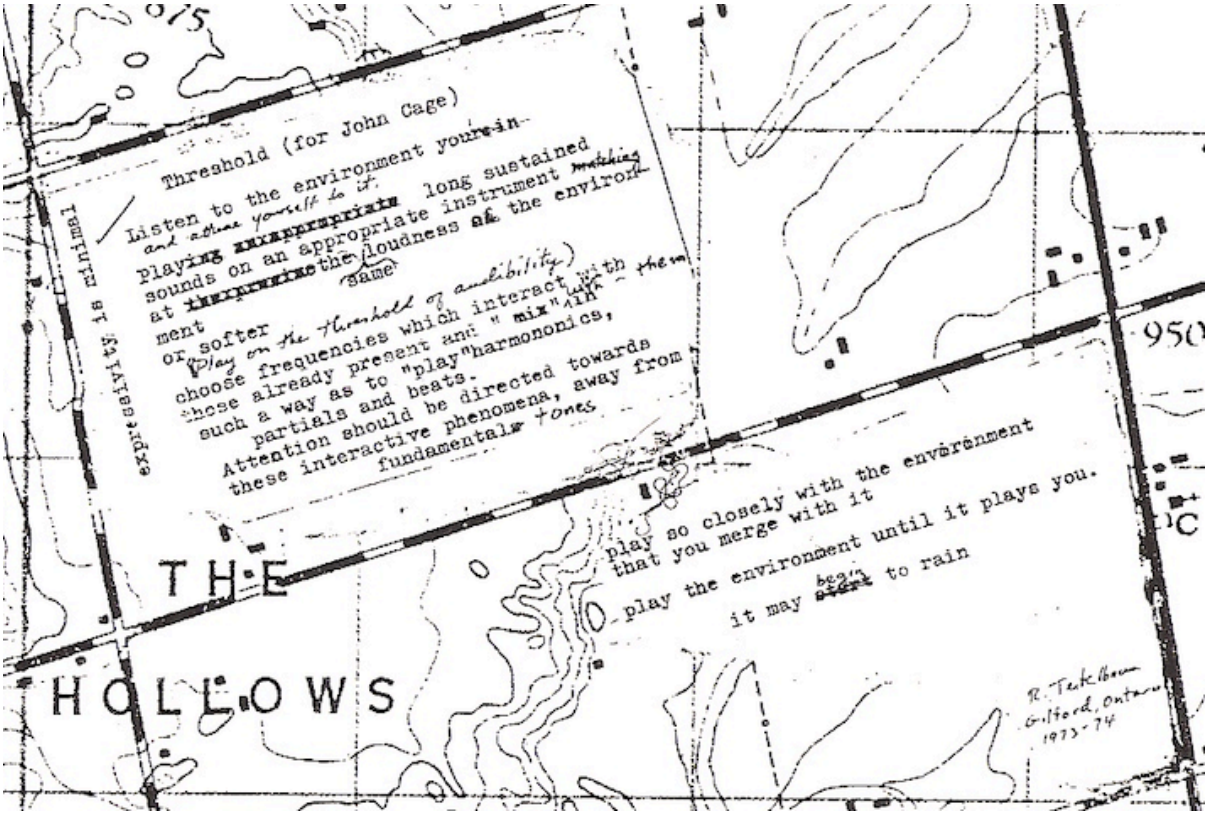

Figure 59: Threshold Music excerpt. The score is superimposed over a map of Gilford, Ontario, one of the quietest places the composer had ever heard.

Teitelbaum wrote over the years about this piece, trying it with his legendary trio MEV for a time, later incorporating it into student ensembles at Bard over the years, and returning to it consistently in his personal solo practice. Describing the piece to Walter Zimmerman, Teitelbaum commented, "I think that it's in a way the most personal music that I've ever done, the most intuitive and instinctive, the closest to me. Actually it's a kind of activity that I've been doing subconsciously for years, like humming almost

[145] Freunde Guter Musik Berlin e.V., "Relevante Musik: Festival Politischer Medienkunst, Performance Und Musik," accessed December 15, 2024, https://fhein.users.ak.tu-berlin.de/Alias/Geschichte/Konzerte/2013.07.20b-RelevanteMusik_Teitelbaum.pdf.

inaudibly with the drone of my car motor, or a fan in an elevator or whatever. Sometimes I think I could do nothing but that. But then again perhaps it's so hermetic and personal that it's too introverted. So I keep doing other musics like playing with MEV and other musicians."[146]

This idea of "personal music" bears repeated emphasis. In fact, Teitelbaum was also my first composition mentor as an undergraduate at Bard College—his class *John Cage and his World* as a freshman in college left an indelible impression on my musical awareness. Even further, Teitelbaum was perhaps the first composer in whom I had confided about my tinnitus, which I developed around the end of my college career. Richard had also suffered from tinnitus for many years, and, many decades older than I, confused and challenged my youthful spirit with gentle questions like, "does your music always have to be so loud?" At the same time, Teitelbaum never proselytized his own music, preferring to work with his students' ideas rather than his own. My entire awareness of his piece *Threshold* (and, in fact, all of his music) came much later, after he died. I was already at work on the *Masking Songs* and when I discovered *Threshold*, and I began to compose a tribute to him in my songbook, inspired by the magic that can happen at the threshold of audibility.

There are some aesthetic disconnects between the Masking Songs tribute for Richard, and the original piece by Teitelbaum himself. The essence of Teitelbaum's piece is to listen to the acoustic environment in which you are playing—it is the real "score" to his piece, in his own words, not the poetic text pieces that exist in history: "since the sound of the immediate performance environment is actually the score, I

[146] Walter Zimmermann, *Desert Plants: Conversations with 23 American Musicians*, 1st ed (Vancouver, B.C: Zimmermann, 1976).

generally try to write it out after hearing the space". Teitelbaum's notations seem more like remnants of an event than a sonic prescription. To merge with the environment, one listens and interprets these sounds on one's instrument, reproducing hums and whispers that one hears. Yet a curious phenomenon happens in quiet spaces: "The softer the room, of course, the harder it is to perform."[147] The sounds you make transform the environment so critically that it becomes hard to play in it without commanding too much attention to yourself. As such, Teitelbaum often realized this piece using field recordings, blended and filtered extremely subtly, to influence his players, and to allow them to play more fully and loudly without "disturbing" the environment. My tribute to Teitelbaum, *Thresholds Again,* literalizes this encounter, by allowing each performer to record their sounding environment as part of the rehearsal process, to build up a mass of signal/noise on top of which they can decide to mask or be masked:

Thresholds Again

Do not practice this song in advance—wait until hearing the sounding environment—concert hall & associated architecture—such as halls, foyer, and outside the venue.

Begin to record this space, using a variety of field recorders. Make sure no voices or intentional sound is on the tape—try to focus on the resonance of the spaces surrounding you. Tapes can be of any length. Explore different gain structures, even different EQ, try to hear the range of sounds inside the space.

Play back these sounds in space using one speaker per recorder. Dynamic range can vary, or be manipulated live. Ensemble improvises inside this texture at the threshold of audibility. Louder tape part encourages ensemble to play more freely (loudly).

Figure 60: excerpt from Masking Songs: Thresholds Again

Does Teitelbaum's piece have anything to do with tinnitus? Does one's acoustic environment have anything to do with phantom sound? Speaking to Randy Reine Reusch, Teitelbaum asserts that in Threshold, "My idea was to stimulate auditory

[147] Zimmermann.

hallucinations."[148] Tinnitus in its simplest terms is just that—a sonic hallucination. It seems plainly clear that listening to the perimeters of perception causes a kind of autopoiesis wherein listening creates *itself*—the sounds of the environment influence the sounds of the players, and the experience of tinnitus affects the choices of the composer.

But, there's something else at play. Years later, as I sit and write about both of these pieces, I can't help but remember something Alvin Curran said to me, during a rehearsal of Threshold Music hours before performing at Teitelbaum's Memorial Concert at Roulette, in 2022. For our ensemble, composed of Curran, myself, Matt Sargent, Leila Bourdreil, and Miguel Frasconi, I had prepared (with Matt Sargent's help) a careful field recording of Teitelbaum's quiet backyard, with wind blowing and birds chirping, which I played into the concert hall to increase the ensemble's dynamic range. But in rehearsal we were somewhat stymied by the philosophical abdication of Teitelbaum's text-score's direction. Curran, an old collaboration of Richard's, offered some succinct advice: "Richard never would have invited people to come together on stage in order to do nothing." The idea was that the philosophical concept of the piece was just its gestation—the real world sonification of *Threshold Music* is still very much about making music with people, and listening to each other.

Teitelbaum may have indexed this problem himself when he criticized his own piece as "hermetic and introverted", in speaking with Walter Zimmerman. Indeed, I encountered some similar difficulty back in 2019, as I began collecting the first anthology of text scores that comprised the many Masking Songs. For, while these text

[148] Randy Raine-Reusch, "Integrating Extremes: The Music of Richard Teitelbaum.," *Musicworks* Number 85, no. Spring 2003 (n.d.): 41–53.

scores share the philosophical zeal of the hermit, they also pose real uncertainty about how to realize them when actually sitting down with musicians.

3.3 Unmasking the Daxophone

Around the same time, I began to feel that these text scores were missing something, a new direction resulted from a commission from Science Ficta, a viola da gamba consort with a particular interest in modern music. I was faced with the opportunity to write notated music for an ensemble who I wouldn't get to work with for very long. I had worked with them briefly, in 2018, for my colleague Cleek Schrey's piece, *Zones*, so I knew they were curious and game for experimentation—for the daxophone, too. But, do the players know *me*? Do they care about tinnitus? Have they taken any time to read the introductory quotes? Have they studied my music? Is anyone getting paid enough to have a serious conversation? And, would that conversation produce musical results you could hear? I realized I could not take these questions for granted or even that I would have time to answer them. Rather than prime my collaborators for my philosophy about listening and trying to "steer" the improvisations resulting from a text score, I could simply try to get very clear about what a "masking etude" could be—and notate it carefully with western techniques.

Thus, *Excitation Patterns* emerged, for three gambas and three daxophones, performed by myself and my Daxophone Consort (DF, Ron Shalom, Cleek Schrey). Subsequent pieces in the Masking Songs saga have focused exclusively on notation, eschewing the text score, and getting deeper into systematic relationships of pitches, noises, and silence. Though I have mentioned my desire to treat this commission as an

opportunity to just make *Masking* work “on the page”, it’s important to note that I had “stacked the deck” from the outset: Half of the performers were players that I knew well and had worked with for many years. Furthermore, they were playing my own daxophones. Of course, this is what good musicians have done for many years in a simple way: working together with musicians who understand each other, who are intimate with each other’s ideas, produces telling results.

The way *Excitation Patterns* works is by contrasting a rotating soloist against the ensemble on instruments, which repeatedly uncover or cover the soloist through crescendi and decrescendi. Each player takes turns being a soloist, following their number in the score, reading the first line of each system, whereas “E” represents the “ensemble” notation. Each system is set up like an experiment for three measures, with the soloist as the control group, and the ensemble as the test, to see what dynamic transformations can reveal.

I first began to set aside materials I found compelling on both the gamba and the daxophone: clear, pitched arco tones, scratchings, whispery pitched noise, high friction tones, “stirring” and col legno bowing. I created a gamut of pitches stemming from Cage's *String Quartet in 4 Parts* for the Gamba pitches. For daxophone pitches, I utilized Anthony Braxton's "Diamond Clef," which simply means a clef where "C" can be played relatively anywhere on the staff, allowing free transposition to any key. Thus, we daxophonists could use relative pitch freely as we played and harmonize with the ensemble. This was an intentional choice primed for the chaotic tuning reality of the daxophone. I have attempted to clarify this aspect of the daxophone extensively—anyone who knows the instrument, knows how hard it is to find the notes from tongue to

tongue. This sentiment is also well explained by Molly Herron, who interviewed Cleek regarding his experience working with The Daxophone Consort extensively for her PhD dissertation. She writes:

> "One of the characteristics that came to the fore in the daxophone ensemble, is the relative pitch relationships of high, middle, and low. The idea of working with relative pitch has been of interest to Schrey for a long time, stemming from his early interest in the indeterminate scores of Morton Feldman, but it was only through the daxophone that practical experience of relative pitch clarified for him. The daxophone performer achieves pitches by applying pressure to the wood with the dax. Specific pitch can be achieved, but pitch isn't physically organized on the instrument like the piano or guitar. This nature of the instrument immediately makes relative pitch a prominent aspect of the performance experience[149]"

The daxophone is perhaps even more relative than Herron is suggesting. Considering that every tongue is different, then, the notes are not logically organized from high to low *on a single tongue*. And then, even further, every daxophone tongue's pitch groupings are distinct from each other.

Beyond the diamond clef, I also began to notate pitch ranges with square noteheads, to notate pitchy or noisy areas on a dax tongue that wouldn't intonate discretely or including multiple potential pitches a player could select on a particular passage. In another sense, however, the diamond clef was carefully chosen for my two

[149] Molly Maclin Herron, "Composing with Musical Instruments: Physicality and Instrument Intervention in the Creative Process" (PhD Dissertation, Princeton, NJ, Princeton University, 2001), http://arks.princeton.edu/ark:/88435/dsp01rb68xf989.

daxophone collaborators: I knew from experience what kinds of pitches Cleek and Ron would pick when faced with certain kinds of harmonies, and I composed on the Gamba to “excite” certain “patterns” of responses. Armed with a set of material and a collection of dynamic translations, I began to think about how to work through this material.

For this matter, I borrowed a page from Alvin Lucier. In fact, the Consort had commissioned Lucier to write a piece for daxophone[150]; this was no straightforward process, and the piece evolved considerably over the course of our many rehearsals together. During these rehearsals, Lucier revealed to me some of the ways he dealt with materials, specifically, explaining a way he took arbitrary number sequences and applied serial techniques to them.

1	**2**	**3**	**4**	**5**	**6**
4	**3**	**5**	**2**	**6**	**1**
2	**5**	**6**	**3**	**1**	**4**
3	**6**	**1**	**5**	**4**	**2**
5	**1**	**4**	**6**	**2**	**3**
6	**4**	**2**	**1**	**3**	**5**

1	**2**	**3**	**4**	**5**	**6**
3	**4**	**2**	**5**	**1**	**6**
2	**5**	**4**	**1**	**3**	**6**
4	**1**	**5**	**3**	**2**	**6**
5	**3**	**1**	**2**	**4**	**6**
1	**2**	**3**	**4**	**5**	**6**

Figure 61: Alvin Lucier's serial "row", adapted for Masking Songs, with my modification on the right.

The concept is simple: Lucier picks a length for his row, and begins by counting up from 1. The next row begins in the middle, and them leap-frogs back and forth from the middle number. So, the sequence 1 2 3 4 5 6 begins in the middle, at 4, and jumps between adjacent numbers (down one to 3, up one to 5, etc), and continues the

[150] This piece, *Hard Wood*, was premiered at Issue Project Room in 2019. consists of four players who tap daxophones, not using bows or daxes, thus exploring the resonance and tone quality of the tongue in a purely rhythmic manner without embellishment. Lucier’s piece stripped the daxophone to its most minimal essence.

sequence until the row begins again at 1 2 3 4 5 6.[151] I also made my own pattern, by jumping up a number instead of down a number, which had the curious result of ending every statement with a 6. The effect of this, for example, when mapped to dynamics, means: 1: ensemble enters alongside soloist and decrescendos; 2: soloist enters first and ensemble crescendos dal niente; 3: ensemble crescendos and then decrescendos; 4: ensemble enters alongside soloist, fades out and then fades in; 5: soloist plays alone; 6: only ensemble plays. Using my own pattern comprised the entire dynamics for each six pages, with the result of the "chorus" ensemble ending each sequence.

I found these numerical relationships a simple way to organize the total musical material for the piece, though I didn't apply them strictly. It was simply a way to answer questions about what occurs when, without relying merely on my own intuition or "improvising while composing" as often composers are wont to do. The result was a kind of watershed moment in the Masking Songs collection—I was able to create, simply, these sequences in dynamics and perceptions for other players to command.

[151] This technique extends an oft quoted exchange between Lucier and Rzewski, who was wondering why so many of Alvin's pieces just have simple rising and falling glissandos: "Frederic Rzewski, he said, "Alvin, you should change the pitch of the oscillator with your hand. Play it with your hand." What good does that do? If you change it, you made a relationship. You have to change it again. I'm not interested in relationships in that way." Alvin Lucier | Red Bull Music Academy," accessed March 23, 2024, https://www.redbullmusicacademy.com/lectures/alvin-lucier-lecture.

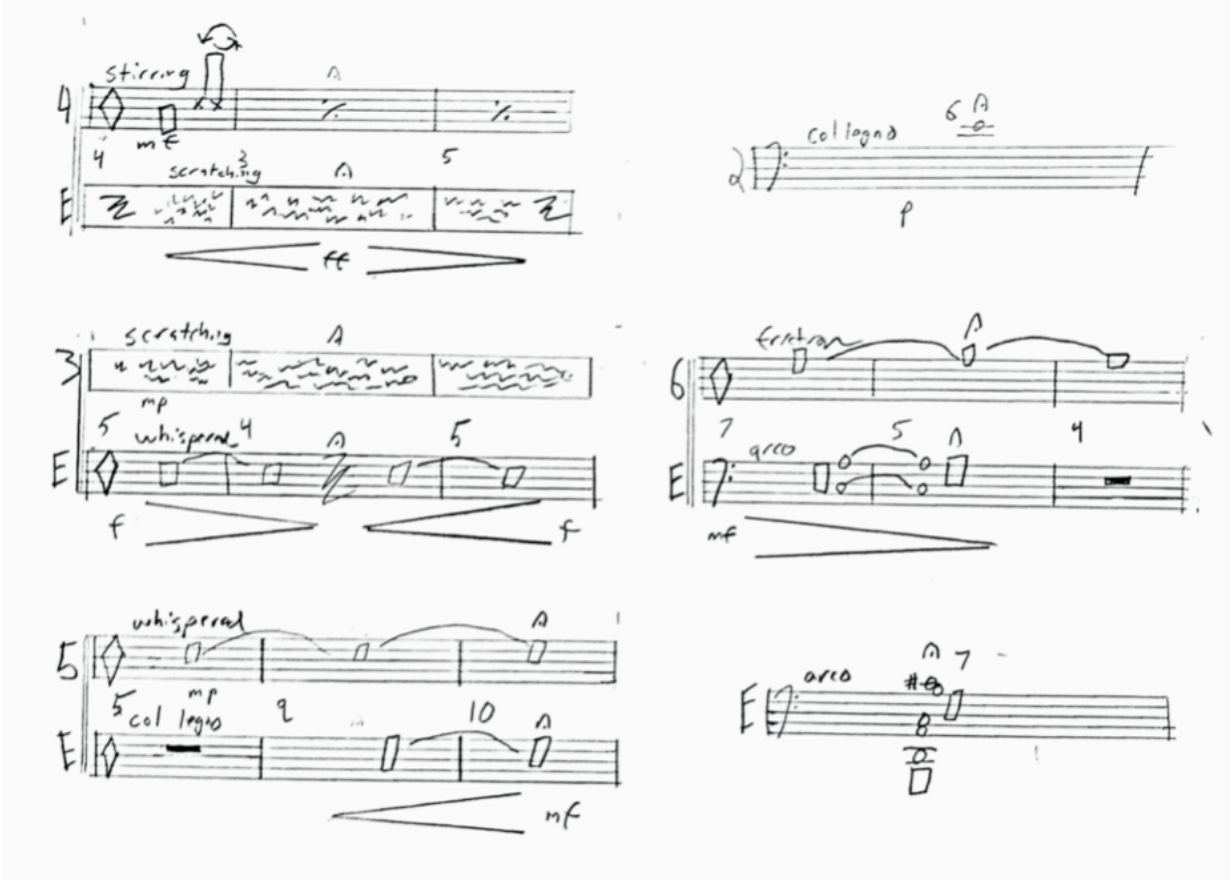

Figure 62: Excerpt from Excitation Patterns (2019) from Masking Songs

This piece was composed quickly on paper. I look at it now and reflect that my penmanship was not up to standard at this point in my career. Rather than revise it, I continued to preserve the palimpsest aesthetic of the composition. I would also be tempted to iron out the performativity of a piece like “the cocktail party effect,” for different reasons. Better to include them all, warts and all—I suppose Masking Songs is more of a record of hypotheses than any particular thesis statement. One primary test for the entire collection was whether *other people* could perform “tinnitus music”, and in notating Excitation Patterns, I believed that I had made a step forward. In addition to concertizing this piece myself, a few other ensembles staged readings of Masking Songs on their own accord. I reasoned that while the piece had plenty of spirit in it left to

intuition, if my experiment was correct, I'd hear what I composed whether I was there or not to supervise. One such example was performed at "Barely there: A concert of quiet music", an event that occurred in the immediate aftermath of the Covid Lockdown in 2021, at Georgia Southern University. Watching on Zoom, the ensemble was playing the right notes, but it still didn't sound right compared to the recordings I had made with my Consort. I realized that the daxophone was an important container for the ideas I was working on, and, like so many traditions of music making, I would as a composer nevertheless have to be present to perform my own music with an ensemble of my choosing.

Some years passed. I went to the anechoic chamber. I returned, unscathed, but troubled. Later, in 2023, almost three years later, I went on to compose a second notated piece in the Maskings Songs saga, *Off Center Frequency Listening.* This piece took the existing schema but complicated matters in several ways. I continued with the discoveries of my previous sextet, this time, bringing down the number of players to five: three daxophones, plus fiddle and contrabass, Schrey and Shalom would serve double duty. I wanted to be more deliberate about pitch materials. An article I found presented an interesting solution: a chart of different patients with tinnitus who had transcribed, with the help of technicians, the particular frequencies they heard.[152] This was interesting to me. The issue of insularity and tinnitus has always dogged my research agenda. In some ways, this is a formal concern: no one can hear my own tinnitus but me. And, hearing loss has a way of isolating people: chasing them away from restaurants and ecstatically loud rock concerts for fear of annoyance or further damage.

[152] Philippe Fournier et al., "Comparing Tinnitus Tuning Curves and Psychoacoustic Tuning Curves," *Trends in Hearing* 23 (October 7, 2019):, https://doi.org/10.1177/2331216519878539.

#Patient	Age (years)	Sex	Tinnitus matching	Tinnitus width (Hz)	Tinnitus laterality	Tinnitus duration (years)	Tinnitus frequency (Hz)	reduced by 1/2 octaves	Tinnitus equivalent level (dB SPL)	TTC type	PTC type	TTC–PTC at F0 (dB)	Note	Octa	¢ dev	Microtone
1	46	Female	Tonal	1	Unilateral	2	2100	262.5	26	Flat	V	21	C	7	6	
2	44	Female	Tonal	1	Unilateral	15	1575	196.875	1	Flat	U	10	G	6	8	
3	Missing	Female	Tonal	1	Bilateral	8	1300	162.5	43	Flat	U	8	E	6	-24	
4	65	Female	Tonal	1	Bilateral	2	200	25	49	Flat	Flat	6	G	3	35	0.25
5	42	Male	Noise	800	Bilateral	5	2000	250	28	Flat	V	53	B	6	21	
6	72	Female	Noise	785	Bilateral	1	2000	250	1	Flat	U	34	B	6	21	
7	46	Male	Noise	300	Bilateral	Missing	1150	143.75	55	V	V	8	D	6	-37	-0.25
8	Missing	Female	Noise	800	Bilateral	1	500	62.5	30	Flat	Flat	−12	B	4	21	
9	46	Female	Tonal	1	Bilateral	19	4300	537.5	45	Shifted V	Shifted V	16	C	8	47	0.25
10	40	Female	Noise	600	Unilateral	14	5500	687.5	17	Shifted V	V	46	F	8	-27	-0.25
11	54	Female	Noise	400	Bilateral	5	6200	775	34	Flat	V	24	G	8	-20	
12	73	Male	Noise	400	Unilateral	1	6500	812.5	43	Flat	U	21	G#	8	-38	-0.25
13	61	Female	Noise	300	Unilateral	5	5000	625	41	Flat	V	15	Eb	8	8	
14	61	Male	Noise	600	Unilateral	4	6200	775	65	Shifted V	Shifted V	9	G	8	-20	
15	19	Female	Noise	700	Unilateral	2	3700	462.5	61	Flat	V	9	Bb	7	-14	
16	62	Female	Noise	800	Bilateral	12	4000	500	70	Flat	Flat	2	B	7	21	
17	63	Female	Tonal	1	Bilateral	8	2700	337.5	11	V	V	−3	E	7	41	0.25
18	68	Female	Tonal	1	Unilateral	20	6000	750	70	Flat	Flat	−8	F#	8	23	
19	74	Male	Tonal	1	Bilateral	20	6400	800	81	Flat	Flat	−10	G	8	35	0.25
20	55	Male	Tonal	1	Unilateral	0.3	8200	1025	57	Shifted V	Shifted V	19	C	9	-36	-0.25
21	36	Female	Tonal	1	Unilateral	1	11200	1400	51	Flat	Flat	3	F	9	4	
22	60	Male	Tonal	1	Unilateral	5	6650	831.25	67	Shifted V	Flat	1	G#	8	1	
23	50	Female	Tonal	1	Unilateral	20	8400	1050	98	Flat	Flat	1	C	9	6	
24	23	Male	Tonal	1	Unilateral	2	6800	850	35	V	V	1	G#	8	40	0.25
25	Missing	Female	Noise	700	Missing	Missing	6800	850	49	Flat	U	32	G#	8	40	0.25
26	43	Female	Noise	1300	Unilateral	1	7300	912.5	48	Flat	V	3	Bb	8	-37	-0.25
27	67	Male	Noise	400	Unilateral	20	8300	1037.5	59	Flat	Flat	2	C	9	-15	
28	39	Male	Tonal	1	Unilateral	3	8000	1000	46	Flat	U	0	B	8	21	
29	61	Male	Tonal	1	Bilateral	11	8900	1112.5	46	Flat	Flat	−1	C#	9	6	
30	54	Male	Tonal	1	Unilateral	1	9100	1137.5	86	Shifted V	Shifted V	−2	C#	9	44	0.25
31	56	Male	Tonal	1	Unilateral	0.1	7400	925	49	Flat	V	−4	Bb	8	-14	
32	40	Male	Noise	160	Bilateral	1	10600	1325	14	V	V	−3	E	9	9	

Figure 63: Data derived from " Comparing Tinnitus Tuning Curves and Psychoacoustic Tuning Curves"

Now, I had the chance to think about *other people's tinnitus*, not merely my own[153]. This was an imperative to me, ever since I began making tinnitus music that didn't use my own tinnitus instrument, the Lady's Harp. I extrapolated this spreadsheet of data from the article, Comparing Tinnitus Tuning Curves and Psychoacoustic Tuning Curves, and I added a frequency to note transcription, so I have a linear sense of where these pitches lied. Then it was a simple job to get these pitches onto the stave.

[153] My Essay, Charlie Haden's Earplugs, deals with a very focused account of the jazz bassist's approach to pursuing beauty in his music despite his struggles with hyperacusis and tinnitus. Daniel Fishkin, "Charlie Haden's Earplugs," *The Senses and Society* 19, no. 1 (January 2, 2024): 67–79, https://doi.org/10.1080/17458927.2023.2258617.

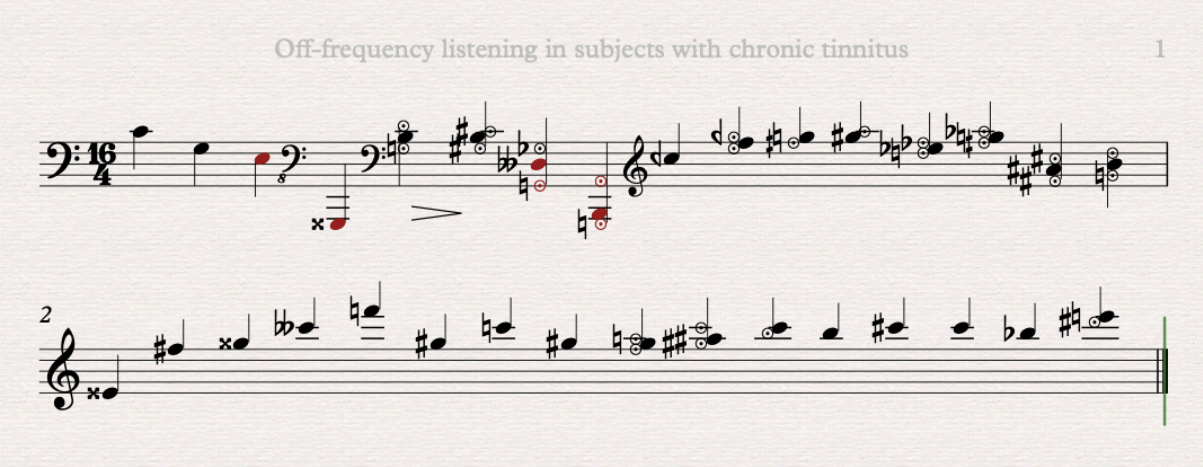

Figure 64: The Data from "Comparing Tinnitus Tuning Curves" converted to staff notation.

The next step was to formalize my notation strategy. Since 2019, I had spent more time working with digital notation—I simply realized I was better at graphical design than pen and paper. But the basic structure of soloist over ensemble, and the gamut of techniques I was using, remained. The basic schema of masking sounds with other sounds, or through attention, remained. One big difference now was that the specific content of the music's pitch set was determined by this tinnitus tone row. Another important difference: I was composing for a single ensemble, not using a gamba trio as a foil for the dax trio. I had worked with Ron and Cleek for almost ten years at this point, so I knew how their instrumental resonances fit alongside the daxophone, and I knew they'd be very serious and uncompromising when reading with their violins.

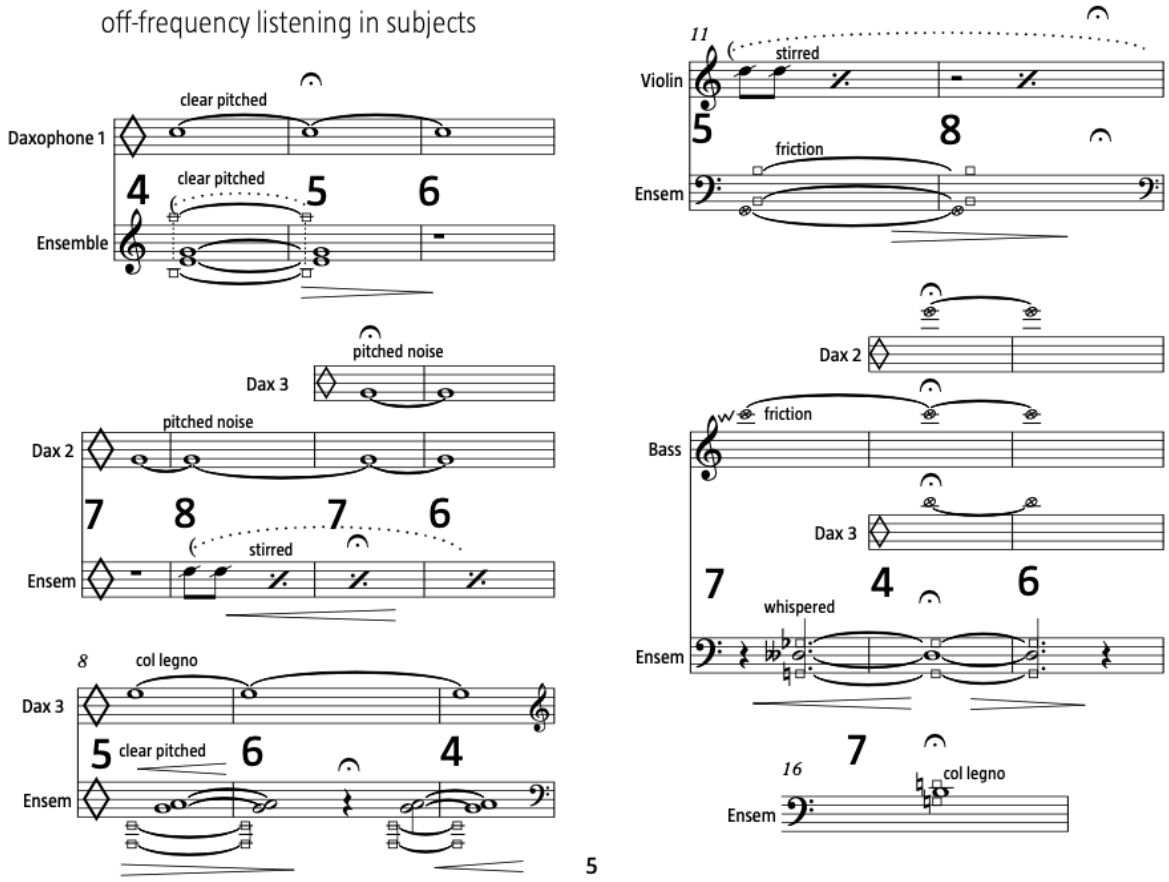

Figure 65: Off Frequency Listening in Subjects, page 1

During a “mini-retreat” at the Watermill Center in January 2023, where we had spent many cumulative weeks over the years for multiple residencies, I gathered the trio to record the piece in a series of overdubbed takes.

To some degree, the number five deserves mention. I returned to that serial numerology I had extrapolated from Lucier’s technique, for I found it made reading through material make sense, in an easy and free way.

1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3 4 2 5 1	3 2 4 1 5	3 2 4 1 5
2 5 4 1 3	4 2 1 3 5	4 1 2 5 3
4 1 5 3 2		2 1 5 4 3
5 3 1 2 4		5 4 1 3 2

1 4 3 5 2
3 5 4 2 1
4 5 2 3 1
2 3 5 1 4
5 3 1 2 4

Figure 9: Alvin Lucier's serial "row", adapted for Masking Songs, based around the number 5.

Changing the number to five produced a few possibilities, because the sequence was no longer odd. I could “go up” or “go down” or “go both ways”, yielding three distinct patterns that provided me sufficient variety without retrograde or inversion. “Sticking to the script” of my previous notations in the Masking Songs arc proved interesting. Soon I was totally exhausted and frustrated by my own rules, so I broke them. I included “solos” for each daxophonist in the form of graphical notation. Another such cleaving was the final page, wherein I disregarded all crescendos and decrescendos, and all sequences of extended techniques, and instead focused solely on pitch. In this section, I included, finally, my own pitches derived from Tinnitus Journal—my tinnitus breaks through and joins the “study participants” to sing along with them.

3.4 Conclusions

When composers write about our own work—say, for a PhD dissertation—we have a funny problem. We attempt to explain, but in sharing, do we risk ruining the power of music? I worry that I’ve gone too far into the weeds, as it were, to explain some of the formal and contextual realities in this chapter. And I had desired to *zoom in* on my tinnitus, which I have done through very different means. Now, please allow me to zoom out.

The *Masking Songs* collection is a palimpsest, for as I composed it, different ideas and techniques emerged. It spans a wide range of thought and musical activity—it isn't meant to be conclusive and isn't recorded as such. Some of the early text pieces were recorded or performed by other ensembles during the pandemic, even—I have found it difficult to remain enthusiastic about preserving and tracing the entire history of these performances. What I have discovered, at the end of it, is a more deliberate way of notating indeterminate music for daxophone that ties into my larger creative practice. Or, a way of writing for daxophone which is in dialogue with the instrumental realities of the daxophone itself. Also, I found a way to create music about hearing damage that doesn't involve the Lady's Harp and does involve the daxophone, which I had never found a way to bring formally into the Tinnitus Music saga, until now. In another way, I sought to compose and record music for the daxophone which sound nothing like Hans Reichel's tonal adventures. And this music also incorporates and thrives on a fundamental indeterminacy which is shared between the daxophone and tinnitus. At first blush that might seem like a stretch. But after all, listening to tinnitus is listening to the fundamental instability of one's own listening—it is a reminder that when we hear the world, it is always through a very personal filter.

Today, when I hear my ears ringing, I am reminded that my tinnitus has been a gravitational force in my life for a decade or so. My reactions to it—the ways that I live and the ways I make music against the grain of it—are changing with the years. Reading back through my master's thesis from Wesleyan ten years ago, I'm surprised by some differences in my sonic world. Back then, I couldn't practice music on my Lady's Harp for very long, because loud, immersive sound would wear out my ears, and

cause further aural fatigue. So I experienced some real conflict in the difficulty I took to set up my instrument, and how long I could actually spend sitting and playing it. This stray observation seems unfamiliar to me, today.

Indeed, the frustration of last decade seems mostly mulched over, for while my tinnitus is there if I go looking for it, I don't suffer the same degree of misophonia and hyperacusis that caused me to experience *life* and *music* so differently. It's possible that working with the Lady's Harp offered real sublimation for me. Back in 2016, in the 50 page grant application I submitted to the Pew Center For Arts & Heritage to fund *Composing the Tinnitus Suites: 2016*, a yearlong investigation into the Lady's Harp and its many related projects, I was clearly not interested in healing of any kind: "I have been asked whether my art functions as a kind of personal therapy. I feel good making what I want to make, but I don't believe that this project is about healing. The promise of music and its aesthetic potential is sanitized when relegated to a therapeutic modality. The aesthetic realm is the only place where solutions can be found."[154]

These old words, they come back, they assert themselves again. They ask me not to forget the way things were, when I think about how things are. This is important, because it is possible to paint too rosy a picture of my experience of hearing damage, especially now that I don't struggle with it on the daily basis, as I have in the past. And, it's too easy to confidently assume that everything is "normal" now, only to be shattered by an errant car horn, head cold, headphone accident, or whatever rips through the fabric of everyday and throws me back into a world of acoustic pain. But as my failed experiment in the anechoic chamber revealed, the quiet moments contain equal portent.

[154] Daniel Fishkin, unpublished (but successfully funded) grant application for Composing the Tinnitus Suites: 2016, supported by the Pew Center for the Arts & Heritage

For it is not only the loud sounds of the world that could trigger the painful return of these symptoms, but the quiet ones, if I allow them to affect how I perceive things.

I am reminded once again of You Nakai's succinct definition of David Tudor's understanding of a musical instrument, which I invoked in my introduction: an instrument consists of: "any *material* (usually physical, but not always) that can be *used* to realize a performance" (emphasis my own).[155] Until now, I've sought to link my two practices of composing instruments and composing Tinnitus Music by thinking carefully about material, or its absences, which define its limitations and therefore its compositional possibilities. Thus, the *material* links between the daxophone, the arbrasson, the Lady's Harp, and tinnitus seemed so fecund, for in every case the material made real decisions for all players, listeners, and composers about what to hear and when.

But now, this sentence reminds me of something different—something very different from David Tudor's composerly visions of circuits, concept, and control. For, I realize that an instrument is *used* to *realize* something. I wrote and repeated another phrase so many times it became like a mantra to me: "I don't want to get used to my hearing damage—I want to use it." But in *using* it, did I get *used* to it? And have I only just *realized* that—now? And then, what was the instrument that I used? Surely the Lady's Harp was instrumental in this nearly decade-long process of sublimation which led to experiencing my tinnitus—and all sound—once more without the panic I associated with fearing my hearing was being damaged. But perhaps my tinnitus was the instrument that composed me, that compelled me to do things with the objects I

[155] You Nakai, *Reminded by the Instruments: David Tudor's Music* (Oxford, New York: Oxford University Press, 2021), page 18.

have made. Perhaps my tinnitus led me to understand feedback as a formal and conceptual ingredient, in order to make an instrument about it, to embody itself in the real world, a neurological hallucination existing via feedback process inside my brain, hearing itself in the physical world through a feedback process inside an iron wire. And, when circumstances (in no particular order: herniated disc surgery; Covid; California; others pending assessment) led to abandoning the Lady's Harp, its heavy frame laden with so many transducers weighing a hundred pounds or more, all twenty feet of its extruded aluminum, its five flight cases full of amplifiers and mixers, its endless cables—my tinnitus found a new stage to play upon. And thus, perhaps my tinnitus was the instrument through which I realized something very different about the daxophone, that young instrument which is still growing and finding its voice in the world, still capable of defying its animal basis, of being something entirely different. And, perhaps my tinnitus, is not "gone", but just packed away for the time being, like a set of finely tuned bells, tucked away in a mildewed case under the couch, ready for the next occasion to come out and dazzle the room with its shimmering, sparkling ringing.

Conclusion: Deer Tick and the Kerf of Sound

4.1 Deer Tick…and the Kerf Sound

In the early days of Spring 2021, instrument designers Peter Blasser (based in Berlin, Germany) and Daniel Fishkin (based in Virginia, USA) convened on the internet for a series of conversations. This was also the reunion of their "soldering band," Deer Tick—a band which does not play live shows or even instruments, but rather solders circuits together. The directive of these talks was to explore the nuances of instrument building, and the intricacies of hearing, specifically through the intertwined conditions of tinnitus (ringing in the ears) and misophonia (hatred of sound). The flow of these conversations was continually interrupted by the listening of another mysterious inhabitant.

Nota Bene: You are only reading this chapter if you commence with a screening of the film, Deer Tick… and the Kerf of Sound. The film is the chapter.

This dissertation concludes with a collaborative film, made over Zoom, during the height of the Covid-19 Pandemic Lockdown. I was in the middle of my qualification exams. A year into the Pandemic, I had become immersed in the nascent culture of streaming concerts and Zoom-based art praxis. So, when I was invited to give an "artist-to-artist talk" by the American Composer's Forum, I thought, rather than having a simple Zoom streaming interview with a stranger I admired, that I'd make a movie with my friend Peter Blasser. I had already experimented deliberately with the medium, using the "streaming concert" as an occasion to hold a film screening—to show a film and call it a concert. For me, the most exciting thing to do with the setting of streaming was to do

something that resisted the deadness of the live streaming medium and instead embraced asynchronous transmission. So, I invited my friend Peter B to reunite our "soldering band", Deer Tick, to make a series of videos, knowing his own ambivalence to live concerts and how easy it would be to quickly make interesting content together.

We "shot" this film over a series of Zoom conversations, adding cinematography in the form of a few extra iPhones and GoPro video cameras to supplement our computers. Then, with over 5 camera angles and audio sources, we gradually began to shoot scenes in the form of unscripted conversations, which we decided would focus on instruments and topics through which we shared specific overlap. For example, Blasser discusses his solar powered instruments, the "Tocante", and tunes one with customized capacitors in front of the camera. In turn, I discuss our Solar Sounders project, which is a collaborative project begun by Blasser in 2017, and by 2020, I had invented several of my own circuits to add to our growing orchestra of solar-powered instruments. Also, Blasser has misophonia[156], which he describes as a "psychological rage" against certain sounds, whereas I have tinnitus. The neural pathways between tinnitus[157], hyperacusis, and misophonia[158] are clearly demonstrated by the field of auditory neuroscience. But we don't need the field of science to legitimize these connections, for the overlap is

[156] According to Blasser is, for him, "a psychological condition wherein he reacts uncontrollably to small, human sounds. A typical meal with Peter B will find him agitated and perhaps angry, because he is exposed to chewing sounds, Tupperware sounds, or bowl clinking. This condition leaves him stranded in most social situations, a captive of his own anger, who must seek the quiet dark closet at these most important moments. The upside of it, however, is its usefulness to the craft of synthesizer debugging, as it leaves him more attentive to the subtle variations of timbre and distortion and the mechanisms they imply. Misophonia is a rage directed at other people, but it is rare to feel rage at the sounds of a machine, an animal, or a child, whose sounds are "innocent".

[157] Pawel J. Jastreboff and Jonathan W. P. Hazell, *Tinnitus Retraining Therapy: Implementing the Neurophysiological Model* (Cambridge: Cambridge University Press, 2004), https://doi.org/10.1017/CBO9780511544989.

[158] Miren Edelstein et al., "Misophonia: Physiological Investigations and Case Descriptions," *Frontiers in Human Neuroscience* 7 (2013), https://www.frontiersin.org/journals/human-neuroscience/articles/10.3389/fnhum.2013.00296.

obvious to anyone who suffers from any of these conditions. Tinnitus, hyperacusis, and misophonia represent overflow: too much sound (tinnitus), too much volume (hyperacusis), too much feeling (misophonia). Furthermore, they are *subjective* phenomena—they are only perceived by the perceiver. Yet Blasser suggests that misophonia helps him listen to the nuances of synthesizers, too—his invocation and description of it represents a personal, albeit fraught, approach to listening that parallels my own experiences with tinnitus and hyperacusis. Clearly, we had much to discuss!

We determined that we would intentionally sit down and listen to each other's music—which, as this was billed as an "Artist-to-Artist" talk, fulfilled an important function for the audience, who might not know what our music sounded like. As such, early versions from the Masking Songs Saga and from the Tinnitus Suites saga feature prominently in this film. For Blasser, this was a tricky dilemma. Blasser is ambivalent to the production of songs and pieces, for he sees his instruments themselves as the main course. When I suggested we share each other's music, I fell into the role of curator, taking written fiction from his blog and asking him to read it aloud, which I later scored with recordings of his synthesizers I found on his website, sometimes padding the film with "b-roll" sound of previous pieces I had never found a place for in an album.

After amassing many hours of recording, the film was edited by Tyler Clapsaddle, a young artist with experience in filmmaking. It was important to work with someone a little more distanced from the material who wouldn't get lost in the details, as well as someone who could handle syncing all the disparate footage and audio.

4.3 The Inhabitant

One puzzling character that emerged from our discussions was, in Peter's words, "the inhabitant", a neighbor of his studio building who is disturbed by the interjections of others' sonic presence through music making or through talking. The inhabitant makes three appearances in the film. It's clear that this figure suffers from misophonia, like Blasser does. But their responses to misophonia seem both familiar and unfamiliar. Blasser says that this inhabitant was damaged by former days when the techno scene in Berlin was vital and active, and the inhabitant was forced to listen to much loud music through the floorboards. So this inhabitant now slams rhythms into the floor when they hear any sort of sounds—be they intended to be music or not—creating patterns that mimic the ghosts of the rave scene that disturbed them so much.

PETER: I guess the best musical piece I could ever do in my whole life would be to give this inhabitant *a drum kit*. If I could go up and bring a drum kit upstairs.
DANIEL: Well, why don't you just order it on Amazon?
PETER: And just have it sent? [beat] …straight upstairs. Yeah. And not even go there. Because actually, me going there might mess it up.
DANIEL: Yeah.
PETER: I want to respect this inhabitant as one who is damaged by the building. And respect this inhabitant as a musician too.
DANIEL: We're talking about misophonia now.

PETER: —And say, “you can use your rhythms to make music.” You know, there's, these are imagined sounds, there's imagined sounds, demonic sounds like club sounds coming into this inhabitants mind that they're presence. That they seem like they're coming *now*, even though they're coming from the past. So the inhabitant is reacting to sounds, memories of sounds that are heard *now*. But the inhabitant does think of themself as a musician.

DANIEL: Right.

PETER: A singer. So they have to combine.

DANIEL: Yeah. They need a microphone! They need the ghost of the past, and the premise of the future. But also, if someone thinks of themselves as a singer, they're also haunted. Because they're haunted by what they want themselves to be. Right.

PETER: Yeah, they're haunted by the lyrics of songs past.

DANIEL: Yeah. You're haunted by the kind of construction of a song.

Haunted by music—what better way to describe a individual who is compelled to live and listen a certain way by their tinnitus, hyperacusis, misophonia, or their drive to compose musical instruments? Later in the film, I sit down with Peter to listen to Masking Songs, taking time to describe the themes and function of the music as I had imagined and detailed in Chapter 3. During this listening, even though Blasser is

listening to Masking Songs with headphones—he begins to hear the rhythmic banging sounds of his neighbor once more. Blasser goes on to suggest that the Inhabitant's banging on the floor is an active form of masking. If the inhabitant is not only triggered by sounds but by the suggestion of music or presence, then this inhabitant reveals themselves as truly hyperacutic as well as misophonic—deriving displeasure from even very quiet sounds. We continue to discuss Blasser's idea to provide his neighbor a drum set—he says, if she had a drumkit, her banging sounds would cease to be masking and become music. I venture to suggest, then, that this would be expression, not "suppression" in the tinnital sense. In this regard, we see a real-world application and collision of the themes brought up in my *Masking Songs* series, wherein Masking presents us with boundaries—like the contrast of "signal-to-noise"—and a listener's refusal or inability to make music out of her symptom reveals its pernicious effects on her. Thus, this reveals the resultant range of emotions accompanied by masking: the inhabitant is *upset*.

Emotions can be hard to discuss in the hereafter. They are so urgent in the moment, and yet, so fleeting years later. Blasser is not perturbed by these deep emotions, nor by some kinds of sounds being dubbed as "not music". Rather, he suggests that making masking sounds has its own value, and that it's important to "nourish [his] anger, to let it grow." For a second listening session, we sit down to listen to *Composing the Tinnitus Suites: 2020,* the last "outing" of the Lady's Harp recorded the year prior to the Lockdown. After the piece, the fadeout reveals street sounds—ambulance sirens, and dog barking angrily. I sheepishly suggest I should have faded it out, but Blasser affirms that we need to hear the anger. Indeed, how frustrating to be

“locked in” to one way of perceiving the world—how frustrating to be stuck with a sound you can’t influence, that won’t go away.

But the hallucinations of this neighborly inhabitant are not as fixed as they appear. In the final appearance of the inhabitant, Blasser reveals he had suggested collaborating with the inhabitant. Blasser attempted to broker peace with his neighbor. He had said to her, “We are all musicians, are you a musician too? Why not play with us sometimes, play a drum set instead of banging on the floor?” To which her immediate response was: “’No one should be playing keyboards in tune with me when I’m singing.” In essence, her “piece” as a neighbor has changed from “the neighbors are making weird sounds, and I must cancel it by beating rhythms on the floor” to become “be quiet while I am singing!” As I suggest to Blasser, her own perception of herself changed immediately after someone asked her if she was in fact a musician—she became not a drummer beating on the floor, but a *singer*. Thus the meaning of her masking activity changed entirely—*she* was now the musician, and her neighbors noodling on Casio (completely imagined, for no one, as Blasser points out, is actually playing keyboard) were interfering with her artistic activity.

The proof isn’t here, though, in these words. Peter is a friend, and as such, I could not really begin to analyze our collaborations and our words through any sort of traditional method. There is so much to extract from this film about composing instruments that I do not feel should be put into text. For this reason, I hope the film speaks on its own—despite its colloquial register, I think we get to heart of things better than I could through description alone.

4.3 Epilogue

There are those who live a life without music. I cannot speak to them, and to their proclivities, though I know they live deep lives full of joy and fear. And then, there are those of us who are musicians, who live a life of resonance and transformation. Sound cuts us. We start like trees, we start small and grow, we communicate with each other through organisms no one really understands yet, deep under the soil. And we grow stronger, ideas taking root in our psyche. But at some point, we are cut down. And we dry out, and we are cut into a million different pieces for a million different reasons. And past the scars you could see on our surface, we show the knots inside, the growth patterns, the slow seasons, the bursts of growth from storms and rain.

Acknowledgments

Thank you to Matthew Burtner, my incredible dissertation advisor, for your thoughtful mentorship. You have been a model for interdisciplinary discipline, and I have learned so much from studying the way you work. I also want to thank my committee, Matthew Burtner, Ted Coffey, Luke Dahl, Mona Kasra, and Ronald Kuivila. Ted, thank you for welcoming me into the UVA community and sharing your computer music. Luke, thanks for your kindness “between the cracks” of academic life. Mona, thank you for helping me broaden my analysis. Finally, Ron, thank you for your mentorship for nearly 12 years, which still resonates since our psychoanalytic advising sessions at Wesleyan.

I am grateful to have been supported for many years at the CCT program, as well as by many fellowships at University of Virginia. In the Music Department, I encountered many bright, brilliant minds: thank you Fred Maus, Nomi Dave, Noel Lobley, Basile Koechlin, Alex Christie, HM Meese, and so many more. Thank you to the Jefferson Fellowship, for funding two years of independent research. Thank you to the Institute for Humanities and Global Culture for awarding me the Clay Fellowship. Thank you also to GSAS for a teaching relief grant and a summer research grant that aided my travel to France. In a sense, too, I began this dissertation at UCSD, where I spent two years before switching teams. I nonetheless learned a lot from Charles Curtis, Sarah Hankins, Shahrokh Yadegari, Anthony Davis, Tom Erbe, Amy Cimini, Jann Pasler, and Jon Fonville.

To Peter Blasser, I want to thank you for so many spirited conversations over our many years and geolocations of friendship. Our film documents the incandescent quality of our gonzo conversations—if only I could record them all! Countless friends saved my life a hundred times over the course of this dissertation—too many to list here! Thanks, in particular, to my friends Anthony Vine and Monroe Street for teaching me so much about music and life. To Ellen Fullman, Hans Reichel, José Le Piez, Maryanne Amacher, I am indebted. I also want to thank Ron Shalom and Cleek Schrey, for investing so much care into stewarding the daxophone, for developing your own sound with it, and for imagining ambitious art projects for our band. I could not predict what would happen when I made instruments for you in 2015. May our archive endure!

Thank you to my apprentices. Sam Boston: you were the first to step into my workshop. Your experimental intuition and your pursuit of craft perfection have provided me so much momentum. Next, I thank Femi Shonuga Fleming: you were next to join my studio. You are a true lifer! I am grateful for our many side and main quests. Thanks also to Chloe Seaton, Josephine Jean-Baptiste, and Jack Schwarz. You have all provided me such an uncynical vision of musical pedagogy in its purest form.

Finally, my family. I want to thank my wife and sweetheart Catalina: I love you so much. You have inspired me to make films and changed my life in a thousand ways—except I still disagree with you about the way screws look in wood. Thank you to my son Lou, three years old by the time this sentence is written! I love singing to/with you. And I want to thank my parents, Drs. Lana and Ralph Fishkin, for supporting me for so many years—you are the only people who I shall ever allow to call me *Dr. Fishkin*!

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Appendix A

Accompanying this written exposition are several works of artistic production. In many cases, I have worked collaboratively. This section sets the credits of these works into text, as well as preserving the score of *Masking Songs* in its entirety.

Bois De Rose

Modos de Transporte is a multilingual travel-series. In the episode, “Bois de Rose” the host takes a high-speed rail train from Paris to Bordeaux and there discovers the studio of Jose Le Piez, builder of “arbrassons,” a type of friction drum sculpted from trees that sings with the simple caress of a hand. As if possessed by these tree sounds, the travelogue dissolves into a film of long takes and slow sounds.

Created by: Catalina Alvarez & Daniel Fishkin
Directed by: Catalina Alvarez
Written by: Catalina Alvarez & Daniel Fishkin
With: Catalina Alvarez, Daniel Fishkin, Etienne Rolin, José le Piez, Lou Heiskus
Editor: Will Mullany
Music by: Daniel Fishkin, José le Piez, Etienne Rolin
Cinematophrapher: David Winnerstam
Location sound: Johanna Tilche
Sound Edit: Daniel Fishkin & Will Mullany
Assistant Editors: Emily Packer & Ben Still
French Translation: Mimi Luse & Hicham Benhakllam

Your Ol’ Toolbox Smells Good

Chapter 1 also presents two compositions from a work-in-progress collaborative album made with musician Aaron Dilloway.

A Long Sparse Seeping
Performed by: Daniel Fishkin (daxophone, arbrassons) and Aaron Dilloway (8 track tape loops, electronics)
Editor: Daniel Fishkin

Your Ol’ Toolbox Smells Good
Performed by: Daniel Fishkin (daxophone, arbrassons) and Aaron Dilloway (8 track tape loops, electronics)
Editor: Daniel Fishkin
Additional Production by: Zack Villere

Masking Songs

The complete score for *Masking Songs* is included following this exposition. In addition, two recorded pieces from the collection have been included as musical selections.

Off-Frequency Listening in Subjects
Composed by: Daniel Fishkin
Performed by: The Daxophone Consort
Daniel Fishkin: daxophone
Ron Shalom: daxophone, contrabass
Cleek Schrey: daxophone, hardanger fiddle
Recorded at the Watermill Center, Water Mill, NY, 2023
Recorded by Daniel Fishkin & Ron Shalom
Mixed by: Ron Shalom
Mastered by: Kevin Ramsay

Excitation Patterns
Composed by: Daniel Fishkin
Performed by: The Daxophone Consort and Science Ficta
Daniel Fishkin: daxophone
Ron Shalom: daxophone
Cleek Schrey: daxophone
Doug Balliett: viola da gamba
Loren Ludwig: viola da gamba
Zoe Weiss: viola da gamba
Recorded by: Travis Thatcher
Recorded at Old Cabell Hall, University of Virginia, Charlottesville, VA 2020
Mixed by: Ron Shalom
Mastered by: Kevin Ramsay

Composing the Tinnitus Suites: 2020

This piece is both an audio composition as well as a video document of that recording.

Composing the Tinnitus Suites: 2020
Composed by: Daniel Fishkin
Daniel Fishkin: Lady's Harp
Recorded at mise-en place, Brooklyn, NY 2020
Mixed by: Daniel Fishkin
Mastered by: Kevin Ramsay and Daniel Fishkin
Filmed and edited by: Nate Lavey

Deer Tick… and the Kerf of Sound

Deer Tick … and the Kerf of Sound
Created by: Daniel Fishkin & Peter Blasser
Editor: Tyler Clapsaddle

Soundtrack:

Salesclerk Sex Session at Radio Shack
Daniel Fishkin

Tocante Instruments
Peter Blasser

Masking Songs
Daniel Fishkin
performed by the Daxophone Consort and Science Ficta

Kingshead
Peter Blasser

The Man with the Bones in his Ears
The Daxophone Consort (Daniel Fishkin, Cleek Schrey, Ron Shalom)

Onion Sandwich Man / Zitherous
Peter Blasser

Gentle Clouds over Radioshack at NightFall
Daniel Fishkin

Solar Sounders
Daniel Fishkin & Peter Blasser

Composing the Tinnitus Suites: 2020
Daniel Fishkin

Walk Like a Demon
Daniel Fishkin and Jim Strong

Composing the Tinnitus Suites: 2015
Daniel Fishkin, Cleek Schrey, Ron Shalom

The Bat
The Gongs (Peter Blasser, Clara Latham, Stefan Tcherepnin, and Grisha Krivchenia)