

Summer 8-2-2018

# Rediscovering The Interpersonal: Models Of Networked Communication In New Media Performance

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**REDISCOVERING THE INTERPERSONAL: MODELS OF NETWORKED  
COMMUNICATION IN NEW MEDIA PERFORMANCE**

By

Alicia B. Champlin

B.A. University of Maine, 2015

**A THESIS**

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Fine Arts

(in Intermedia)

The Graduate School

The University of Maine

August 2018

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By Alicia B. Champlin

Co-Advisors: N. B. Aldrich, MFA and Dr. Joline Blais

An Abstract of the Thesis Presented  
in Partial Fulfillment of the Requirements for the  
Degree of Master of Fine Arts  
(in Intermedia)  
August 2018

This paper examines the themes of human perception and participation within the contemporary paradigm and relates the hallmarks of the major paradigm shift which occurred in the mid-20th century from a structural view of the world to a systems view. In this context, the author's creative practice is described, outlining a methodology for working with the communication networks and interpersonal feedback loops that help to define our relationships to each other and to media since that paradigm shift. This research is framed within a larger field of inquiry into the impact of contemporary New Media Art as we experience it.

This thesis proposes generative/cybernetic/systems art as the most appropriate media to model the processes of cultural identity production and networked communication. It reviews brief definitions of the systems paradigm and some key principles of cybernetic theory, with emphasis on generative, indeterminate processes. These definitions provide context for a brief review of precedents for the use of these models in the arts, (especially in process art, experimental video, interactive art, algorithmic composition, and sound art) since the mid-20th century, in direct correlation to the paradigm shift into systems thinking.

Research outcomes reported here describe a recent body of generative art performances that have evolved from this intermedial, research-based creative practice, and discuss its use of algorithms, electronic media, and performance to provide audiences with access to an intuitive model of the interpersonal in a networked world.

## ACKNOWLEDGMENTS

My first thanks must go to N.B. Aldrich, my closest advisor throughout the two-plus year trajectory of this project. Nate's dedication to mentoring and his constant encouragement pushed me through many blockades. He refused to accept less than my best efforts and worked tirelessly to prove to me that I was capable of shattering my own expectations. His expertise in this area of research has guided me and inspired me. To a great degree, it is his mentorship and advocacy that has positioned me for my next steps with an international network of allies and resources. I am forever grateful for the critical perspective I've gained from working with Nate.

Next, I'd like to thank my advisory committee, Dr. Joline Blais, Dr. Sofian Audry, Jon Ippolito, and Amy Pierce, MFA. Each of them contributed extremely valuable perspectives and helped me to identify important blind spots. I have great respect for their work as individual creatives, and feel fortunate to have such an accomplished team behind me. In particular, I am extremely grateful for Amy's counsel in navigating the complexities of the academic system and the thesis process, as an ally and a cheerleader.

I credit Wade Warman for pushing me that first step toward using BCI (brain-computer interface) technology as a tool. Wade provided me with a MindFlex EEG instrument, which he had expertly modified for raw data output. My early tests with this instrument were supported by the open source Kitschpatrol/brain Arduino library for decoding the MindFlex EEG data. Much of my continuing research into BCIs (especially building my own) would not have been possible without the amazing community working around the OpenBCI platform and its open source software. Their innovation and dedication

to keeping advances in BCI technology accessible, along with their commitment to supporting an engaged and active community of users, has been invaluable to my work.

A large part of this research was supported by a Research and Development Grant from Hangar Interactive Labs in Barcelona, Spain. I am extremely thankful for the opportunity to represent their mission. My time in residency there was more valuable than I can say, not just for the financial and logistical support of the project, but also in my personal development as a researcher and in growing my network of wonderful people working in this field.

I would also like to thank Carsten Galle (another Hangar alumnus) for his early enthusiasm and generosity with his time as a research assistant in Barcelona. I owe a great thanks to my undergraduate lab assistants Justin Brown and Sara Taylor at the University of Maine for their time and assistance in the last weeks of production for the final performance of *I Am Sitting....* I wish them both continued success in their studies, and I will follow their work with anticipation. Huge gratitude also goes to my production support crew for their contributions in making the final performance such a professional operation: Jim Winters (lighting and photography), Arturo Camacho (videography), and especially Steve Norton (audio recording), who was always ready to lend two hands or a critical eye.

I must also thank the University of Maine, specifically the Intermedia Department, for supporting my development as a scholar with grants and research assistantships throughout my time in the program. None of this would have been possible without their financial support, which made these opportunities available to me. Particularly toward the completion of the project, Gene Felice was extremely generous in providing near-unlimited access to the

department's largest space, so that I could build a custom sound stage for the last phase of my research.

Finally, I want to thank my partner, Niklas Reppel, my favorite collaborator in art and life. He has given countless hours to this project, during its most challenging times, and has been a patient teacher of all things audio. His encouragement, patience, and support go far beyond the intellectual, emotional and logistical. Thank you for being my biggest inspiration and my best incentive to grow.

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## LIST OF ABBREVIATIONS

- AI:** Artificial Intelligence.
- ALM:** Artificial Life Modeling.
- AP/PE:** Adaptive Performance/Presentation Environment.
- BEK:** Bergen senter for Elektronisk Kunst, in Bergen, Norway.
- BCI:** Brain-computer interface.
- BPM:** Beats per minute.
- EEG:** Electroencephalography/electroencephalographic, study of the brain via its minute electrical outputs.
- FFT:** Fast Fourier Transform, a computational algorithm.
- Hz:** Hertz, a measure of frequency.
- IEM:** Institute for Electronic Music, in Graz, Austria.
- IMFA:** Intermedia Master of Fine Arts.
- IMRC:** Innovative Media Research and Commercialization Center.
- OSC:** Open Sound Control, a communication protocol.
- R&D:** Research and development.
- VLF:** Very low frequency.

## INTRODUCTION

In 2006, I completed the ‘Shikoku 88’ pilgrimage in Japan. By forcing me to learn an entirely new way of navigating the world, this seven-week walking experience changed the way I think about how people perceive and participate in the construction of their language, culture, environment, and selfhood. I came to understand the pilgrimage (both the act of doing it and the system as a whole) as a work of generative art, in which material culture and its culturally coded environment are the emergent results of pilgrims’ iterative experiences and actions feeding back into the system. This was the seed for my current research, which looks at the themes of human perception and participation within the contemporary paradigm. Building on the consensus that a major paradigm shift occurred in the mid-20th century from a *structural view* of the world to a *systems view*, my creative practice is concerned with the communication networks and interpersonal feedback loops that help to define our relationships to each other and to media since that shift; this is the impact of contemporary New Media Art as we experience it.

This thesis proposes generative/cybernetic/systems art as the most appropriate media to model the processes of cultural identity production and networked communication. First, I will begin with a brief definition of the systems paradigm and some key principles of cybernetic theory, with emphasis on generative, indeterminate processes.

In the Methodologies section, I will outline my own creative practice, and clarify how and why I choose to apply generative processes, cybernetic principles, and a reductionist experimentalism to model communications, particularly the interpersonal. I will review the defining features of a complex, self-regulating system, place those features in the terms of

generative art, and show how these models can be understood in the context of the communication networks and cultural production mechanisms of today.

These definitions will provide the context for a review of precedents for the use of these models in the arts, (especially in process art, experimental video, interactive art, algorithmic composition, and sound art) since the mid-20th century, in direct correlation to the paradigm shift into systems thinking. After reviewing other artists' work within these themes, I will present a summary of my own portfolio leading up to my present research.

In the final chapter of this document, I will focus on that research and its outcomes: a recent body of generative art performances that have evolved from my intermedial research-based creative practice. I'll discuss its use of algorithms, electronic media, and performance to provide audiences with access to an intuitive model of the interpersonal in a networked world.

## CHAPTER 1: KEY DEFINITIONS AND METHODOLOGIES

### 1.1 Research Concept & Limitations of Study

Cultural critics such as Jean Baudrillard, Guy DeBord, and Neil Postman have warned of the unchecked effects of our contemporary media ecosystem on the state of interpersonal communications. They have prophesied our devolution into an age of simulacra and simulation, self-obsession, and spectacle - there is no denying that their future is now here, however bleak.

But, these are not simple cautionary tales that can easily be foisted on the general public, to be swallowed whole. These thinkers have given us deep insight into the workings of the systems of media, communication, and identity, writ large. These principles are complex and demand a great deal of intellectual accountability.

In this regard, a real need arises for *alternative means of access* to these principles and an understanding of the delicate mechanisms that have driven us to this precarious situation. I see my role as a researcher and artist as that of a pathfinder; my directive is to find ways to translate these complex ideas into a more concrete, sensory realm, to reinforce the idea of participation in an interpersonal context. The more we as a human network understand how these principles operate, the better equipped we are to save ourselves from the annihilation of all meaning and human connection. My work explores ways in which systems modeling can create aesthetic surfaces that act as a model for understanding these important relationships. Through systems modeling, I aim to transmit my research outcomes through a type of *embodied access*, which I am working to define in the following pages of this document.

Areas of inquiry which this study may encounter but does not take up at present are critiques of cybernetic modeling from feminist, post-human, or economic perspectives. Efforts here are made to frame cybernetics through its early, basic definitions, and then the context of its

further use largely relies upon the developments of the Second Cybernetics of the 1960s and 70s, in its broader contributions to communication studies, AI, and cognitive science. There arise some interesting relationships as well as conflicts with Post-Structuralist thinking, however these philosophical skirmishes are not explored here except to parallel the development of these arguments with the wider paradigm shift into systems thinking.

Here I might also note that the scope of this paper is not to review the whole history and tenets of cybernetic theory, nor systems theory, nor even of post-structuralist communications theory, but to enumerate and discuss the specific concepts, methods, and methodologies that I have applied in pursuit of the idea that embodied access through generative models of understanding can teach us something about interpersonal communications.

## 1.2 Definitions

This section gives a broad overview of conceptual definitions at the core of my practice.

### 1.2.1 An Intermedial Research Practice

This Master of Fine Arts program is not a generalized program to support any chosen course of study in the Arts. Nor does it specialize in the typified media of Fine Arts, like painting, sculpture, film, etc. The specialized focus of this program is Intermedia. Unlike the field of painting, this often needs a definition.

This program teaches that Intermedia is not the same thing as multimedia, which is simply the application of more than one media at a time. It frames its own definitions of Intermedia as being based in a tradition of some of the most radical movements in 20th century Art History, like Futurism, dada, and Fluxus. Like these movements, the term

Intermedia, as coined by Dick Higgins, describes a process of dissolving and remaking the boundaries of art.<sup>1</sup>

This program also places Intermedial practice as a research endeavor, rather than as a style of art. Art which is truly intermedial, in the sense of its ability to move the field and change the vocabulary of art, can only be intermedial for a moment, because once its contributions become part of the canon, it is not really in the fringe anymore, no longer pushing a boundary. So, I see intermediality as an operational function of, rather than an aesthetic quality of art. In working between media, or where media overlap or conflict, there is room to experiment with their aesthetic and functional vocabularies. To experiment is to question, to misuse, to abstract, and to deconstruct these vocabularies, even pitting them against each other. These intermedial ‘transgressions’ should be seen as a shifting of intent<sup>2</sup>, away from the aims of canonized aesthetics and toward finding new modes of artistic communication and interaction with the world at large.

I've come to define Intermedia as a research-based experimental art practice - one that demands the deconstruction and abstraction of the aesthetic vocabularies of traditional and emerging media, so that they can be examined, questioned, and combined in novel, but relevant ways. Novel, but relevant combinations can occasionally result in art that is ahead of the field, where no critical vocabulary has yet been formed to put it completely in context. These are the frontiers of art, where we have the most to learn about ourselves. This Intermedial research forms the foundation of my creative practice, which is medium-agnostic. I am free to allow my research inquiries to make use of any medium that provides a

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1. Dick Higgins, *Horizons* (New York: Roof Publishing, 1998), 29-30.

2. David Pirrò and Hanns Holger Rutz, in discussion at BEK, Bergen, Norway, June 10, 2018.

relevant aesthetic vocabulary. This fosters cross-domain connections, bridges which can provide crucial new pathways for dialogue and reception. In particular, I find that working materially through artistic practice affords certain opportunities not provided by traditional research methodologies – both in the freedom to take certain liberties with the process as well as the chance to work with a material vocabulary that offers its audiences a different model of understanding through the embodiment of research outcomes. In sum, I define my artistic practice as Intermedial because it methodically interrogates *artistic practice as research* and the utility of its outcomes in a wider context.

### 1.2.2 Embodied Access

Because embodiment can be understood in so many different contexts, I would like to propose a working definition for the purposes of this discussion. In all contexts that I am referring to the term, it is with reference to a hybrid of two related ideas: embodied systems and embodied cognition. *Embodied cognition*, a version of the idea of enactivism, is defined by Varela *et al.* as follows:

*By using the term embodied we mean to highlight two points: first that cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities, and second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological and cultural context.<sup>3</sup>*

Where *embodied systems* are commonly understood as systems (biological or not) that have some kind of body (or interface), the models I present typically utilize my own physical

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3. Eleanor Rosch, Evan Thompson, Francisco J. Varela, *The Embodied Mind: Cognitive Science and Human Experience* (Boston: The MIT Press, 1991), 172–173

body as a component. Just as importantly, these models also attempt to employ the audience as a body. This is not a means to interact with the audience *through* an interface, but is instead the adoption of my own and the audience's sensorimotor capacities *as an interface* to that biological, psychological, and cultural context. In a sense, these systems could be said to be scaffolding upon the sensorimotor capacities of that embodiment in order to close important feedback loops, and in the process, we gain agency within the modeled system and our embodied experience both references and informs the context of the model and its emergent properties.

I am proposing that embodied access is a situational accumulation of experience through sensorimotor capacities, and that non-biological systems can become embodied through the sensorimotor interface of an audience, giving the system access to a larger environmental context. The proposed outcome is that through this hybrid embodiment, I, the audience and the model each gain a new point of *access* to the fundamental relationships of the system through that sensorimotor context rather than a purely rational one.

### 1.2.3 The Systems-Based Paradigm

To properly position my research questions, a definition of the systems-based paradigm is required to set the foundation. Briefly, the currently emerging paradigm is replacing an old one, in which our understanding of the world was organized according to rigid structural relationships and static hierarchies. The new paradigm is one of dynamic processes, interactivity, and dialogue.<sup>4</sup>

*In the past our technologically-conceived artifacts structured living patterns.*

*We are now in transition from an object-oriented to a systems-oriented*

---

4. Roy Ascott, "The Cybernetic Stance: My Process and Purpose," in *Systems*, ed. Edward A. Shanken (London: Whitechapel Gallery, 2015), 65.

*culture. Here change emanates, not from things, but from the way things are done.*<sup>5</sup>

While Jack Burnham asserts that the *currency* of this interactivity is information<sup>6</sup>, it is also recognizable as ‘communication and control,’ in the terms of physicist Norbert Wiener, the father of cybernetics. Wiener implies that everything communicates with everything, that messages are as fundamental as Newton’s gravity, and might provide a more accurate model of the universe.<sup>7</sup> For the scope of this paper, suffice to say that Wiener’s introduction of systems-thinking through cybernetics was based in a highly probabilistic mathematics that had a broad definition of what messaging is:

*Besides the electrical engineering theory of the transmission of messages, there is a larger field which includes not only the study of language but the study of messages as a means of controlling machinery and society, the development of computing machines and other such automata, certain reflections upon psychology and the nervous system, and a tentative new theory of scientific method. This larger theory of messages is a probabilistic theory, [...] Society can only be understood through a study of the messages and the communication facilities which belong to it; ... in the future development of these messages and communication facilities, messages*

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5. Jack Burnham, “System Aesthetics,” in *Systems*, ed. Edward A. Shanken (London: Whitechapel Gallery, 2015), 113.

6. Burnham, “System Aesthetics,” 112-15.

7. Norbert Wiener, *The Human Use of Human Beings*, (New York: Doubleday & Company, Inc., 1954), 7-12.

*between man and machines, between machines and man, and between machine and machine, are destined to play an ever-increasing part.<sup>8</sup>*

#### **1.2.4 A Cybernetic Theory of Post-Structuralist Communication**

In tandem to our shift into the systems paradigm (as outlined above), post-structuralism proposes that meaning is not predicated on structured relationships, but on the functional rulesets that *define* those relationships and the dynamic exchanges that arise within them.

My research relies on the above cybernetic view of messaging and communication processes in order to break these relationship structures down to expose what functional rulesets might be at work. For example, by working with the *transactional capacities* of communication, rather than just its semiotic structures, interpersonal interactions can be modeled by systems that demonstrate their own behaviors, rather than describe theoretical outcomes.

These truths might not be demonstrable with philosophy or critical theory (this seems to me to be the central argument of post-structuralism), but I am arguing that they can be manifested *pro tempore* and distilled through a process of exposing the transactional and algorithmic parameters of the system that bears them out. I offer an analogy in the difference between AI and Artificial Life Modeling as methodologies to discover the mechanisms of intelligence, where AI often focuses on executive function and knowledge mapping, ALM seeks to model the observable fundamental processes (*transactions*) in nature which may cumulatively give rise to ‘intelligent’ behaviors.<sup>9</sup> Working within a cybernetic framework of

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8. Wiener, *The Human Use of Human Beings*, 15-16.

9. “Art and Artificial Life – a Primer,” Simon Penny, accessed July 17, 2018, [http://simonpenny.net/texts/Resources/a\\_life.pdf](http://simonpenny.net/texts/Resources/a_life.pdf).

communication provides me a vocabulary for these transactions and algorithms, so that they can be examined and essentialized into their functional components for use in modeling communications systems on an interpersonal scale. Working in this mathematical (or algorithmic) sort of way, we can use generative processes to summon the genie. This gives rise to emergent phenomena which provide new “models of understanding”<sup>10</sup> - the intended proceeds of my research and creative output.

### **1.2.5 Systems Thinking - Generative & Indeterminate Processes**

The roots of systems thinking, a shift from a deterministic to an indeterministic world-view,<sup>11</sup> seem to overlap with the dadaist and futurist critiques of Modernism, in the early 20th century. These critiques were radical efforts to undermine the status quo of rational, hierarchical principles in art, literature, and thought. Dada celebrates the advent of a world defined by indeterminacy, “*a world where, as Marx said, ‘everything is pregnant with its contrary’ and ‘all that is solid melts into air’....*”<sup>12</sup> This parallel shift in contemporary art and artistic thinking toward an irrational and non-deterministic experience of the world continued into the mid 20th century, and constituted the basis for such diverse movements as Fluxus, Minimalism, and Serialism. Work such as concrete poetry and text-based art, performance art, happenings, action painting, early electronic arts, tape music, and so on; they are all in dialogue with this shift into the new systems-based paradigm.<sup>13</sup>

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10. “Artist Statement,” N.B. Aldrich and Zach Poff, accessed July 17, 2018, [http://median.newmediacaucus.org/archives\\_in\\_progress/pre\\_2009\\_issues/2007\\_fall/statements/aldrich\\_n\\_b\\_and\\_poff\\_zach/aldrich\\_n\\_b\\_and\\_poff\\_zach.html](http://median.newmediacaucus.org/archives_in_progress/pre_2009_issues/2007_fall/statements/aldrich_n_b_and_poff_zach/aldrich_n_b_and_poff_zach.html).

11. Joel Chadabe, “The History of Electronic Music as a Reflection of Structural Paradigms,” *Leonardo Music Journal* 6 (1996): 42, <https://doi.org/10.2307/1513303>.

12. Marshall Berman, *All That is Solid Melts into Air*, (New York: Penguin Books USA, 1988) 35.

13. A discussion of specific artists’ work that supports this statement follows in **Chapter 2**.

The waymakers of mid 20th century art, for example, Alison Knowles, Pauline Oliveros, Allan Kaprow, John Cage, Merce Cunningham, Yoko Ono, Jackson Pollock, Sol Lewitt, Yves Klein, William Burroughs, Brion Gysin, among many others, all embraced the cause of questioning our meaning-making systems. Indeterminacy was a cornerstone for each of these artists, a guiding principle which, when applied as a tool, could help to more accurately model the non-deterministic qualities of life, experience, and meaning.

The use of indeterminate processes such as algorithms and chance operations is a means to generate specific content which, as John Cage says, “imitates Nature in her manner of operation.” The proceeds of the composition come about *independently of the artist’s psychology*, as described here by John Cage in 1952:

*It is thus possible to make a musical composition the continuity of which is free of individual taste and memory (psychology) and also of the literature and ›traditions‹ of the art. The sounds enter the time-space centered within themselves, unimpeded by the service to any abstraction, their 360 degrees of circumference [sic] free for an infinite play of interpenetration. Value judgments are not in the nature of this work as regards either composition, performance, or listening. The idea of relation being absent, anything may happen. A ›mistake‹ is beside the point,, for once anything happens it authentically is.<sup>14</sup>*

(I would like to emphasize that while this quote references sound, this same principle can apply across any medium.)

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14. “Imaginary Landscape No. 4,” Median Kunst Netz, accessed July 18, 2018, <http://www.medienkunstnetz.de/works/imaginary-landscape-4/>.

Indeterminacy is also a qualitative attribute that emphasizes the exchange of information (*transactions*) over form and content (*structural relationships*), and gives priority to *dynamic processes*. Applied in art, this leads to art forms that demonstrate a primary aspect of both systems thinking and post-structuralist critique: *transactional behavior as dynamic processes*. Indeterminism and generative processes are thus two of the primary touchstones of system aesthetics, along with the algorithms and feedback loops that govern them.

### **1.3 Process of Inquiry: Applying Cybernetics and Systems Thinking to the Problem of Interpersonal Communication**

My work applies the cybernetic principles of signal transfer, meaning-making, and self-regulating networks to interrogate modern interpersonal communications, raising questions about how we perceive our Selves and our surroundings. The creative tools I rely upon most, such as algorithmic composition, generative systems, and feedback loops, likewise fall under the umbrella of systems theory and cybernetics. This section gives an overview of each of these principles and tools.

#### **1.3.1 Cybernetic Processes of Interpersonal Communication**

Below, I propose three cybernetic models for working on questions about communication. These processes offer a way to make complex communications concepts more accessible through intuitive experience and abstraction. As proposed by E. W. Dijkstra, process of abstraction is not one of generalization, removing by degrees a concept from its origin, but rather as the breaking down of relational complexities that obscure an underlying truth. Thus, the aim of an abstraction is to represent the clearest, most ideal form of a concept:

*We all know that the only mental tool by means of which a very finite piece of reasoning can cover a myriad of cases is called "abstraction"; [...] the purpose of abstracting is not to be vague, but to create a new semantic level in which one can be absolutely precise.<sup>15</sup>*

### 1.3.1.1 Signal Transfer

The concept of signal transfer, for me, represents a process (a transaction) in which some potential moves from one place to another. Norbert Wiener calls this *messaging*, in the abstract, and it is the container for all communication.<sup>16</sup> For a more concrete sense of the abstract idea of the ‘signal’, think of it as something transmitted: in raw form such as light or sound, in perceptual forms such as color and musical timbre, in representational form such as visual media and data. I use the term signal transfer in my work because it captures the notion that a signal can be transposed or transcoded from one domain or medium to another such as color into frequency. Often this transposition takes the form of an algorithmic process that abstracts a signal from its surroundings in a way that privileges its inherent relationships over its structural context. Several works in my portfolio deal with this transmediation of signals, and it is a method I often apply to distill a more self-evident experience from a complex process.

### 1.3.1.2 Meaning Making

Returning to the idea of enactivism, in which embodied cognition is characterized by interaction within environmental and cultural contexts,<sup>17</sup> a further step for this idea was into

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15. Edsger W. Dijkstra, “The Humble Programmer,” *Communications of the ACM*, October, 1972, 864, <https://doi.org/10.1145/355604.361591>.

16. Wiener, *Human Use of Human Beings*, 95-97.

17. Rosch, Thompson, and Varela, *The Embodied Mind*, 179

the realm of ‘sense-making’ to describe the reflexive and iterative process of how we build our social vocabulary. This generative theory of meaning seems to have much in common with Performativity, (via Austin & Butler) while not in terms of Gender/Queer Theory, but in so far as identity and self are manifested through action in the present (*pro tempore*, if I may) by enactive and selective communication (*transactions*) of culturally derived vocabularies, as opposed to acting according to some blueprint of identity as a pre-existing condition (*structural relationship*) which dictates those social acts. Again, these ideas echo the paradigm shift from a deterministic, top-down structural hierarchical thinking into indeterministic, dynamic systems thinking. Self and the cultural environment as an extension of that Self can be shown as an emergent property of the interpersonal communications network, which is the domain of signals.

Both of these theories describe a transactional, accumulative, and self-reflexive process of meaning production, whether the drivers of this system are performative or enactivist transactions. In this light, I believe our perceptions of self and other emerge from the interactive evolution of cultural vocabulary. Whatever lexicon we have available to us supplies the only means with which we define and understand ourselves – our vocabulary defines the limits of our agency.

This network of fluctuating signals is a memetic feedback system, forming the basis of the primary mechanism of meaning-making as I use it in my work.

### 1.3.1.3 Self-regulating networks

The notion of the self-regulating network is at the root of our first definitions of intelligence and interactivity.<sup>18</sup> Self-regulation through the mechanism of some feedback

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18. Kevin Kelley, *Out of Control*, (Boston, Addison-Wesley Longman Publishing Co, 1995), 100.

loop is a fundamental condition for any autonomous system that might be a candidate for exhibiting intelligence - in a sense, self-awareness. The self-regulating system contains a mechanism by which it can respond to its own production. In contrast to a simple repetitive process, the self-regulating system's own generative output influences the behavior (or agency) of its component parts, and subsequently the manifest behavior of the system itself. All possible future states and available interactions are continuously redefined by the outcome of prior transactions. To me, this is a fundamental test for the label of 'interactive' art. If the history of transactions between a work of art and its audience do not lead to novel interactions and new possible outcomes over time, then the work may be 'participatory' but it should not be considered *interactive*.

In this transactional interchange of the interpersonal communications network, we manage to conduct all of our communication. It defines us, yet it is by nature indeterminate. The nature of meaning is in constant flux - new words, new memes, new symbols, and new concepts are always being traded for old, moved into and out of various overlapping or contradictory domains, and every individual cognitive experience updates our cumulative reference libraries of the vocabularies on hand for use.

Meaning is inherently a negotiated construct. We accumulate and perform our perceptions of it, imitating and testing, with each repetition joining positive and negative feedback loops that reinforce some ideas and deemphasize others. We come to understand ourselves through interactive *feedback loops* of constant evaluation and renegotiation of definitions, valuations, associations, etc. These feedback loops are internal to our social systems and arise naturally within communication networks as a form of *self regulation*, the effects of which emerge as an interactively derived manifestation of meaning. From this

volatile pool of what is meaningful, we construct our Selves, our cultural identities, our environments, and all of our interactions.

### **1.3.2 Tools for Modeling Cybernetic Processes: Creative Methods Derived from Systems Thinking**

In the previous section I have outlined three cybernetic processes that can be applied conceptually to interpersonal communications. This section describes tools for modeling those processes, using applied systems thinking.

#### **1.3.2.1 Algorithmic Composition & Generative Systems**

A creative practice built upon generative systems speaks directly to the paradigm in which my key research questions exist. Networked communication is itself a generative system. Using the experimental and intermedial approach defined at the start of this document, I am able to relate and extend a wide variety of different media (electronics, video, sound, performance, installation) and modes of thinking (eastern, western, aesthetic, academic, intuitive) by scaffolding<sup>19</sup> smaller component systems upon one another to compose complex systems that operate across multiple conceptual landscapes.

One of my most relied-upon methods of abstracting a concept is through transposition or transmediation, as noted in the discussion about signal transfer. Transposition of some data set is accomplished generally by mapping one domain onto another, often through the use of an algorithm<sup>20</sup>. An algorithm is simply a rule set that applies to every transaction in a given exchange. It is the representation of the logic applied in the flow of information. It may be mathematical or operational, but is generally transformative. An algorithm can be a

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19. Andy Clark, *Being There*, (Cambridge, MIT Press, 1997), 45.

20. David Berlinski, “In the Logician’s Voice,” *The Advent of the Algorithm*, (New York: Harcourt, 2001), xix.

musical score, or a Rube Goldberg machine, or a way to visualize brainwaves. Algorithmic compositions manifest an iterative and generative logic that pushes beyond the psychological will of the composer.

### **1.3.2.2 Cybernetic Principles of Interactivity - Cellular Automata & Autonomous Agents**

Much of my work involves reducing a complex interaction down to its component parts. In terms of the study of artificial intelligence, Andy Clark outlines key concepts for understanding how complexity arises. He explains a model that describes most complex behaviors as simply the emergent qualities of a self-organizing system, consisting of interactions across a network of autonomous agents.<sup>21,22</sup>

These interactions are governed by feedback loops that reinforce or throttle different types of behavior. In accordance with our systems-based paradigm, our understanding of ‘intelligence’ is now based on these dynamic interactions rather than a structural, top-down blueprint. Each autonomous agent may have only one goal, one effective input and output, but the accumulation of interactions between these agents and their environment produces the relatively complex phenomena we see arising out of these systems.

In modeling communication systems, I look for the smallest irreducible mechanisms which operate upon their own rule sets, or cellular automata. Connecting an array of these kind of agents in some algorithmic process allows for an interactive system that will generate something beyond what the initial rule set for any given cell could anticipate. The result may

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21. Agent, in the sense of any component of a system with agency, or the ability to independently interact with its environment in some way.

22. Andy Clark, *Being There*, 11.

be exponentially increasing chaos, or it might demonstrate feedback loops that add to or limit the types of interactions possible as the algorithm progresses.

## 1.4 A Hybrid Methodology for Intermedial Research Practice

My research and production practices have developed via the application of particular methodological frameworks, but I also attempt to take advantage of the flexibility inherent in the fact that artistic production is not held to the same rigid structures of traditional research in the sciences and humanities.

### 1.4.1 Critical Methodologies

My thinking is very much informed by the critical analyses of art historical and philosophical discourse. While I accept that a *critical* methodology (such as Formalism, Reception Theory, Deconstructionism, etc.) is distinct from a *research* methodology (i.e. per Social Sciences or Humanities research), these two approaches to research and production are complimentary. The application of historical, critical discourse allows me to examine how my work is in dialogue with various aesthetic practices and provides a vocabulary and context for the work.

### 1.4.2 Design Thinking & Systems Engineering

Using rapid prototyping and iterative practices from a Design Thinking methodology allows for learning quickly what will and will not work as expected when I am building a process-based model. It also gives opportunities for mind-mapping to outline basic relationships and potential contradictions. Further, I believe this process is also reflective of my professional experience in the world of software engineering, where it was common practice to outline, prototype, test, redefine, and loop through this process toward a more complex and robust model of the desired interactions. Several directives from that industry apply still for me in practice:

acceptance testing, in which one finds all the ways to break something so they can be fixed; bug replication, in which phenomena are documented in terms of their repeatability in order to find their root causes; and the idea of ‘Fail fast, fail cheap,’ which describes rapid prototyping as a way to couple incremental gains with incremental risk and investment, and avoid late-stage catastrophes. Design Thinking and Systems Engineering methodologies bring serious questions to bear regarding risk assessment and criteria for success, but they also allow for a collaborative and playful approach to exploring big ideas and gathering feedback from others, through brainstorming, storyboarding, and role playing with stakeholders.

### **1.4.3 Material Practice**

This research, I believe, exploits certain opportunities made available through material practice, that are not strictly available to, for instance, researchers in a Social Science discipline. The project of this thesis provides a ripe example, in the sense that I can interrogate the relationships among the components of an interpersonal communications system through the use of materials in a practice of *making*. My aim is to create models of understanding that do not come about through logical constructions. Instead, an abstract idea is invited to articulate itself through emergent sensory phenomena, allowing audiences to access an embodied experience of a concept’s implications.

### **1.4.4 Reductionist Experimentalism**

Reductionism, which I recognize as being problematic in some applications due to its effectiveness in decoupling a subject of study from its relevant sociological (Feminist, Marxist, Intersectional) contexts, is for me simply a way to describe the process of eliminating anything from the experimental process, whether operational or aesthetic, which does not directly support the core thesis of a given project. It is a simple form of abstraction

that removes details that could introduce possible symbolic confusion, or irrelevant outcomes. The point is to make sure that the components of a composition are distilled to a point of clarity that allows a work to speak for itself about what it is and what it does. In this way, the aesthetics of a system are defined by the exposure of its mechanisms so that they *demonstrate*, rather than describe, their inherent and emergent behaviors. It is my hope that the important relational contexts that may be temporarily lost through this reductionism could actually be reinforced in the end – evidenced in the result by way of emergence through the demonstration of a system in operation.

Applying this term to an experimental process means that compositions evolve through an iterative process of testing and editing, reducing and distilling. I use what I have learned from each iteration to simplify further, with increasing focus on whatever processes emerge as the fundamental interactions of a system. Every iteration raises new questions about how a self-organizing system works, and how it might respond to different parameters. Because of this, many of my projects have tended to become open-ended inquiries that produce works in series and multiple versions. The best ones are never finished, but continue evolving into new domains, in similar fashion to scientific inquiry.

## CHAPTER 2: SELECTED SURVEY OF ARTISTS

My aim in this section is not necessarily to outline an exhaustive census of relevant artists and evaluate their influence on my work. Instead, here I am evaluating a cadre of works for their ability to represent the paradigm shift into systems thinking. And as such, yes, they are models for my work too, or at least for the principles at the heart of my practice. This list is illustrative of the historical and conceptual framework in which I consider my work situated.

The groundwork of establishing the occurrence of that paradigm shift was laid out in the previous chapter. This list is then a *selective* survey of the evolution of process art and algorithmic composition, giving demonstrative examples of this paradigm shift playing itself out in art and creative thinking. Certainly, there are many more fine examples, but I have chosen specific, often-well-known works that I feel most succinctly illustrate my point, and best demonstrate the same methodologies I am using in my own practice. In choosing individual representative works from these artists' often-encyclopedic catalogues, I have also given preference to pieces of which I have specific working knowledge, by way of performing them or otherwise directly responding to them, so that many (though not all) of these examples have a demonstrable context within my own work.

### 2.1 Jackson Pollock: *Number 1 (Lavender Mist)* (1950)

Pollock's drip techniques are an undeniable signpost for a radical shift in (some might say the very death of) painting. He was depicting the *process* of painting, and using his physical body as part of the medium.<sup>23</sup> This correlates directly to the process-based thinking of the new systems-based paradigm.

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23. "Lavender Mist," Jackson Pollock, accessed July 17, 2018, <https://www.jackson-pollock.org/lavender-mist.jsp>.

## 2.2 John Cage: *Imaginary Landscape #4* (1951)

This piece is exemplary of Cage's many works that severed the 'psychology,' as he put it,<sup>24</sup> of the artist from the art product, and broke down barriers between art and its audience, all while fundamentally redefining music and listening, for a new world defined by emergence. This score<sup>25</sup> for 24 players and 12 radios acted as a simple algorithm to generate an immersive experience of non-deterministic outcomes.

## 2.3 Yoko Ono: *Secret Piece* (1953); *Cut Piece* (1964)

*Secret Piece*<sup>26</sup> is an example of Ono's Fluxus scores that emphasizes placing oneself in the midst of an unfolding universe. (I performed this piece in concert with Experimental Music Collective in Skowhegan and Orono, Maine, in 2016.) *Cut Piece*, a durational piece in which Ono invites the audience to cut and tear her clothing off, is significant as a foundational example of indeterminate process, performance, and interaction.

## 2.4 Yves Klein: *Leap into the Void* (1960); *Anthropometries* (1960)

*Leap into the Void* was Klein's bold announcement that the new definition of art (and reality) was completely up for grabs, and unknowable. At the same time, his series of *Anthropometries* arose directly from his desire to distance what he called 'the artist's hand' from the canvas and generate something that was indexical of its process, just as Cage had done. I must clarify that I am including this example here not as an endorsement of Klein's methods, but because his radical views and experiments were irrefutably reflective of the paradigm shift and widely influential. I recognize much of

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24. Referenced in **Chapter 1** of this document.

25. See **Appendix A.1**.

26. See **Appendix A.2**.

Klein's work is highly problematic in its objectification and sexualization of women, and its wholesale appropriation of their performances with him. My work, *Motive* (2016),<sup>27</sup> was in direct response to Klein's *Anthropometries* aims.

## **2.5 Nam June Paik: *Random Access* (1963); *Magnet TV* (1965); *TV Buddha* (1974)**

*Random Access* is in direct dialogue with the systems-based paradigm, announcing a complete divorce from a linear, structural experience of traditional media, and predefining what later becomes New Media as a networked web of databases with dynamic relationships. This generative sound piece was a unmediated demonstration of "how audio technology worked and what it was capable of."<sup>28</sup> Paik's genre-defining work with video came in response to the portable video camera and the startling new ability to televise the unfolding of life in real time, (and its influence on life in real time). Again by interrogating the technology itself, *Magnet TV* is another example of a work which generates its aesthetic surface from the processes inherent within. *TV Buddha* also breathes an uncanny life into the feedback loop between modern media and its audience by simply modeling a closed-circuit video loop.

## **2.6 Alvin Lucier: *Music for Solo Performer* (1965); *I Am Sitting in a Room* (1969)**

These two pieces have become celebrated monuments to sound art as a genre. Both of these works are simply demonstrations of their functional processes at work, a surfacing of natural phenomena that are otherwise lost in the noise of our sensory world. I have discussed these in greater depth, especially regarding their influence on my thesis work, in **Chapter 4** of this document.

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27. See **Chapter 3: Portfolio of Works**.

28. Jon Ippolito. "Ten Myths of Internet Art," *Leonardo* 35, no. 5 (2002): 489, <https://muse.jhu.edu/>.

## **2.7 Steve Reich: *Clapping Music* (1972)**

*Clapping Music* exemplifies algorithmic composition as a method for generating complex, emergent patterns from simple rules. My piece *Clapping Music for 6 Parties in a Cube* (2018)<sup>29</sup> is in reference to Reich and his research on multi-vocal algorithmic chanting in the indigenous tribes of Bali.

## **2.8 Marina Abramović: *Rhythm 0* (1974); *The Artist is Present* (2010)**

Like Ono's *Cut Piece*, *Rhythm 0* uses the audience to evoke the unknowable consequences of all possible interactions. Both here and in *The Artist is Present*, Abramović emphasizes the rules of interpersonal interactions and our undeniable responsibility toward one another, through durational performance. Her choice to place herself as the object (unlike Klein) is key to personalizing the audience's experience of her work, and has set an example for my work as well.

## **2.9 Pauline Oliveros: *Rock Piece* (1979)**

While Oliveros is celebrated for her early work in electronic tape music, which aesthetically demonstrated the generative principles of sound art, *Rock Piece*<sup>30</sup> is a later composition that elegantly showcases the indeterminate complexities of nature using the simplest of algorithms. (I have performed this piece in concert on 3 occasions with Experimental Music Collective, 2016-2017.)

## **2.10 Simon Penny: *Petit Mal* (1995)**

*Petit Mal* is a touchstone example of the application of artificial life modeling principles, using a simple feedback loop to apply an algorithmic rule-set that produces what may be

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29. See Chapter 3: Portfolio of Works.

30. See Appendix A.3 for score.

perceived as intelligence or awareness. This piece establishes a baseline for interactivity as a guiding principle and method for demonstrating the operating principles of complex, self-regulating systems.

### **2.11 Christina Kubisch: *Dreaming of a Major Third* (1997)**

*Dreaming of a Major Third* is a piece that exemplifies *musique concrète*, taking recordings directly from life and using them as the raw materials for a composition that is abstracted from its source and yet remains fully referential. This work is built from the sounds of the bells in the clocktower of Mass MoCa, and operates as a surprising recontextualization of the passage of time.

### **2.12 Miya Masaoka: *Pieces for Plants* (2001)**

This sound performance turns the EEG signals of plants into a responsive synthesizer that demonstrates Masaoka's interactions with the plants. *Pieces for Plants* questions the boundaries of what we consider agency or awareness in an interactive system. Her work with feedback loops and experimental sound yields a generative performance process which gives a sensory point of access to hidden relationships and their signals.

### **2.13 Richard Serra: *The Matter of Time* (2005)**

This group of monumental works on permanent exhibition at the Guggenheim in Bilbao, Spain, is an intervention into the everyday, unremarkable experience of architectural space and its effect on the body. Serra's massive, irregularly-shaped works derive an aesthetic surface from negative space, which manifests and amplifies the physicality experience of relative space-time and scale. This installation generates a dramatically shifting physical perspective as one moves along its overwhelming and alienating surfaces, consistently denying vantage points or fixed visual context along any path one

takes through it. These pieces are not metaphors for the experience of space-time; they fully exist as continuous re-instantiations of the dynamic, indeterminate exchange between an audience and its field of perception.

## **2.14 Sofian Audry: *Vévé* (2008)**

*Vévé* is a web-based work of generative poetry, operating on the post-structuralist premise that meaning does not come from language structures, but from dynamic relationships between our changing associations with words. In this work, a web interface hosts algorithmic entities which use simple interactions with their audiences to ‘learn’ new words and associations. As these entities become more complex, they demonstrate the principles of self-organizing systems and “seem to act with their own free will.”<sup>31</sup>

## **2.15 Jane Prophet: *Neuro Memento Mori* (2014-)**

In this ongoing series of explorations, Prophet collaborates with researchers in the field of neuropsychology to model her own contemplations of death and the infinite, and in doing so generates images and objects which are material evidence of life and humanity. This work enlists advanced technology in the forensic exploration of the interior self. In generating digital media from her own biometry and the signals of her own neural network, Prophet’s work throughout this series materializes the relationships within the system of the self. *Neuro Memento Mori* embodies art as process, while it questions the neuropsychological implications of mapping these relationships with digital media.<sup>32</sup>

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31. “*Vévé*,” Sofian Audry, accessed July 19, 2018, <https://sofianaudry.com/en/works/veve>.

32. “*Neuro Memento Mori*,” Jane Prophet, accessed on July 19, 2018, <http://www.neuro-memento-mori.com/>.

## **2.16 N.B. Aldrich & Zach Poff: *Sferics II: Bell Cloud* (2013); *Witnesses: Trikaya* (2015)**

*Sferics II: Bell Cloud* is a generative sound installation which manifests actual events of ionospheric weather. When lighting in the upper atmosphere is detected by a VLF radio antenna, one of an array of tiny bells on the ceiling is activated. The installation captures and expresses these extrasensory events in real time, demonstrating in sensory terms the indeterminate interactions of the world around us. *Witnesses: Trikaya* makes dramatic use of photovoltaic sensors as interfaces, giving agency to individuals in an ‘audience’ of Chinese-made Buddhist chant-boxes, and allowing these boxes to respond to changing imagery of the annexation of Tibet. The chant-boxes operate as autonomous agents, modulating their songs to create a startling chorus of individual voices in concert with one another, and collectively exhibiting what may be perceived as awareness. Both of these works may be said to operate on the principles of artificial life modeling, and work to algorithmically generate aesthetic models of understanding for complex phenomena. Additionally, both are instances of iterative series that rely upon the feedback of prior outcomes to continue to develop more articulate models.

## CHAPTER 3: PORTFOLIO OF WORKS

### 3.1 Cymatics Experiments (Oct. 2015)

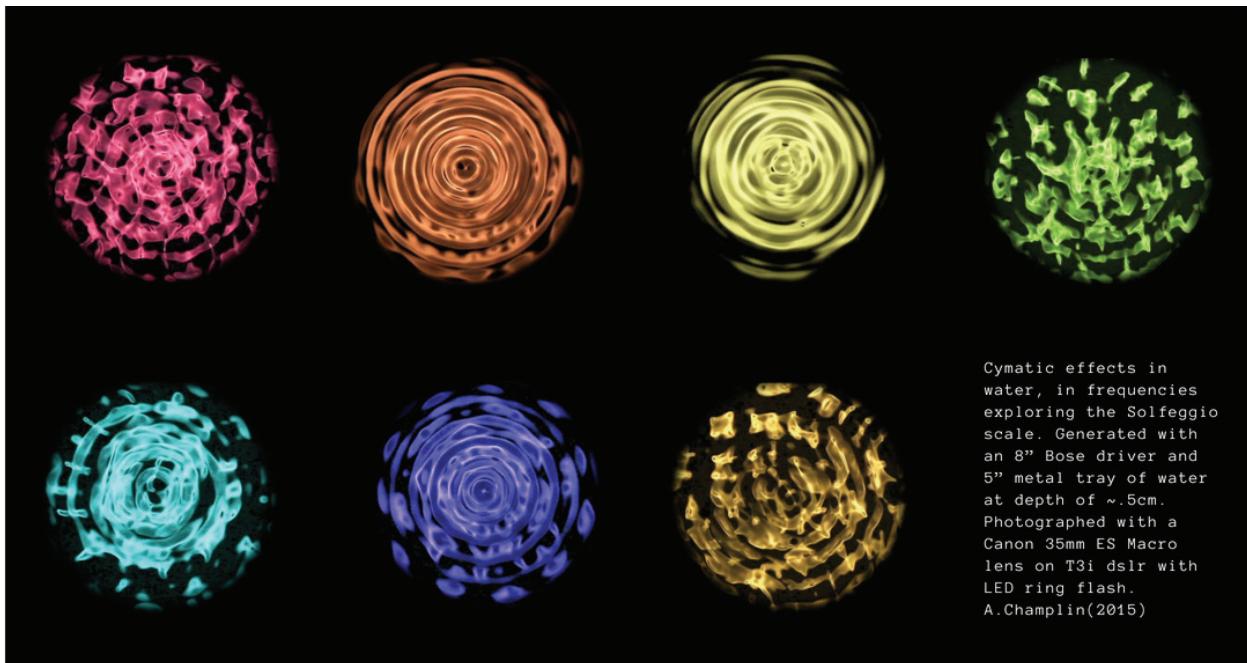


Figure 3.1 Cymatics Experiments. Alicia Champlin, 2015. A collection of still images from color-processed video documentation of cymatic effects generated in water.

In my first semester (Fall 2015), I was exploring Cymatics as a way of engaging with the idea of transference or transposition: mapping signals (such as information, ideas, and phenomena) from one domain into another. Cymatics is a field of research in which sound frequencies are applied to excite a substance, usually water or fine grains like sand or salt. The substance will tend to respond by generating a standing wave in a particular geometric pattern or shape, depending on the different frequencies applied.

In this set of experiments, I was testing a specific set of human-audible frequencies known as the Solfeggio scale, which are the central topic of a pseudo-scientific pursuit. Proponents of the Solfeggio scale claim many variations of historical synchronicities and extraordinary physical effects in the body, such as the different tones' abilities to banish

anxiety, awaken chakras, and cleanse the pituitary gland in such a way as to make one available to alien communications from space.

After testing a number of different strategies to produce patterns from these frequencies and others, I found that some frequencies do produce wonderful images, but that these images owe more to variations in size and type of transducer, size of excited body, and type of excited substance than they do to any particular scalar logic. Although the proposed Solfeggio frequency set did not produce a corresponding set of patterns, I did employ the patterns I was able to generate to create a small catalogue of videos, which I processed in colors related to the chakras, in order from lowest frequency to highest. These videos were later used as visual content in several video projection mapping projects.

Seven videos corresponding to the above thumbnails are included in the digital appendix of this portfolio.

### 3.2 *Chromesthesia Fabula* (Dec. 2015)

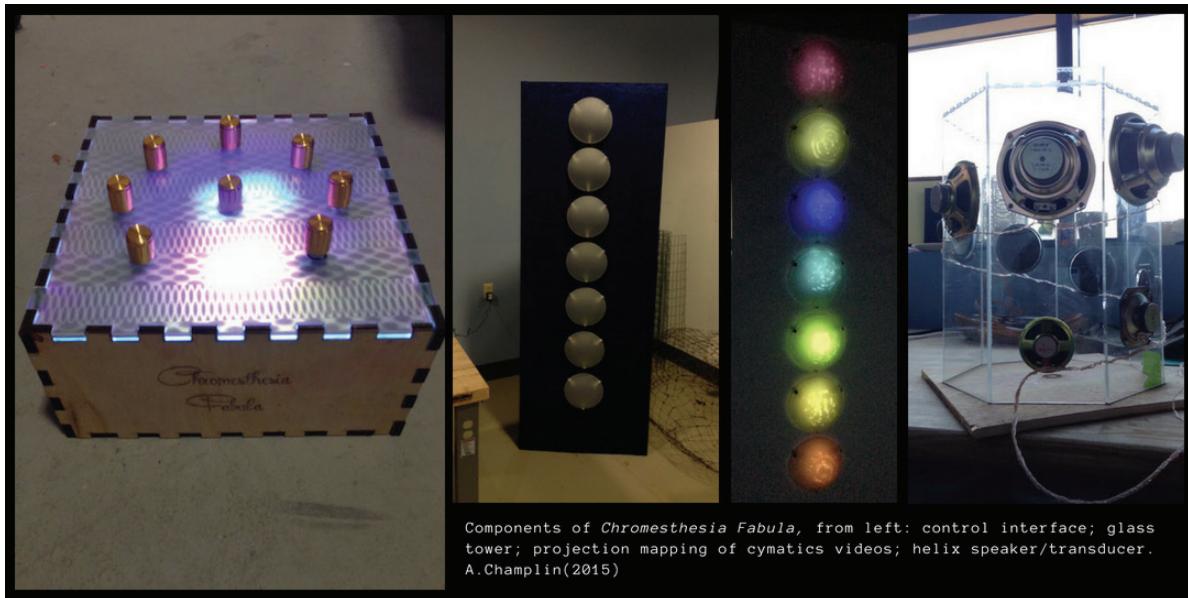


Figure 3.2 *Chromesthesia Fabula*. Alicia Champlin, 2015.

In December of 2015, I expanded upon the cymatics work to present a multimedia installation called *Chromesthesia Fabula*, consisting of a physical tower of 7 glass sconces, projection mapping, a laser-cut heptagonal/helical speaker or transducer, and custom electronics interface. The installation intended to provide audience members an electronic controller to mix 7 tones, with 7 corresponding video channels projected individually on the tower. The 7 tones were representative of the Solfeggio scale mentioned in the Cymatics experiments, to go with the videos projected from those experiments.

This piece was an attempt to further explore the transference of signals, through the concept of synesthesia, or the brain's ability to map one sensory perception onto another. *Chromesthesia*, specifically, is the ability to 'see' sounds as color, or *vice versa*. *Fabula* (from Latin) means "play" or "story." The interface consists of 7 faders that change the volume of individual tones, as well as the opacity of their corresponding video projections. When a tone is made louder or softer, the corresponding cymatic projection fades up or down, giving the user a direct visual sense of the colors and shapes of the sounds they hear.

### 3.3 Experiment #27: CONTROL (Feb. 2016)

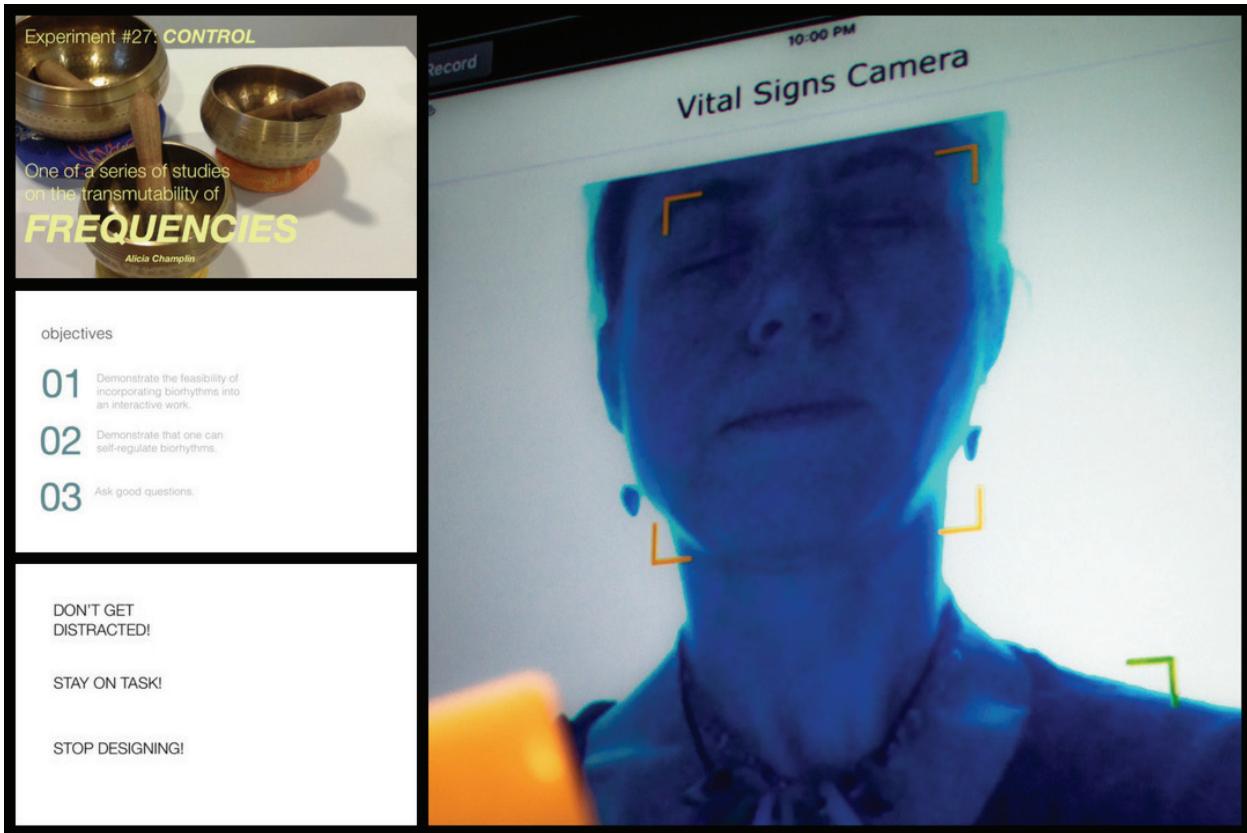


Figure 3.3 *Experiment #27:Control*. Alicia Champlin, 2016. From left: Various slides from left side of split-screen projection; photo of right side of live projection showing heart monitoring app.

*Experiment #27: CONTROL* was a performance made in the Spring semester of 2016, consisting of split screen projection with a slideshow and a live streamed heart monitoring app on the other. In front of the screen, I sat on the floor in mediation, with an iPad running the heart monitor app. This was presented as a surprise alternative to giving a talk about current work in progress.

The stated objectives of this work were to: 1. Demonstrate the feasibility of incorporating biorhythms into an interactive work. 2. Demonstrate that one can self-regulate biorhythms. 3. Ask good questions. The slides quickly detoured into a stream-of-consciousness style relay of google searches, notes, and images relating to my developing

research, while on the other half of the screen, a live image of my face with my BPM broadcast in real time as I tried to meditate under the bright stage lights.

Before sitting down, I handed out 3 tibetan singing bowls and asked the audience to play and pass them around. This created a scene for meditation and used the audience in favor of my efforts, bringing them into the performance, rather than keeping them separate as spectators in an antagonistic stance.

This piece is shared here because it was a prototype of ideas and a foray into the possibilities that later enabled the series of works titled *I Am Sitting*.... It is worth pointing out the choice of words: “demonstrate” and “stop designing”. These are concepts that have become the heart of my practice, in an effort to move away from the personal psychology of the artist and toward work that speaks for itself in its own aesthetic terms.

### 3.4 *I Am Sitting... (vers. 1)* (Apr. 2016)



Figure 3.4 *I Am Sitting... (vers. 1)*. Alicia Champlin, 2016.

*I Am Sitting...* was a first iteration prototype. It consisted of an arduino-based heart rate sensor with MaxMSP data processing and a live camera/projection feedback loop. I sat in between the camera and projection surface, as a literal intervention in the loop, and my heart rate data became an interventionary control mechanism in the live feed, controlling brightness, contrast and saturation of the video output. The resulting visual effects were a product of a natural feedback loop as well as of my own biosignals.

The intent of this project was to explore the potential of the mind to manifest itself in direct terms without mediation by physical gestures. This is a response to a specific theme in the work of Alvin Lucier, that of bypassing the *choreography* of artmaking. This piece owes much to his works “I Am Sitting in a Room,” (1981) and “Music for Solo Performer,” (1965).

At the time of this work, I was also still interested in the direct transduction of a signal from one medium to another, and was beginning to dig deeper into language and communication structures for clues about how meaning, identities, and sociolinguistic ecosystems operate. This piece allowed some movement in the right direction, again away from descriptive terms and toward the direct demonstration of systems and their generative properties.

### **3.5 Cabaret Voltaire Improv Performance (Aug. 2016)**

In July and August, 2016, I traveled to Europe as part of my field studies research. Manifesta 11, the well-known biennial festival, was in Zurich at the time I was passing through, and I found that I could not enter any event at the famed home of dada, the Cabaret Voltaire, without being a Manifesta passholder. The only other way one could attend an

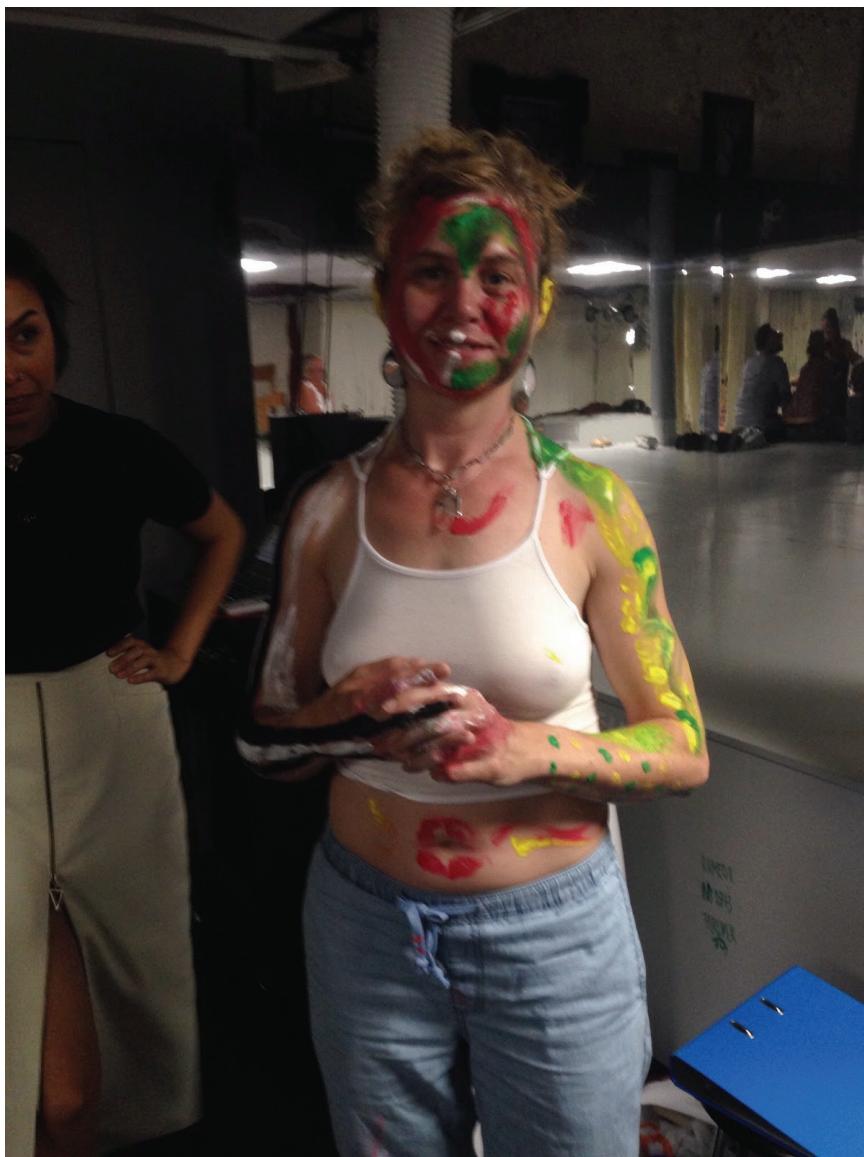


Figure 3.5 Alicia Champlin at Cabaret Voltaire; August, 2016.

event was to be a member of Cabaret Voltaire’s Artists’ Guild, and the only way to become a member was to be accepted to perform on its stage.

Luckily, they invited “Spontaneous Performers” to the stage every Wednesday! So, I booked an extra night in my hotel, and got to work on the task at hand: “Bring a handmade drawing or handwritten concept on a vertical A4 page, show it to the Zunftmeister and if it fits the guidelines of a joint-venture performance you will be welcome to participate.”

Since I was alone and didn’t know anyone in the city, a joint-venture pitch would be difficult. I had nothing with me to demo any of the work I’d been doing recently - only a book about cognitive neuroscience and free will, and 20 hours to come up with an idea. So, I bought some finger paints in the local supermarket, and invited the audience to participate while I sat on the edge of the stage and read to them a random passage from my book. The page opened to a section about the way our social interactions help to construct our personalities, and the audience turned me into a work of art of their own.

This turned out not to be a random act of spectacle, but another example of work that used my body as media and deferred the task of authorship to the system being demonstrated.

### 3.6 Big Words (Nov. 2016)



Figure 3.6 Big Words. Alicia Champlin, 2016

In continuing to look at language and social media, I was hoping to distill some truth about how modern media systems and their platforms change the way we consume words and ideas.

In this exploration, an open-source word frequency analysis tool was applied to a number of PDF texts, creating ‘wordcloud’ images, a shape and concept that is visually familiar to any social platform user. This started with the largest and most inconsequential body of text I could think of, three years’ worth of the junk in my inbox spam filter. The result is still readable and recognizable as a distillation of demands on one’s attention. I went on to apply this tool to several of my own essays and eventually a few of my favorite theorists. My choice of colors and icons were according to those suggested by the material, although clearly (shown here in the case of the two Baudrillard images) some arbitrary choices have been made which somewhat influence the output of the calculations.

This set of images was one of my first projects which explicitly utilized an algorithmic approach to generating output.

### 3.7 Motive (Dec. 2016)

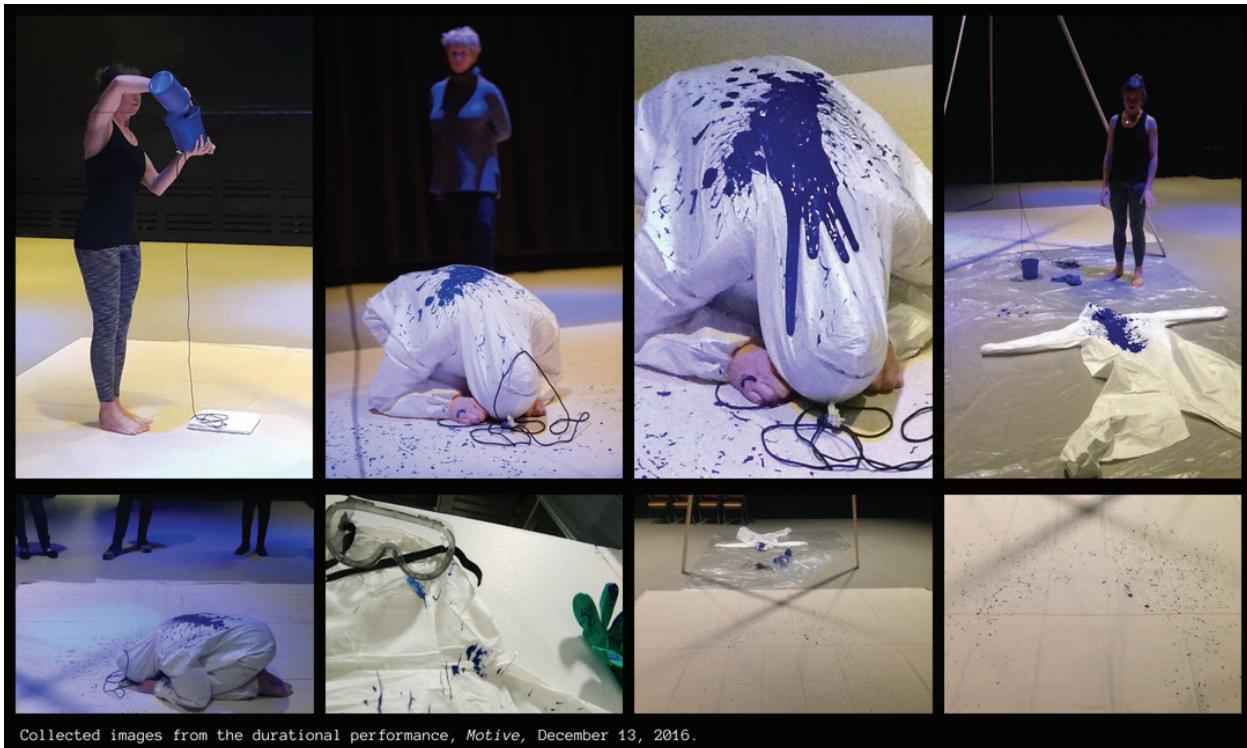


Figure 3.7 *Motive*. Alicia Champlin, 2016.

The durational performance, *Motive*, went through two public iterations. It began as a response to themes in Yves Klein's *Large Blue Anthropometries*, specifically those of distancing the hand of authorship, and making marks that were recognizable as both iconic (figurative traces) and indexical (literal traces). I wanted Klein's ideas, but without all the misogynistic performance and feminist protest that his pieces are infamous for generating.

My attempted solution was a primitive mechanical system that seemed to be the simplest way to get paint onto canvas, using my body as a 'neutral' point of mediation. This took the form of a rudimentary tripod with a pulley and rope to hoist a bucket of paint (International Klein Blue, of course, or the closest I could afford) above the canvas, with me in a white coverall crouched below. The expectation was that the paint would splatter off and create a negative of my form on the canvas.

In the first iteration, the forensic-style display of the paint-splattered suit got much more attention than the action painting produced on the canvas - one person called it a body condom, pointing out how the work was still squarely in the realm of sexually exploitative vocabulary. I felt the conceptual aims of the performance were lost in the same feminist debate in which Klein's work seems to be buried.

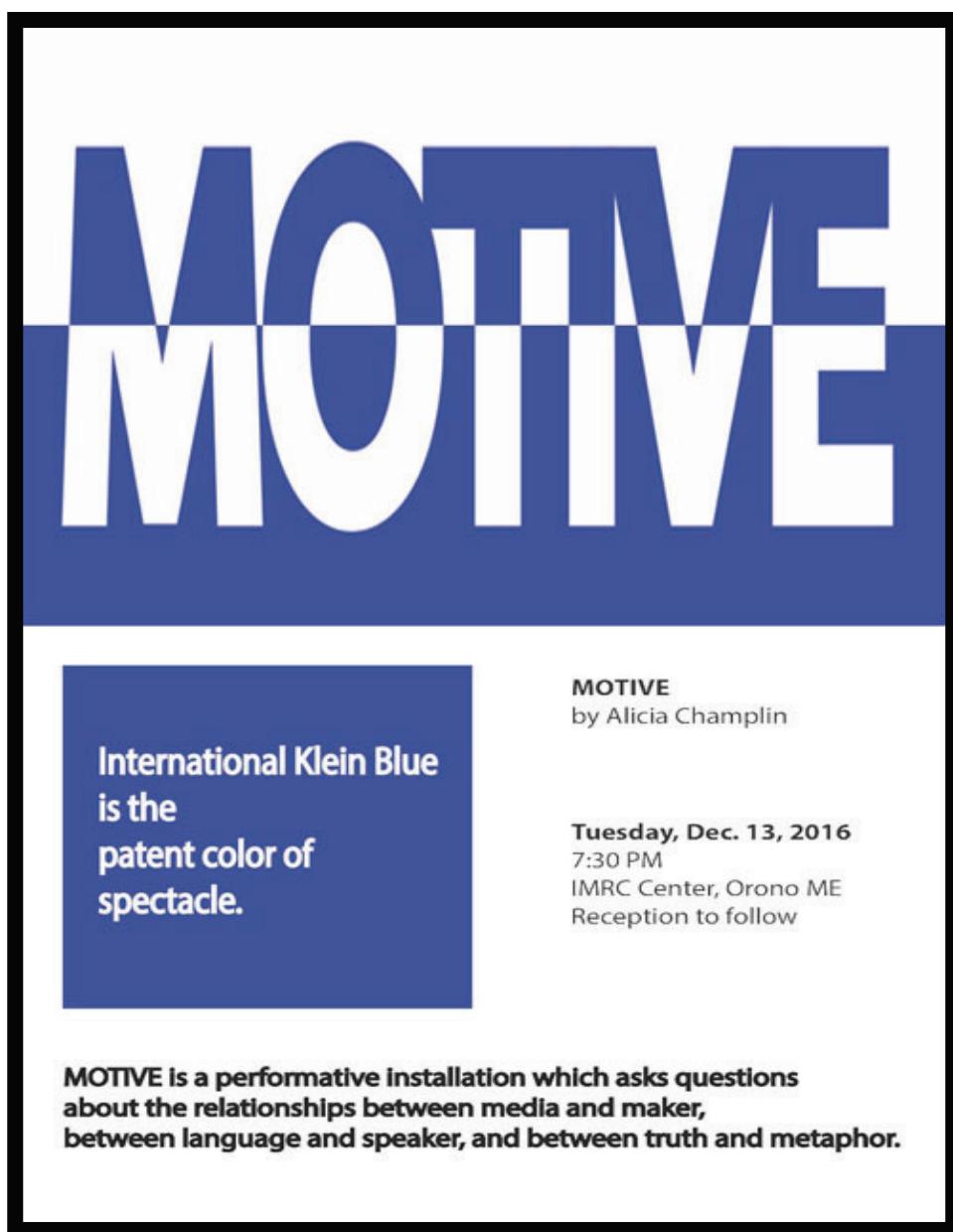


Figure 3.8 Poster for *Motive*. Alicia Champlin, 2016.

The second iteration was a bit more of a deliberately produced event. With better promotion, better staging, and a streamlined wall text, it left fewer arbitrary details to chance. The durational aspect of the performance lasted nearly 40 minutes. I did not show the resulting suit (it had to be cut off me); this time, only the performance along with a narrative of the conceptual themes of authorship and semiology, and a designated time for discussion afterward. The semiotic power of the body as a symbol to dominate a tableau, and its often immediate reference to objectification, became the salient theme I took away from this work, as I continued to apply the methodologies of reductionism and simple self-regulating systems to produce generative work.

### 3.8 Social Media for the Millennia (Dec. 2016)



Figure 3.9 *Social Media for the Millennia*. Alicia Champlin, 2016.

In this series, I again used word frequency analysis to produce wordclouds around the theme of social media, looking back to an age before digital media. This set presupposes the Roman politician and writer Cicero as the pioneer of social media, insofar as he was a hub of information in the form of letters, copied and annotated, which he circulated to a vast network of his acolytes while he was in exile. In counterpoint to these examples from two millennia ago, I placed an influence in social media from a bicentennial lens, Jane Austen, through three of her most distributed works. Aesthetic choices were determined by researching the respective authors and selecting fonts and colors that were consistent with their circumstances. In the contrasts between these two sets, I found interesting questions about the changing nature of social values surrounding communication.

### 3.9 *I Am Sitting... (vers. 2)* (Mar.-Apr. 2017)



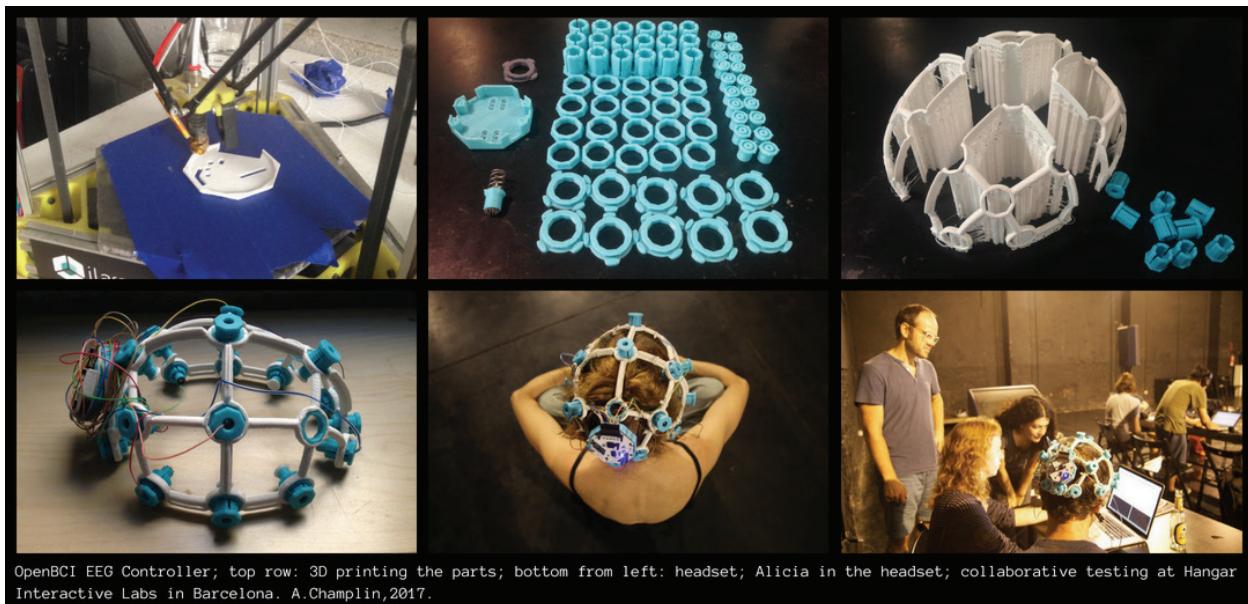
Figure 3.10 *I Am Sitting ... (vers. 2)*. Alicia Champlin, 2017.

After several months of further development, I was working with what I consider the second complete iteration of *I Am Sitting....* This second version was marked by differences in the equipment and the aesthetic, and the purpose was beginning to evolve as well. A deeper discussion of this is included in the main thesis document.

*I Am Sitting... (version 2)* was performed with full staging as part of an exhibition, *Studio Ajar: Performance Edition - 4 Aspects of Experimental Performance* [April 28, 2017], with two mirrored projection screens, which generated a fractal effect in the video feedback loop. Unlike the first iteration, much work was put into programming for the beginning and ending sequences, a sort of choreography that grounded the work within a performance aesthetic.

An additional site-specific edition of this work was performed at the Black Mountain College 2016 *{RE}Happening* biennial. In that edition, a rougher version was presented outdoors after dark, with a portable pico projector and a single screen that was primarily visible from a great distance across the water. Given the open-ended nature of the audience's encounters with the piece, it took full advantage of its visual qualities and owed less to the conceptual groundings, leaving the audience to generate their own narratives about the work.

### 3.10 The BCI Controller (Jun.-Aug. 2017)



OpenBCI EEG Controller; top row: 3D printing the parts; bottom from left: headset; Alicia in the headset; collaborative testing at Hangar Interactive Labs in Barcelona. A.Champlin,2017.

Figure 3.11 OpenBCI Controller. Alicia Champlin, 2017.

During an intensive full-time field study from May-August, 2017, I devoted myself to a collaborative research and development project at Hangar Interactive Labs in Barcelona, Spain.

Thanks to a generous grant and three months of support in Hangar's labs, I developed my work with brain-computer interfaces (BCI) from concept, through prototyping, and into active practice. Drawing from an open source community surrounding the OpenBCI platform, I built from scratch (mostly through 3D printing) a research-grade EEG headset with an 8-channel sensor array, capable of the scientific standard "10-20" electrode placements. The device is paired with a very sophisticated micro-controller/development kit, which enables wireless signal streaming at incredible levels of detail and provides the same capacity for biosensor sampling as that of a manufactured medical device, at a third to a quarter of the cost. Additionally, it is handmade and customized to my own specifications.

Throughout the build process, I became a part of the OpenBCI online community: asking, researching, and answering questions, and occasionally contributing documentation and solutions to shared problems. While I was in the process of building the device, I was also giving weekly workshops at Hangar's 'Open Thursdays,' a community forum and mentoring series hosted in their maker-space. In mid-July, I delivered an artist talk about the headset project and my practice, in relation to research-based design, at Episode 19 of Hangar's *Paratext* series, which has now been published in text as part of the *Paratext* anthology. Happily, many contacts and collaborations came out of this opportunity to speak.

Once the headset was completed, I began exploring various open-source applications and modules to analyze the data stream from my own and a collaborator's brainwave signatures. I have since developed several custom software modules with MaxMSP for use with the headset to generate audio and video media for performance and installations. I have also forged several international collaborations with other artists. These efforts exposed me to Live Coding, an emerging sound and performance practice, and led to prototyping new ways in which the EEG data could be shared in real time and used in various expressions. Two of these side projects came about as part of my show *Extrospacio/Interfacio* at the White Gallery in August 2018. One collaboration led to a prototype for a component of a live-coded music performance, and the other activated a real-time plotter to draw a representation of my brainwave activity on the wall of the gallery.

As a tool, one of the most interesting features of the EEG headset is its ability to generate and share endless amounts of non-deterministic content for use in many different approaches to generative systems and generative art, particularly in sound, video, computer/net art, and interaction design.

### 3.11 *I Am Sitting...* (vers. 3) (Aug.-Sept. 2017)



Figure 3.12 *I Am Sitting...* (vers.3). Alicia Champlin, 2017. From left: *I Am Sitting...* (live detail) at IMRC (Sept. 2017) Live performance at the White Gallery (Aug. 2017); eeg headset on stage at IMRC (Sept. 2017); photo of lecture following performance.

In the fall of 2017, as I finished my residency at Hangar in Barcelona, I produced version 3 of *I Am Sitting...* which utilized the new EEG headset and new software to generate both video and audio. This was the centerpiece of a collaborative show curated by me, *Extrospacio/Interfacio*, which showcased the capabilities of the EEG headset and featured *I Am Sitting...* as the main event.

This version took quite a leap from the last, in that it was the first performance to feature sound, and attempted to combine that with the generative visual components of the video feedback loop. The performance was also a departure from previous versions in that it took place in a small, intimate setting and the audience was essentially placed in the same space as

the performer. A small room, draped in white gauze, with abstracted visualizations projected on three walls, was filled with informal seating. The performance again was essentially a meditation, producing the visuals and the immersive sounds of brain music. Here, the volume of the sound was directly connected to an algorithm that measured concentration as defined by the EEG data.

Upon returning from Barcelona to the University of Maine, I produced another performance of this work, for the purposes of capturing documentation. In conjunction, I presented an hour-long lecture about brain-computer interfaces (BCI) and the research I had been doing to develop the performance. After the lecture, participants were invited to a full demonstration and Q&A workshop which outlined the way the performance came together and how each of the components worked.

### 3.12 Transfer (Nov. 2017- Feb. 2017)

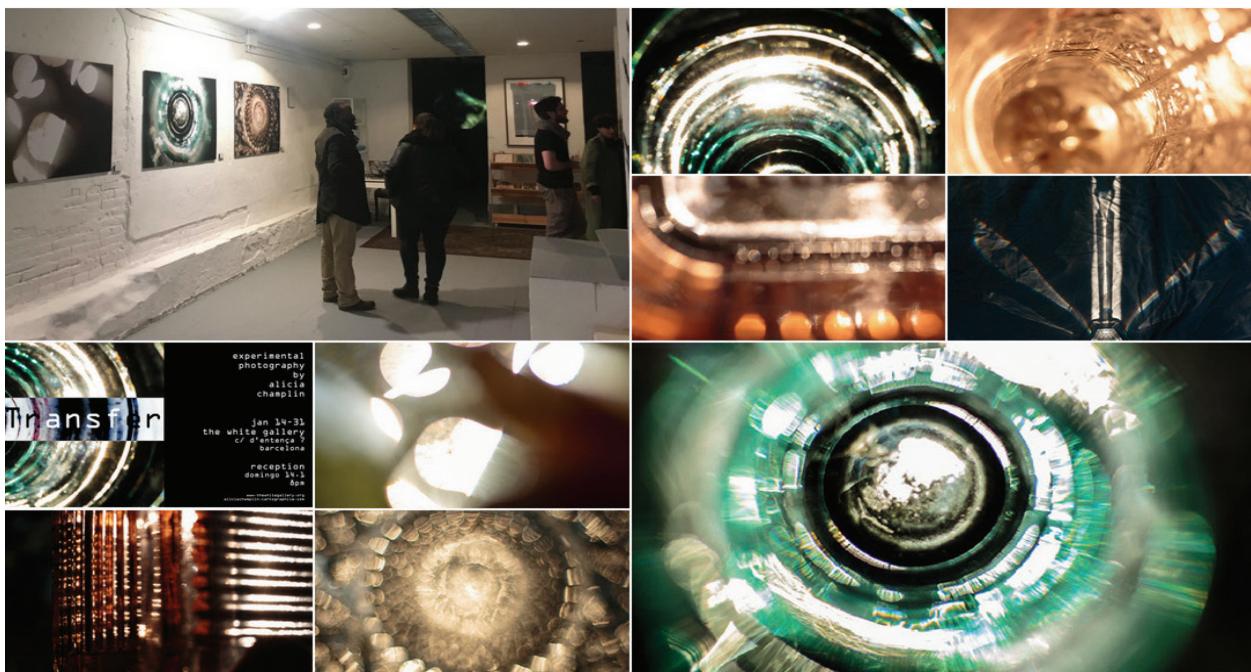


Figure 3.13 *Transfer*. Alicia Champlin, 2017. Clockwise from top left: Opening reception at the White Gallery in Barcelona, 08/17/2017; Transfer #183; #068; #163; #170; #193; #222; #170; #201; Announcement card.

*Transfer* is an experimental photographic study using tableware and direct sunlight. This study was undertaken as an exploration of signal transference, mediation, and pattern recognition. The components used recall the elements of a traditional still-life construction, but the results bear no resemblance. The images produced and presented have not been manipulated for effect, but are simply a record of the informational transactions between the sun, the object, and the camera -- or in terms of communication, the transmitter, the filter, and the receiver.

These images, as with all still-life images, exist in the continuum between formalism and semiotics. The history and tradition of still-life is nearly as long as that of human image making, but are these images a study of pure light and form or are they a study of symbolic objects and their situational rhetorical vocabularies? At what point in our communications stream do we grant the attribute of meaning to what is otherwise simply data?

This body of work was exhibited as a solo installation in the IMRC in November/December of 2017, and at the White Gallery in Barcelona in January/February of 2018. In both cases, the images were displayed as large-format photographs and in digital projection at an architectural scale, along with several videos shot in the same method.

### 3.13 *Clapping Music for 6 Parties in a Cube* (Jan. 2018)

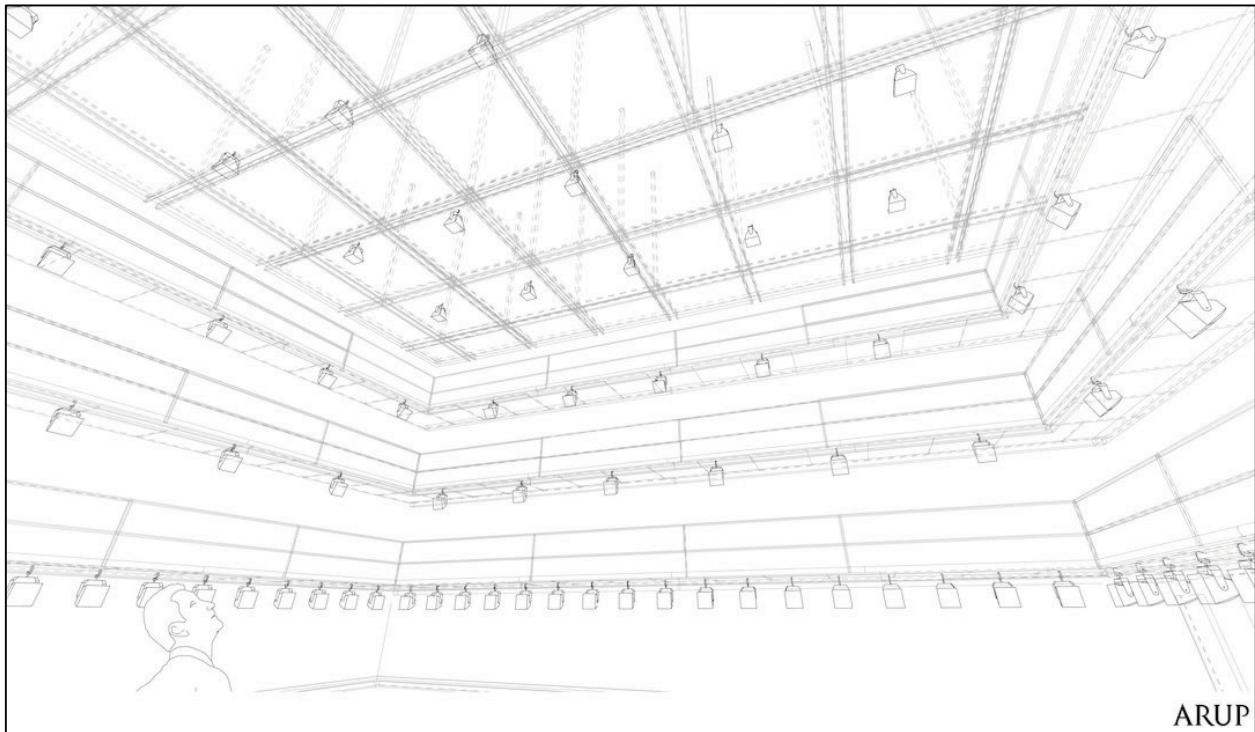


Figure 3.14 The Cube. A rendering of The Cube at Virginia Tech (Blacksburg, VA). Image courtesy ARUP.

*Clapping Music for 6 Parties in a Cube* is sound composition written in MaxMSP and culminating in standalone executable software. This 3D sound piece was composed specifically for Cube Fest 2018 at Virginia Tech (Blacksburg, VA), to be presented in The Cube, a “massively multi-channel” sound stage with 124 individually addressable speakers.

The work was inspired equally by the Balinese kecak (“k’chack” or Balinese Monkey Chant) and the recent hype surrounding the January 2018 State of the Union Address. Kecak chanting is closely related to ‘kotekan,’ a type of interlocking pattern music found in gamelan compositions both traditional and contemporary, such as those by minimalist composer Steve Reich.

The kecak chants are massively multi-vocal compositions for 100 or more voices, with emergent polyrhythms and distinct spatialization effects. Kecak was an ancient trance ritual

of exorcism, and was later developed into a dramatic form whose narrative describes a great battle for the people and the eventual exile of a king.

Today, a similar battle ensues in the American cultural consciousness. As an annual waypoint in our political narrative (and a timely influence on this piece), the State of the Union Address is a forum dedicated to formalized traditions of validation and dissent. Approval and denial are dramatically ritualized - with excessive applause throughout the speech, and immediately followed by the vehement rebuttal of the political minority. The State of the Union Address functions as an exorcism of the uncertain, codifying political ‘truths’ and defining allegiances.

‘Clapping Music for 6 Parties in a Cube’ applies the vocabularies of these two parallel dramas to the unique technical opportunities afforded by a 3D sound environment in order to playfully explore these tensions in a visceral medium, with minimal rhetoric. This iteration of the composition is an abridged version for 6 channels which demonstrates its conceptual and operational form in a 360° environment. It’s ultimate form addresses the Cube’s 124 speakers with 6 chorused groups to further highlight the individual voices in the array.

### 3.14 Duet for Bow Chime & Live EEG (Mar.-Jul. 2018)



Images from performance of *Duet for Bow Chime and EEG*. Left and center: March 27, 2018 IMRC recording session with discussion; right: July 9, 2018 at the Apohadion Theatre, Portland, ME.

Figure 3.15 *Duet for Bow Chime and Live EEG*. Alicia Champlin, 2018

*Duet for Bow Chime & Live EEG* was first a live improvisational performance recorded in the IMRC's AP/PE on March 27, 2018. A second iteration was performed at the Apohadion Theatre in Portland, Maine, on July 9, 2018. The second run improved upon the sound quality with upgraded transducers and a longer performance with greater depth and opportunity for the audience to hear the range of the instrument.

This work uses a modified instrumental technique for the bow chime, which includes live EEG (brainwave) data in combination with bowing. EEG data processed through custom software built with MaxMSP is converted to a sound signal and output through a pair of full-range transducers attached to the resonator of the bow chime.

The effect is such that the bow chime's own range of frequencies becomes focused where it is resonant with the EEG signal, and the two work together to produce complex layers of sound. Further, the normal haptic feedback loop between the bow chime and player, which allows the player to choose sympathetic bowing actions, is layered with the added

element of biofeedback from the EEG sounds generated by the player in action. The result is that all 3 components (the player and both instruments) are balanced in continuous feedback loops with one another.

The bow chime in use for this project is a modified bow chime developed by Matt Samolis. I have been studying ‘cymbal bath’ techniques for this instrument with Samolis since mid-2017. The instrument is modeled on the original bow chime invented by German artist and composer Robert Rutman in 1967.

### 3.15 *Lasting and Leaving* (May-Jun. 2018)

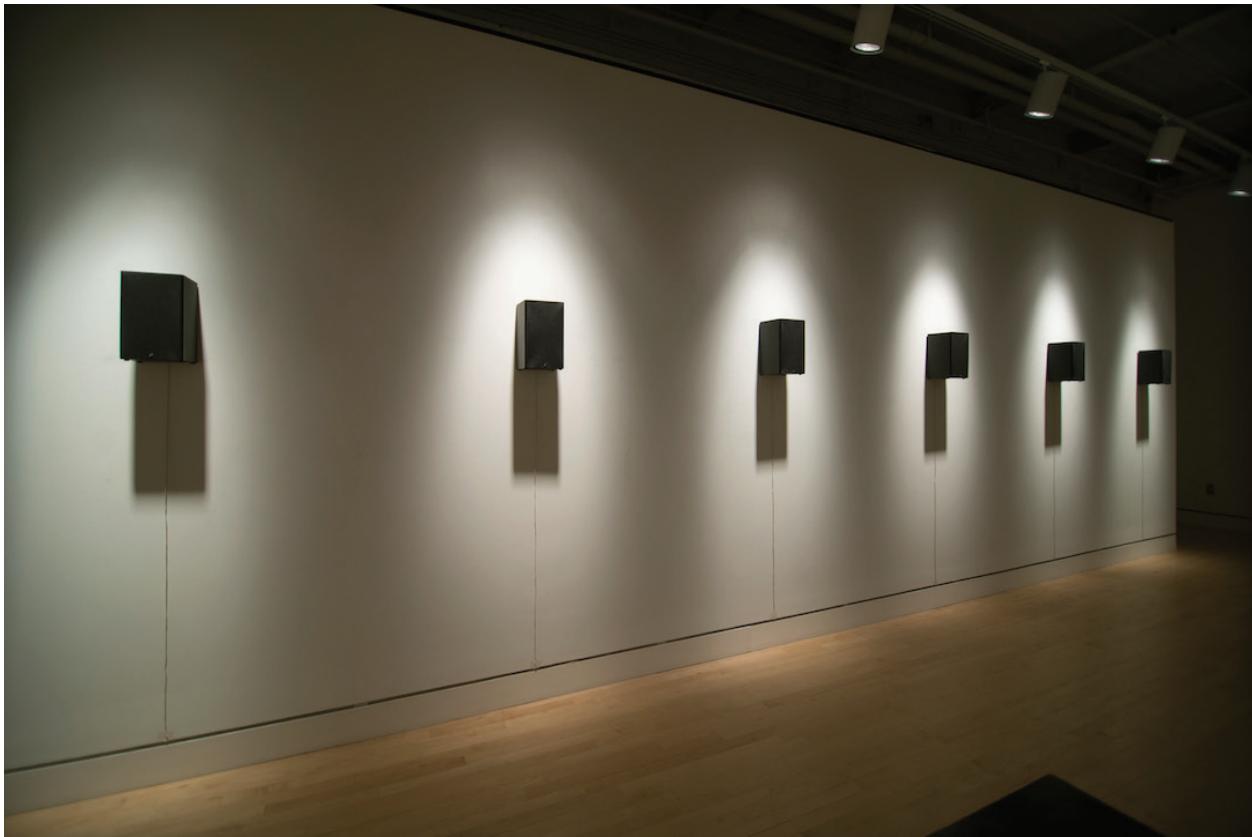


Figure 3.16 *Lasting and Leaving*. Alicia Champlin, 2018. From the Without Borders XV thesis exhibition, Between You and Me.

*Lasting and Leaving* is a live-generated sound composition and installation built with MaxMSP for a multichannel speaker array. Random periodic sequences are triggered by foot traffic in a well-traveled area. The piece requires an audience to work, but as long as people continue to arrive, it will play indefinitely.

This work was partly inspired by the 1913 score *Musical Sculpture* by Marcel Duchamp, which says in part:

*Sounds lasting and leaving from different places and forming a sounding sculpture that lasts.<sup>33</sup>*

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33. Marcel Duchamp, “Musical Sculpture,” in *Sound*, ed. Caleb Kelly, (London: Whitechapel Gallery, 2011), 168.

This was later interpreted as *Sculptures Musicales* by John Cage.<sup>34</sup>

This piece is also a personal recalling for me, near the end of my MFA studies. I began my research into systems thinking and communication in the critical examination of a seven-week pilgrimage undertaken in Japan, which cemented for me the idea that an environment encodes the embodied access of those who travel through it, leaving traces and taking pieces with them.

*Lasting and Leaving* demonstrates one of the core principles of systems theory: that simple, rule-based actions by autonomous individuals will layer upon one another to generate complex and dynamic group behaviors.

This work inhabits a standalone executable program with a fully developed user interface. A prototype with 6 speakers was installed briefly in the main hall at the IMRC. Later, the full version was displayed in Lord Hall Gallery as part of the Without Borders XV Thesis Show: *Between You and Me*, May-June of 2018.

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34. See **Appendix A.4**.

### 3.16 Custom Software Library (2016-2018)

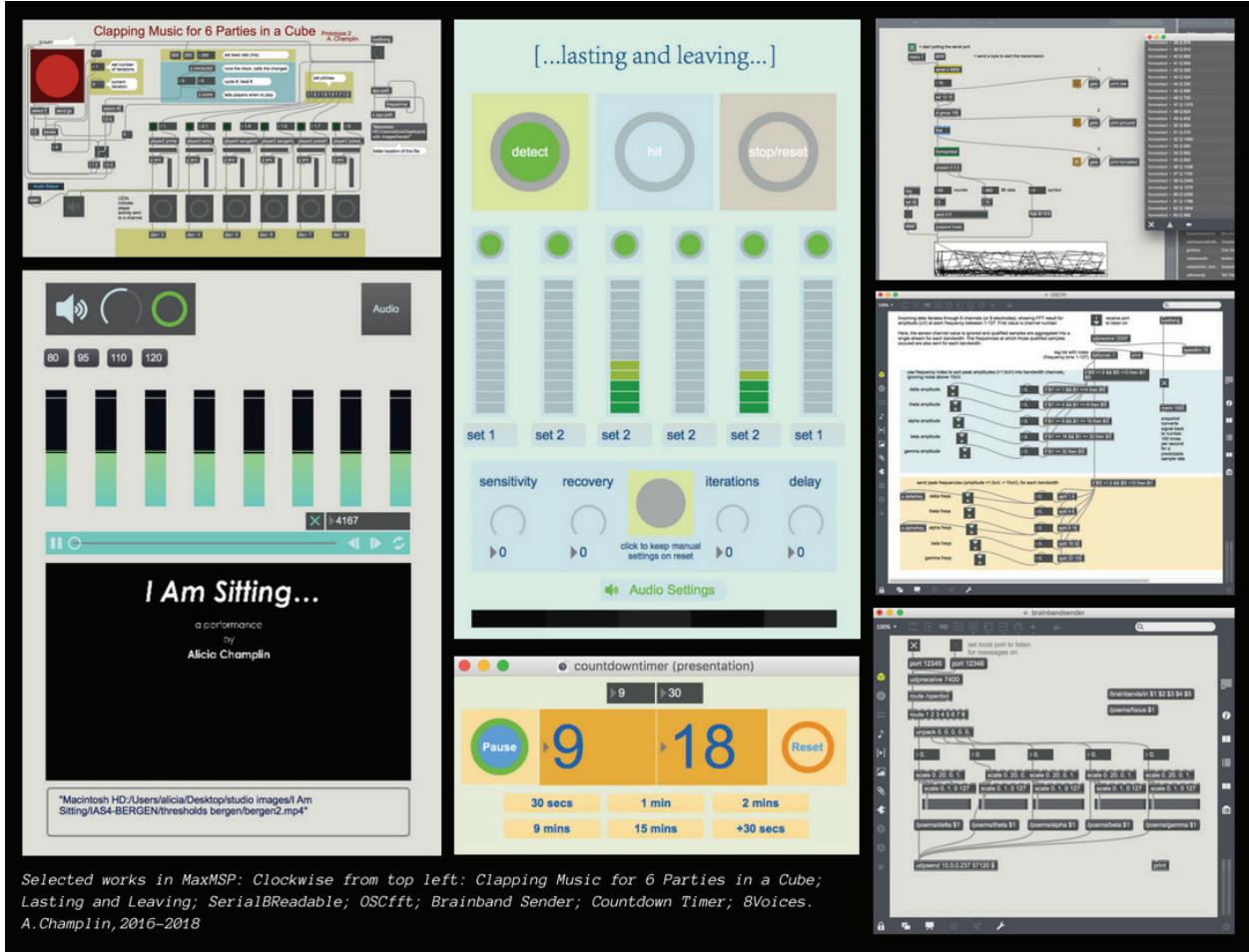


Figure 3.17 Selected Works in MaxMSP. Alicia Champlin, 2018

In the summer of 2016, I took on MaxMSP as an independent study. Since then, I have developed numerous pieces of software and plugin-style ‘patchers’ in MaxMSP, tangent to some of the projects already mentioned. A few examples are custom OSC (Open Sound Control - a communication protocol) nodes, that enable the import and export of tailored data structures for use in collaborative or component projects, or custom parsers that import and organize data from microcontroller interfaces for use in a number of ways. Here is a brief overview of the library of tools I have created:

- *Soundcheck*: a basic tool to quickly test a system’s multichannel sound configurations.
- *Mousesynth*: a quick demo piece for use in teaching & workshops. Uses fundamental objects, definitions, and simple interface controls to demonstrate many introductory concepts of MaxMSP. Originally developed as a live performance for a “9-Minute Challenge” in which Live Coding performers must start with a blank screen and play a live sound piece from scratch within 9 minutes.
- *Quantizzle*: a plugin-style component or “abstraction” in MaxMSP terms which converts system time in milliseconds to human-readable time. Accompanied by a short teaching video explaining the solution to the problem and steps to build it.
- *Countdown Timer*: a standalone app with fully developed user interface; it does exactly as the title implies. Users may input a time value or choose from presets and the timer displays a countdown until the desired time has elapsed.
- *Scratchphases*: Another “9-Minute Challenge” Live Coding composition, this piece produces layers of sound with dynamic timbre and rhythm based simply on feeding the phase value of an oscillator back into itself as an amplitude modulation signal. Provides a teaching demonstration of what *phase* is in relation to sound.
- *Bpm2ms*: a conversion module to handle raw data from an arduino-based heart monitor. Outputs a beats-per-minute value in milliseconds.
- *ZenMonitor 1 & 2*: Used in *I Am Sitting... (versions 1&2)*, this software provides an interface for live streaming data to augment a video feedback loop, changing contrast, brightness, and saturation in real time before exporting video for projection.

Components:

- *SerialBReadable*: receives and decodes incoming serial data from an arduino-based heart monitor that I built for the first iteration of *I Am Sitting....*
- *ScaleTo*: a smart-scaling component that allows for customized mapping of data into more than one useful range.
- *EEG Serial Eater*: receives and decodes two values from a hacked Mindflex™ EEG toy.
- *Mindwave*: receives and decodes ten values from a hacked Mindflex™ EEG toy, and provides status as to connection quality. Used in *I Am Sitting... (version 2)*.
- *Mindwave Selector*: parses and scales individual data streams from ten parameters output by a hacked MindFlex™ EEG toy. *(version 2)*
- *OpenBCI Sound*: software used to generate sound for *I Am Sitting... (version 3)*.
 

Components:

  - *OSCfft*: Imports FFT (fast Fourier transform) data from the BCI headset over OSC (Open Sound Control) protocol, and parses it into 127 distinct streaming values for use as a driver in modulating synthesis. Sorts amplitude values into five bands along the spectrum of 0-127Hz (respective to 5 types of brainwaves), and outputs a moving average of the strongest frequencies for each band of the spectrum.
  - *OSCTimeplot*: Imports 8 channels of raw, real-time EEG data in microvolts over OSC protocol, parses it into 4 distinct streaming values for the regions of the brain (frontal, central, parietal, occipital), based on the geographical placement of the 8 sensors providing the data.

- *OSCfocus*: Imports focus data from the EEG headset over OSC protocol, parses it into a streaming average by converting on/off values into a dynamic percentage over time.
  - *Deltabeats*: Applies the lowest frequencies of brainwaves (delta, 1-4Hz) as modulating values in a synthesizer, designed to make these low frequencies audible as a beat, rather than as a pitch. The carrier frequency of this synthesizer can be tied to heart rate data from another sensor input.
  - *Sonograph*: a modular synthesizer built for brain music, using raw amplitude values as pitch, an FFT hashed value as a modulator, and a scaled measurement of meditative focus as amplitude. OpenBCI Sound contains 4 separate instances of this synth, each using data from a different region of the brain.
  - *Pranger*: a self-learning scaling component that tracks the highest and lowest of incoming values, in order to more proportionately scale streaming data onto another range of values.
  - *RampOff*: a component that provides settings for automatically shutting down other components, for instance at the end of a performance.
- *BrainBand Sender*: Receives, parses, and repackages streaming amplitude values for the 5 bands of brainwave activity (delta, theta, alpha, beta, gamma) and makes them available over OSC for any user on the same network. Utilized in multiple collaborative projects with other artists.
- *8Voices*: The synthesizer software that supports *I Am Sitting... (version 4)* with 8-channel surround sound for spatialized brain music. This standalone application with

full user interface automates fade-in and fade-out, mixes for 8 channels, and controls and monitors video output with automated timing cued to the performance.

- *Voicebands*: Software supporting one synthesis method for brainwaves. Sonifies streamed EEG data with a pitch-bending effect proportionate to the signal's deviation from a running average.
- *Kecak2Clap*: a standalone app with full user interface that supports the composition *Clapping Music for Six Parties in a Cube*. This is an algorithmic composition that uses a deterministic system, analogous to a music box. It plays a specific sequence of defined patterns, but the structure and logic within can be configured to play any pattern. Components:
  - *Conductor*: keeps the timing and calls the changes;
  - *Score*: specific rhythmic configuration for 6 independent ‘voices’;
  - *Player*: plays media files on command and reports status;
  - *Env*: randomizes the playback envelope settings for each voice to create a chorusing effect when the same media file is played across multiple ‘voices’.
- *Lasting and Leaving*: a standalone app that supports the environmental interactions and 6 channel sound generation for the *Lasting and Leaving* installation described earlier in this chapter. Components:
  - *PixelTrigger2*: uses a live camera feed to monitor traffic through a space. Identifies meaningful changes in the monitored area’s brightness over time compared to a threshold which is continuously calculated in real time from running averages.

- *Fileselector*: Manages access to a given folder of available media files and allows for hot-swapping to a new folder any time. Outputs the name and path of a random file within the given folder, with no repeats until all are used.
- *Duchamplayer*: an autonomous agent designed to work in a modular array. This player accepts a single media file at a time and plays it according to internal settings: looping a set number of times while iterating over any number of separate audio output channels.
- *Iteraterer*: A small control component that supports looping a file according to custom settings. Communicates play-counts and controls automated starting and stopping.
- *Channelchooser*: A small control component that supports custom spatialization patterns in playback across multiple audio channels.

## **CHAPTER 4: THESIS PROJECT, *I AM SITTING...4***

### **4.1 Project Overview**

My thesis work is the fourth iteration of a project called “*I Am Sitting...*” that has been in continuous development for over 2 years. My practice as an intermedial researcher/artist has been largely consumed with this project and its tangents. Each iteration of this work has directly shaped my practice and developed my research methodologies to the point that they are today. In fact, I could not have arrived at these methodological choices (let alone write about them with any clarity) without drawing heavily on the outcomes of this research project, in stages over the last two years.

“*I Am Sitting...*” is a work that includes sound and video generated in real time. This body of work culminates in a live performance of brainwaves in 8-channel audio. Audiences experience an immersive sonic environment that invites them not only to have an engaged listening experience, but also to experiment by moving through the performance space, testing their threshold of influence on the performer, and thus on each other.

The final composition in sound is an algorithmically-generated sonification of live EEG (brainwave) data. As the performer, I follow a score through several physiologically distinct brain states, and custom software (written by me) provides an interface for data processing and real-time sonification. It has evolved through many iterations to its current form, always relying at its core on natural feedback loops and biometric data. In this last iteration, the audience is the most important part of the feedback system.

## 4.2 Applied Media

In this body of work, I rely on performance, video, and sound as the primary media. I've focused specifically on these three because the established aesthetic vocabulary of each of these media directly support the aims of the work, as explained below.

### 4.2.1 Performance

The act of performance is a manifestation. It is a generative act, '*an existence that does not pre-exist*,' says Wallace Bacon when discussing the aesthetics of performance.<sup>35</sup> Given that my work finds some footing in the theory of Performativity, as noted in **Chapter 1**, it is only appropriate to mark these correlations in the media chosen to realize this project. This ability to manifest something in real time that does not describe but *demonstrates* what it is, demands or at least requests a direct engagement from its audience. This ability also parallels my assertion in **Chapter 1** that insights about the interpersonal nature of the human condition are best demonstrated by the *pro tempore* manifestations of a working model of communication.

Further in support of performance as a choice of medium, I feel that *I* am a necessary component in my work. There is much about my process that works to sequester its creative outcomes from my personal psychological will and authority. Therefore, the work can be at risk of seeming overly conceptualized and abstract, disconnected from the subjective experience. Placing myself, literally *my body*, as a primary component of the models I build brings these models back to a place of access, and also gives the model an enactive capacity, (a way to make sense through sensorimotor interactions), and keeps the context in the realm of the embodied cognition. If I can, with my own body, exemplify the embodiment of some

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35. Wallace A. Bacon, "An aesthetics of performance," *Literature in Performance*, 1:1 (1980), 1-9, DOI: 10.1080/10462938009365814

part of a process, then my audience may more intuitively accept a similar embodied experience of that process as well. This interpersonal aspect of performance is requisite for modeling interpersonal communications. To whit, I draw much inspiration from Marina Abramović’s work in this area, with ‘The Artist is Present’ as a clear example.

#### 4.2.2 Video

The use of video in this project has played a major role in several of the iterations prior to the final version of the performance. Some of the seminal ideas for this work were first tested using live video projection, as an interface with the audience which abstracted what I could not have said in words, and instead demonstrated what I was doing in real time.

Early video art echoes some of the primary themes underlying this project - that the systems paradigm doesn’t allow for static truths, and that life unfolds non-deterministically. The first experiments with video came with the advent of the portable video camera, in critical response to the real-time feedback loop of ‘see-self-seen’<sup>36</sup> (from life to camera to screen to life to camera...) which came from the capture of live events. Through the exposure of the working mechanisms of the medium, the aesthetics of videography as an authentic record of events were turned upside down, and used as an abstraction from time and place, much like concrete poetry and music concrete. Nam June Paik’s video works can be seen to operate on these tenets, as they comment on the unraveling of linear narrative in media and the ‘random access’ of the database.<sup>37</sup> Using the technology itself as a generative tool highlights the incompatibility of a static record (a single version of the past or even the present) with a dynamic, indeterminate paradigm.

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36. N. B. Aldrich, in discussion, January 2018.

37. Ippolito, “Ten Myths of Internet Art,” 489.

Early versions of “*I Am Sitting...*” appeared to audiences largely as a screen-based work. However, the fact that I was sitting and meditating in the middle of the space could be brushed aside (along with the conceptual models of the work) and the screen(s) took over. Through informal discussions with audience members afterward, I came to understand that people responded well in the short term to the novelty factor of colorful, dynamic, abstracted visual stimuli, but often didn’t feel compelled to look any further. In short, it played as a cinematic experience, but likely only until they realized there was no linear narrative and no payoff at the end, and that was that. After some thought, this symptom indicated to me that the cinematic (i.e. passive) qualities of previous versions needed to be de-emphasized in so that audience members could understand it as an interactive work rather than a fixed media piece. At that stage I was using simultaneous video *and* performance, and the feedback I was getting was that people simply couldn’t decipher whether I was doing one or the other – not surprisingly, given the contradiction in terms they set up between interaction and passivity. I wanted a to evoke a visual experience that was not cinematic, but performative. Having concluded that my audience was likely having a brief and unfulfilling cinematic experience rather than a performative/interactive experience, my task became to decouple the system’s aesthetics from those of cinema. Briefly, in Version 3, I experimented a bit with disrupting the screen-based aesthetic and projecting formless visuals onto textured surfaces, walls, furniture and floors – something N. B. Aldrich identifies as ‘extended cinema.’<sup>38</sup> Eventually, I was able to let go entirely of the visual in favor of a more performative vocabulary.

Thus, the final version was tuned to further develop and demonstrate the actual performative qualities of the system, by deliberately leaving the video out. The only

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<sup>38</sup> N.B. Aldrich, in discussion, August, 2018.

exception in the end was the inclusion of a tight projection of supertitles that avoided screen-like qualities, in the tradition of opera. This resituated the audience with respect to the interactive qualities, and allowed the use of sound to re-emphasize the performative over the visual aspects.

#### 4.2.3 Sound

To recapitulate the above, the medium of sound has proved (for me) to be inherently performative, while the medium of video in this case was found to be undermining notions of performativity. The field of electro-acoustic music began with experiments with fixed media, not unlike video, but live-generated sound has an immediacy that again speaks to the demonstrability of manifest phenomena in a dynamic system. Video in contrast continually invited notions of the static, narrative, and passive, through its cinematic vocabulary. Through the progression of these experiments, it has become clear to me that live sound requires more of its audience thanks to this dynamic sense of its *now-ness* at each moment of sensory experience. You cannot rewind and play it back, so your subjective recollection of it is all that remains a moment later.

“*I Am Sitting...*” owes much to Alvin Lucier, one of the most celebrated experimental composers and sound artists of the 20th century. His work with sonification of amplified brainwaves in 1965, “*Music for Solo Performer*,” was brought to my attention immediately after my first test of a live biofeedback performance, and again reinforces the performative aspects of sound. Lucier has become a hero of mine for his dedication and sensitivity to the world of acoustic phenomena. My sense of his work is that it often dials in on the simplest operating principles of our sonic landscape, isolating or abstracting them in a way that does not *describe*, but actually *demonstrates* something that was previously invisible, inaudible, or

ignored. I read it as a practice almost tailor-made for enactive or embodied cognition, in the sense that it appeals to the senses and does not ask the audience for much in the way of rational conceptualization. His work simply asks you to listen. To experience a Lucier piece is often to experience a profound physical truth, but one that exists only for a moment in the instant you hear it, then evaporates back into the ideal realm. My work with communication systems aspires to these qualities, and my own methodologies as described in Chapter 1 have accumulated to what they are as a product of my research outcomes in a feedback loop with my research strategies.

While the central component of my performance (me, seated in the center and producing brainwaves that drive the system) is clearly a reference to “*Music for Solo Performer*,” Lucier’s 1969 “*I Am Sitting in a Room*,” likely his most widely known piece, provides the inspiration for the name of this project. This work of Lucier’s exemplifies the feedback loop as a mechanism that can distill and abstract an underlying state in a system. It begins with Lucier reading live into a tape recorder, describing exactly what the piece is: a record of this recording being played back and re-recorded in iterative fashion until the sound is transposed into the fundamental resonances of the room he is seated in. My work uses feedback loops in corollary as a primary mechanism for amplifying the fundamental pathways that signals travel in a communication system, to make them accessible and discernible through sensory perception rather than rational experience.

### **4.3 Research Outcomes**

This section describes the actual implementation of the project, briefly reviewing the iterations leading up to the final performance.

### 4.3.1 Version 0: Agency (Identity, Vocabulary)

In the spring semester of 2016, I presented a brief performance named “*Experiment #27: Control*. ”<sup>39</sup> This piece was literally an experiment in communication. I had ideas about frequency, communication, biofeedback, and the feedback loops of observation and iteration (and every possible tangent), yet I was unable to articulate why all these things felt connected.

The forum where this was presented was intended to be a speaking opportunity to define my artistic practice and my current research, however I had very little context for doing so at the time. I did not have the vocabulary (*agency*) to communicate or organize all that went into my collected ideas, and thus did feel I could represent myself well at the podium. I solved this (temporarily) by generating an abstraction: a representation of myself stuck in a feedback loop with my questions. To do so, I took a step back from the audience; I offered a projected view of myself, even though I was present; on this screen I offered an interior view of my own biofeedback monitor, and my internal monologue of questions, instead of the exterior view of me. I inserted a screen as an interface between myself and the audience, and I sat on the floor almost out of sight. And what I distinctly did not do was describe what I was doing. I simply demonstrated it.

At the time, I did not define this as part of my thesis research, but it held the seeds of its questions. It was the turning point that led me to the work of Alvin Lucier’s “*Music for Solo Performer*,” which helped me begin to make sense of these thousand threads of interest.

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39. See **Chapter 3: Portfolio of Works** for additional description.

### 4.3.2 Version 1: Authorship v. Meaning Making (Choreography)

The first iteration of “*I Am Sitting...*”<sup>40</sup> focused specifically on the question of authorship; it proposed the capacity to do without doing. By placing myself as a component in a simple visual feedback loop, I had agency *within* the system, but not over the specific results of the process - like Jackson Pollock’s view of himself as part of the *medium*, rather than the controller. With Lucier’s work as a prompt, I intended this piece to generate a statement that I could not make alone. This was my first step toward generative systems as a medium which could make discoveries as part of the process of performance.

To support this, the work is given a mechanism to make itself (in this case, a simple feedback loop with camera and screen, and bit of MaxMSP programming to introduce a data stream), and the traditional choreography of art-making is sidestepped. I sat in performance, doing nothing but meditating in the midst of a crowded and noisy exhibition hall, with people all but stepping on me as they hurried through the space. The visual contents of the projection appeared as a product of the system demonstrating its workings, rather than by design of some artistic vision. Only my heart rate had agency in this system. The piece demonstrated a generative system that was human-powered, but indeterminate and non-rational; not surprisingly, it also anchored the body in the natural logic of connectivity and feedback.

This performance won a best-in-show award for the Intermedia category at UMaine’s annual research symposium. This work was clearly engaging people in a way that none of my deterministic creations had ever done. I was spurred on by this encouragement to double down on the concepts of indeterminacy and self-articulating systems.

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40. See **Chapter 3: Portfolio of Works** for a detailed description.

### 4.3.3 Version 2: Mapping (Parameters, Biofeedback)

After several months of further development of these ideas, I was working with what I consider the second complete iteration of “*I Am Sitting....*”<sup>41</sup> This second version was marked by differences in the equipment and the aesthetic, and the purpose was beginning to evolve as well.

The project now consisted of somewhat more nuanced programming, as my skills in MaxMSP improved and my ability to accurately map my biodata into the system became less of a guessing game and more a matter of understanding the natural ranges of my own physiology in relation to the system as a whole. Over time, I could tune the effects of my bio-input based on the range of potential physical influence I had over the data. This meant more consistent results that allowed for experimentation with actual mindful agency over some of the characteristics of the images being generated. For example, with practice I was able to demonstrate the degree to which I was in meditation by influencing the qualitative properties of the image: a deep, saturated image tending toward black when my vitals were high, and a light, pastel or low contrast image tending toward white when my vitals were low. With enough concentration and control, my image would simply evaporate and disappear from the screen.

It was also during this phase that I added EEG data for the first time, using a hacked MindFlex headband. The general principles of the generative video system remained the same, but the inputs from EEG data were a challenge to map to the visualizations in any readable way. With a direct link between the relative amplitude values being streamed by the MindFlex, and the brightness, contrast, and saturation, I was back in the territory of a more or

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41. See **Chapter 3: Portfolio of Works** for more details.

less random visual output, without any legible relationships between the data and the aesthetic surface of the work. (This is analogous, in my mind, to a signal without any useful content, a.k.a. noise.) To me, the intense and seemingly random variation in the visuals felt reflective of my own difficulties in controlling my focus, despite more frequent meditation practice, and also like an allegory for the unfocused network of ideas beginning to proliferate out of this project.

During this second iteration, I was drifting a bit away from the initial idea of making without doing, of manifesting something that bypasses ‘the choreography of artmaking’ (see the portfolio entry for version 1 in **Chapter 3**), and was recognizing that the system of feedback loops I had modeled also potentially created a stage for proposing ideas about interpersonal communication. I was well on the way toward cybernetics and systems thinking as critical methodologies for minimalist or reductionist creative production, but I also was beginning to see how they also might be dynamic models of the fundamental communication protocols that become our social networks and language systems. In presentations of this second version of *I Am Sitting...*, the discussion around the performance was pointing to ideas of neutrality and mediation as functions of communication and identity, and using the feedback loop as a model for these functions at work. From my program notes for *Studio Ajar: Performance Edition - 4 Aspects of Experimental Performance*, on April 28, 2017: the work intended “to allow subtle changes in [my] physical experience to percolate up as broad variances in the perceivable environment.” As such, the work tried to demonstrate (in cybernetic terms:) the connectivity of a single autonomous agent within a self-organizing, generative system, of which language, identity, and the phenomenological environment are emergent quantities.

*I Am Sitting... (version 2)* was performed with full staging as part of the above *Studio Ajar* exhibition, with two mirrored projection screens, which generated a fractal effect in the video feedback loop. Unlike the first iteration, the focus shifted toward MaxMSP programming for the beginning and ending sequences, a sort of container that grounded the work within a performance aesthetic.

An additional site-specific edition of this work was performed at the Black Mountain College 2016 *{RE}Happening* biennial. In that edition, a rougher version was presented outdoors after dark, with a portable pico projector and a single makeshift screen that was primarily visible from a great distance across a body of water. Given the open-ended nature of the audience's encounters with the piece, this version took full advantage of its visual qualities and owed less to the conceptual groundings, leaving the audience to generate their own ideas about the work.

#### **4.3.4 Version 3: Interface (Exposure of Dynamic Relationships)**

The third distinct phase of this project surrounds my full engagement with EEG technology as an interface. I accepted a three-month residency position in Barcelona, Spain, at Hangar Interactive Labs through their Research & Development Grant, which enabled me to build an 8-channel, research-grade EEG instrument<sup>42</sup> from plans and components made available by the OpenBCI open-source development platform. I spent a large part of the summer 3D printing the bulk of the BCI hardware (the headset) and sourcing parts for the 8 electrode sensors. By the end of the summer, I was testing and configuring the software, and building new MaxMSP interfaces to map these 8 new streams of multidimensional data into my performance framework.

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42. See **Chapter 3: Portfolio of Works** for a detailed description of this instrument.

At the end of the residency, I curated a collaborative show at The White Gallery in Barcelona, showcasing the BCI headset and situating it as an interactive interface. I worked on two separate collaborations, in which live EEG data from the headset would be shared over WiFi using OSC (Open Sound Control) protocols, for use as a source of generative content by other artists' works.

Prior to the exposition, I worked out a prototype for data sharing with Live Coding composer Niklas Reppel, and we managed a proof-of-concept for a live EEG data stream to be incorporated into a Live Coding performance. At the show, Reppel performed a set inspired the expo's themes of generative interactivity, but a full implementation of our collaborative concept was saved for later.

Additionally, I generated a data stream for a collaborative piece with Patricio Rivera, which employed his Robotic Drawing Machine to visualize my brainwaves in real time and in large format on the gallery wall during the exposition.

Finally, the main performance of the exposition was *I Am Sitting...* in its third iteration.<sup>43</sup> This version incorporated both the dual-projection loop of fractal imagery and the first full attempt to include sonification of the EEG data, to create an immersive sensory environment.

To categorize this event on August 17, 2017, as chaotic would be a wild understatement. The beginning of the evening was interrupted by the Barcelona terrorist attacks on La Rambla and the surrounding area, which killed 15 and injured over 130 people.<sup>44</sup> The gallery was situated less than a mile away from the epicenter of this tragedy.

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43. See **Chapter 3: Portfolio of Works** for more details.

44. "2017 Barcelona Attacks," Wikipedia, accessed July 20, 2018, [https://en.wikipedia.org/wiki/2017\\_Barcelona\\_attacks](https://en.wikipedia.org/wiki/2017_Barcelona_attacks).

We ultimately continued on, feeling responsible to our small audience, who were stuck there with us while the city was on lockdown.

My performance of *I Am Sitting...* in this setting felt like a reflection of our surroundings. Vivid, wild, and completely unexpected sounds and projections filled a small room crowded with equipment and audience members. The programming that supported this version in its first performance was glitchy and yielded inconsistent results. Its crude algorithms birthed a chaotic system that eventually flew exponentially out of control, just like feedback in a microphone left unchecked. This first performance ended in a mad dash to the volume knob and sighs of relief all around.

I frame these aspects of the performance as a catharsis for the tension outside the gallery at the time. Afterward, conversations revealed that the audience seemed to have been largely carried along with my own experience of the performance - an intense and highly apprehensive disconnection from the rational world, with a sense of the contradicting terms of alienation and connection between us and the environment we sat within. I was further convinced by the experience that this evolving model was indeed capable of generating an interpersonal experience.

A few weeks later after returning to UMaine, I produced the show again in a large multimedia performance space. This was a closed performance, specifically for documentation. By this time, I had stabilized the sonification algorithms and spent lots of effort designing a layout for a larger staging in such a way as to visually demonstrate the relationships between the performer, the technology, and the emergent sensory environment. In tandem to this more formalized production, I presented a ~40 minute lecture on the R&D process that took place over the summer, and the themes surrounding my work. Following

the lecture, I ran a hands-on demonstration of the system, explaining the BCI hardware and the MaxMSP programming that supports the performance. Here I was testing the project as a teaching tool, which is an area I hope to continue developing in the future.

My major takeaway from this 2nd production (of Version 3) was a lingering dissatisfaction with the way the staging had previously separated the audience from the performance and its generated environment. I wanted to recapture the interaction and connection that was inherent in performing in that tiny room in Barcelona with the audience practically on top of me, a tangle of wires and the confrontation with uncertainty. The larger performance space set up a perceived barrier between the system and the audience that left them outside, external to the process. This was my next problem to solve.

#### **4.3.5 Version 4: Interaction (Emerging Phenomena, Feedback Loops)**

The fourth full iteration was performed as part of the 2018 IMFA thesis exhibition, *Between You and Me*, on May 17, 2018. I put all my attention to tailoring a space for the system that *encompassed* the audience, insisted on their participation, and focused their senses where I wanted them. This meant dropping the video projection as per my analysis above, except to provide the text that narrated the script. Even in this projected text, I masked the screen so that only white text on black walls was visible, hoping to minimize the distraction of screen-based media, showing only supertitles (a trick borrowed from opera, which also seeks to emphasize the performative). This piece became all about the sound and the space and the people inside the space.<sup>45</sup>

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45. A full-length video document of the performance is included in the attached digital archive (**Appendix C**).

#### 4.3.5.1 Mapping Out the Model

For this version, the algorithms for sonification underwent a dramatic overhaul. This iteration started from scratch, implementing an array of 40 very basic amplitude modulation synthesizers (8 sensors/channels, each with 5 streams of real-time data, correlating to the 5 frequency bands of brainwaves - delta, theta, alpha, beta, and gamma). The brainwave frequency bands are roughly defined<sup>46</sup> in octave intervals from 0-64Hz, so I have scaled them ( $\times 10^1$ ) to a comfortable listening range. Each speaker in the set of 8 hosts one channel, each channel sounding the 5 intervals with a rich timbral effect.

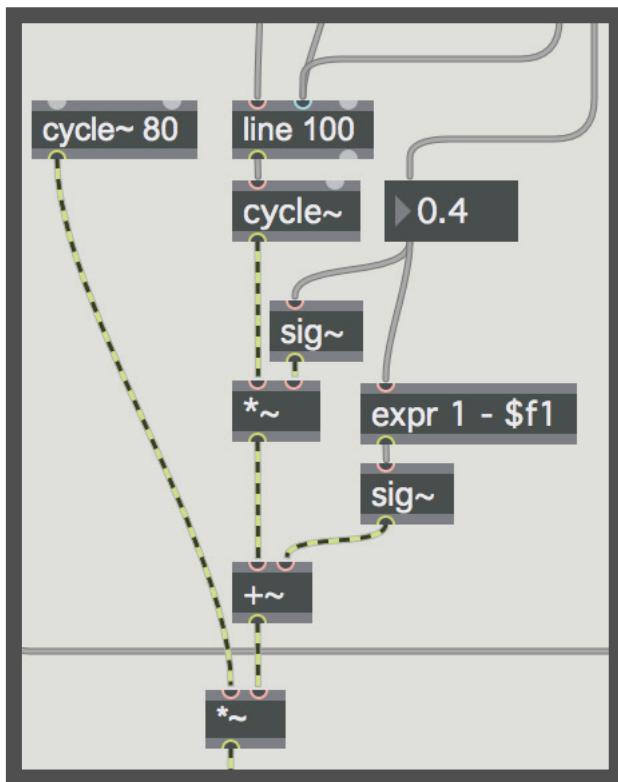


Figure 4.1 Simple Amplitude Modulation Synthesis for *I Am Sitting* (v.4), (detail of 8Voices). Alicia Champlin, 2018. One of the 40 synthesizers working together to sonify brain activity captured by the BCI controller. Further explanation of this mapping strategy is found in Appendix B.

46. There is no agreement in standard reference works what *precisely* these ranges should be, however they fall roughly into octaves of one another. My mapping of these ranges is in line with most, but defines perfect octaves in order to best demonstrate their relationships with sound. Please see Appendix B for details on this mapping.

The primary harmonic and morphological features (the texture and variation of the sound) of this compound synthesizer are manifested in beating artifacts and overtones, demonstrating the changing relationships between each of the 5 brainwave streams. This layering is recapitulated in the acoustic space, where the sound from each of the 8 speakers is ‘mixed’ in real time by the participants, simply by their moving through the space.

The final version of the synthesizer was chosen after developing 3 different software prototypes with completely different algorithms for sonification. I selected the one I ultimately used based on its ability to demonstrate the more granular differences without over-emphasizing the larger spikes in the data, which often resulted from my movements rather than brain activity.

#### 4.3.5.2 The Score

The score for the performer (me) is a progression through a number of physiologically distinct states of mind that can produce small but perceptible changes in the data. This ‘cognitive choreography’ required endless hours of practice in mindfulness and meditation. The score itself is also the product of an algorithmic organizing principle, in which the brain states are in order, progressing from lowest order to highest in terms of cognitive complexity, and then reverse in palindromic form, but with the added twist that the audience is participating in the second half. Each brain state is held for about 90 seconds and the entire performance lasts about 22 minutes, with the first half giving time for the audience to come to terms with what they are seeing, hearing, and experiencing, and the second half giving them time to absorb the fact that they are participating. Please see the Appendix for the complete text of the score.

#### 4.3.5.3 Thesis Performance - May 17, 2018

In performance, the culmination of this system functioned somewhat like you would imagine a human Theremin might work. I sat motionless in the middle, performing the score, as the audience explored the sonic geography of the room, with 8 individual channels of spatialized brainwave sounds. By moving through the space, I hoped the listener could easily perceive the dynamic relationships of signals weaving together. In my own position in the center I felt the soundwaves filling my senses with an almost tactile experience. Individuals moving near me seemed to discover that their movements had sometimes dramatic effects on the sounds generated, and some participants began to deliberately play with their newfound

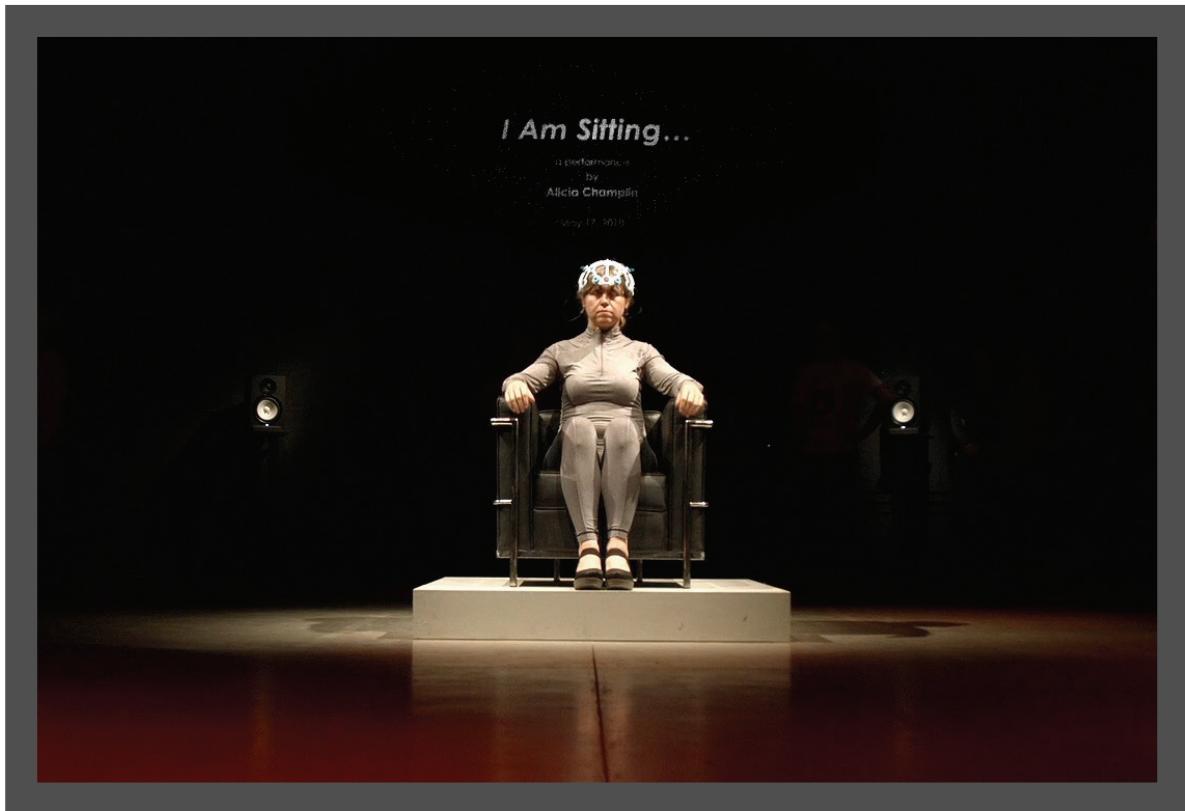


Figure 4.2 *I Am Sitting...(v.4)*, introduction. From Without Borders XV thesis exhibition, May 17, 2018. Alicia Champlin, 2018. (credit: J. Arturo Camacho.)

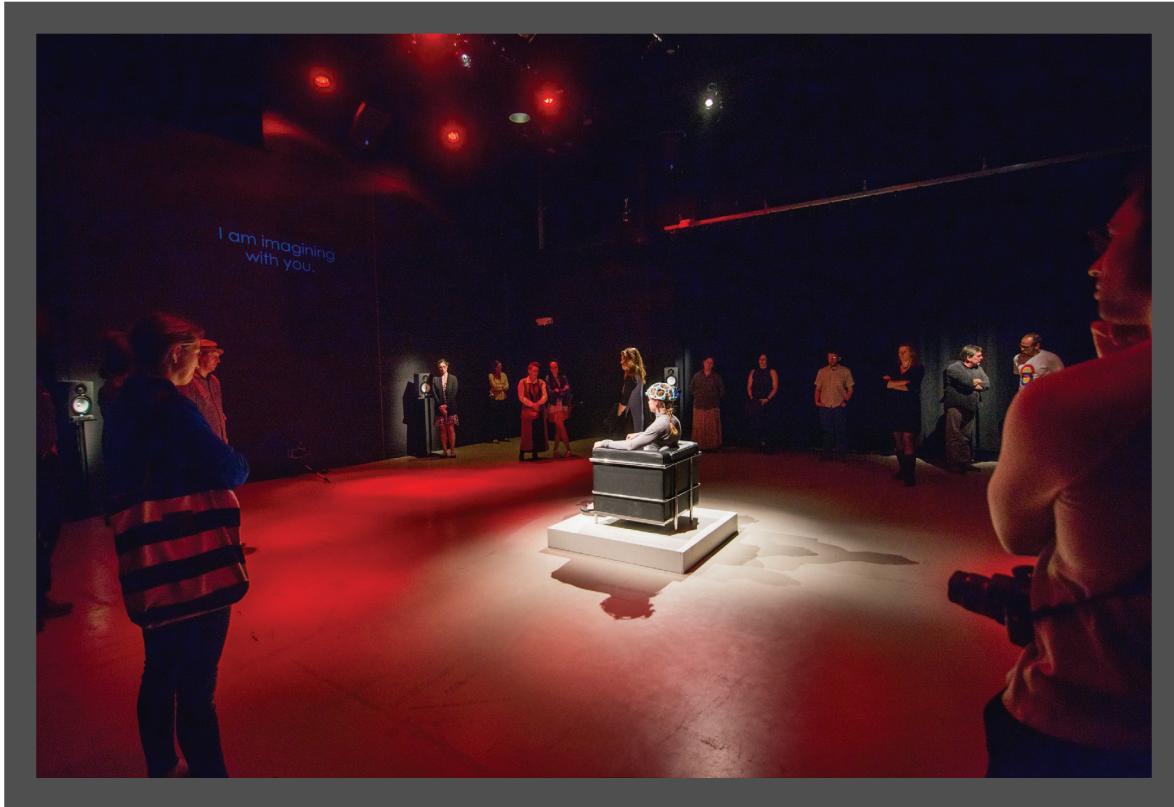


Figure 4.3 *I Am Sitting... (v.4)*, with supertitles. From Without Borders XV thesis exhibition, May 17, 2018. Alicia Champlin, 2018. (credit: James Winters.)

ability to have an effect on the output of the system. As for me, I progressed through the script but I felt close to an out of body experience at some points. I felt physically connected to something larger, something inclusive of all of us in the room. After the show people described to me in various ways all manner of visceral experiences of interconnection, and some even described feeling inspired by a touch of the sublime, and a few tried to express that they had an experience that they couldn't or didn't care to put into words. Through a number of these informal interviews and some anecdotal reactions from my audience, I have gained a sense that a more than a few people felt something similar to what I experienced, in terms of feeling connected and actively engaged with something. Could this be a realization of the goal of providing *embodied access*? I do see that here is a generative model of a

system, which relies on its audience's experience of itself to work, and based on the informal reviews, it did produce physical experiences. I can't say anything about determining success in the minds of the audience, because there were no right or wrong experiences, but I am confident from hearing their reactions that some people had physical, performative, enactive experiences, rather than worrying about what the conceptual logic of the piece was 'designed' to be. It certainly was the case for me that I lost my rational, objective self for a while in the system and simply absorbed what it meant to be a body in my position.



Figure 4.4 *I Am Sitting... (v.4)*, interactions. (*Opposite page.*) From *Without Borders XV* thesis exhibition, May 17, 2018. Alicia Champlin, 2018. (credit: James Winters.)

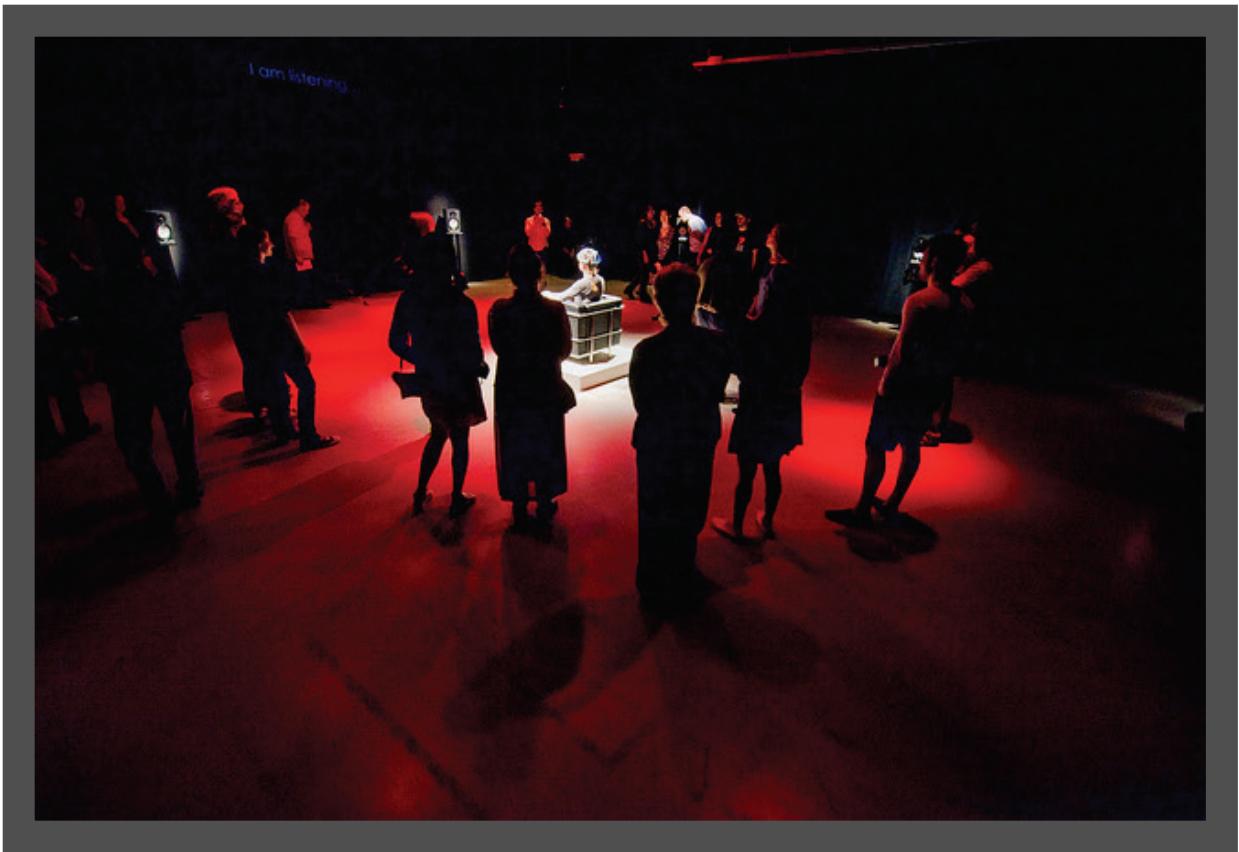


Figure 4.5 *I Am Sitting...(v.4)*, audience. From *Without Borders XV* thesis exhibition, May 17, 2018. Alicia Champlin, 2018. (credit: Jim Winters.)



Figure 4.6 *I Am Sitting...(v.4)*, sublimation. From *Without Borders XV* thesis exhibition, May 17, 2018. Alicia Champlin, 2018. (credit: Niklas Reppel.)

#### **4.3.5.4 Algorithms That Matter - Bergen, NO, June 4-18, 2018**

*I Am Sitting...* was selected to participate in a two-week long exhibition and workshop titled *Algorithms That Matter*, in Bergen, Norway, almost immediately after its debut at the Without Borders festival. The exhibition and workshop were hosted by BEK (Bergen senter for Elektronisk Kunst) and a collaborative team of post-doctoral researchers from IEM (Institute for Electronic Music in Graz, Austria). The purpose of the workshop was for all participants to be able to cross-pollinate each other's ideas, honing our algorithmic approaches in a way that might produce a different closing exhibition than the one at opening, as well as some new understandings of how/why algorithms '*matter*'. I performed *I Am Sitting...* in the gallery twice during the run of the exhibition, and presented a 'radicalized' version (described by the event hosts as a stripping down to the essentials) at the end. This radicalization exposed more of the dynamic capacities of the underlying relationships in my code, and yet still emphasized the performative capacities, during the closing concert.

The most striking takeaway from this experience, in terms maybe of how algorithms matter, was their suitability for coupling to sensorimotor capacities. Most of the works there took something rigid like a bit of code and generated something either poetically anthropomorphic or physically interactive (or both). I am intrigued by the idea that older critiques of cybernetic theory are being overcome by a humanist approach that privileges the ideas I've pointed to as being markers for *embodied access*. I think this is a hopeful development, as the field moves technology closer to a reconciliation with the body and its experience of the world in flux.

Additionally, the experience of working collaboratively with a dozen other artists using similar methods was invaluable to my understanding of my own work in the context of the field I am working in, and provided a host of new ideas and critiques that will likely keep this project evolving for the foreseeable future.

#### 4.4 Conclusions

In the final version (for now) of *I Am Sitting...*, I have incorporated lessons learned from each of the previous iterations, building on discoveries about how certain mediums communicate, how spaces seem to influence communication, and how audience engagement might operate in service of embodied access to live-generated research outcomes. I am certain that the most important investments in the project were the time it has had over the last two and a half years and my willingness to dig into the process – both my own and the work’s – to the degree that it became an example of an intermedial feedback loop. The project had time and space to evolve, and I had time to work in depth with complex ideas, testing and iterating to reach the degree of clarity that I feel I have attained about the practice of systems modeling. The process has taught me much about the applied aesthetics of video, of performance, and of sound. I have developed a solid skill-set in MaxMSP as a direct result of this work. Maybe most importantly, I have generated my own tested vocabulary for talking about the ideas that press me forward as an artist.

Regarding the success of the work, per its stated aims: it was my intention that the 40 individual synths used at the root of my software were a reduction of complex, multidimensional data, to the simplest and most direct application of the data to sound. Each synth acts as an autonomous agent in an array, all operating on the same basic algorithm. The complexities of their dynamic combinations are what generates the timbre and morphology,

in real time expression of the data stream as influenced by the performer and her interpersonal network. But beyond the mathematical transactions, people moving through the space were placed in a context of completing the model and many of them did seem to demonstrate their knowing participation as sensory agents and interfaces in this network. If so, the model may have manifested itself in an actual experience of agency; I believe this generated some model of understanding through the temporary emergence of an aesthetic surface with the inherent context of its own ruleset. Or more plainly, the interactive and embodied experience we had was conceived through the conceptual terms of interaction, embodiment, and experience.

This sort of indeterminate outcome is not something that can be captured through rational analysis, even after the fact of it occurring, but instead it resides in the audience's perceptions of the dynamic feedback relationships of a self-regulating system, not via a conceptual metaphor, but through an emergent manifestation of embodied access, in direct sensory terms.

An exciting aspect of this for me has been the personal discovery of a way to combine the objective (although sometimes objectifying) aspects of systems thinking and cybernetics with the subjective experience of how we come to know ourselves and our world, and to be able to do so without having to disqualify the subjective as irrational or unscientific. I believe there is a great deal more that this approach to research can reveal, and it seems to be working through intermedial modes that may provide novel perspectives that have not been accessible through traditional research models.

There are also the many angles to explore regarding those which were left on the table through the limitations of this study. I would like to revisit the primary critiques of

cybernetics given the nature of these results; I am sure that my explorations could be further informed by those points of tension. The addition of so many contemporary corollaries and contradictions would be a useful vocabulary in this practice.

## BIBLIOGRAPHY

Ackerman, James S. "A Theory of Style." *The Journal of Aesthetics and Art Criticism*, 20:3 (1962): 227-237. <http://www.jstor.org/stable/427321>

Aldrich, N.B. "An Abstract Model of Instrument Control." Courtesy of the author, 2005.

Aldrich, N.B., and Zach Poff. "Artist Statement." Accessed July 17, 2018. [http://median.newmediacaucus.org/archives\\_in\\_progress/pre\\_2009\\_issues/2007\\_fall/statements/aldrich\\_n\\_b\\_and\\_poff\\_zach/aldrich\\_n\\_b\\_and\\_poff\\_zach.html](http://median.newmediacaucus.org/archives_in_progress/pre_2009_issues/2007_fall/statements/aldrich_n_b_and_poff_zach/aldrich_n_b_and_poff_zach.html).

Ascott, Roy. "Art and Telematics: Towards a Network Consciousness/Kunst und Telematik/L'Art et le Télématique." *Art + Telecommunication*, edited by H. Grundmann, 25-67. Vancouver: The Western Front, 1984.

Ascott, Roy. "Behaviourables and Futuribles." *Theories and Documents of Contemporary Art*, edited by K. Stiles and P. Selz. Berkeley and Los Angeles: University of California Press, 1996.

Ascott, Roy. "The Cybernetic Stance: My Process and Purpose." *Systems*, edited by Edward A. Shanken, 65-69. London: Whitechapel Gallery, 2015.

Ascott, Roy. *Telematic Embrace*. Berkeley And Los Angeles: University of California Press, 2003.

Audry, Sofian. "Vévé." Accessed July 19, 2018. <https://sofianaudry.com/en/works/veve>.

Auslander, Philip. "Going with the Flow: Performance Art and Mass Culture." *TDR*, 33:2 (1989): 119-136. <https://www.jstor.org/stable/1145929>

Bacon, Wallace A. "An aesthetics of performance." *Literature in Performance* 1:1 (1980): 1-9. <https://doi.org/10.1080/10462938009365814>.

Baudrillard, Jean, and Caroline Schutze. *Ecstasy of Communication*. Autonomedia, 2012.

Baudrillard, Jean, Sylvère Lotringer, and Ames Hodges. *The Conspiracy of Art: Manifestos, Interviews, Essays*. New York: Semiotext(e), 2005.

Benjamin, Walter. "The Work of Art in an Age of Mechanical Reproduction." *Illuminations*, edited by Hannah Arendt. New York: Schocken Books, 1969.

Baudrillard, Jean. "The Work of Art in the Electronic Age." *Baudrillard Live*, edited by Mike Gane, 145-51. London: Routledge, 1993.

Baudrillard, Jean. *Simulacra and Simulation*. Ann Arbor: University of Michigan Press, 2004.

Berger, John. *Ways of Seeing*. London: Penguin Books Ltd., 1972

- Berlinski, David. *The Advent of the Algorithm*. New York: Harcourt, 2001.
- Berman, Marshall. *All That is Solid Melts into Air*. New York: Penguin Books USA, 1988.
- Bernays, Edward. “The Engineering of Consent.” *The ANNALS of the American Academy of Political and Social Science*, 250 (1947): 113-120.
- Biblioteca Pleyades. “Brainwave Frequency Listing: Cycles Per Second (Hertz) and Correspondences to Mental States, Physiology, Colors, Notes & Planets.” Accessed November 9, 2017. [https://www.bibliotecapleyades.net/ciencia/ciencia\\_cambio06a.htm](https://www.bibliotecapleyades.net/ciencia/ciencia_cambio06a.htm).
- Blais, Joline, and Jon Ippolito. *At the Edge of Art*. London: Thames & Hudson, 2006.
- Bourriaud, Nicolas. *Postproduction: Culture as Screenplay: How Art Repograms the World*. New York: Lukas Et Sternberg, 2007.
- Bourriaud, Nicolas. *Relational Aesthetics*. Dijon: Les Presses Du Réel, 2010.
- Brook, Donald. “Toward a Definition of Conceptual Art.” *Leonardo*, 5:1(1972): 49-50.
- Burnham, Jack. “System Aesthetics.” *Systems*, edited by Edward A. Shanken, 112-15. London: Whitechapel Gallery, 2015.
- Butler, Judith. *Gender Trouble*. New York: Routledge, 1990.
- Calvino, Italo, and Patrick Creagh. *The Literature Machine: Essays*. London: Pan Books, 1989.
- Chadabe, Joel. “The History of Electronic Music as a Reflection of Structural Paradigms.” *Leonardo Music Journal* 6 (1996): 41-44. <https://doi.org/10.2307/1513303>.
- Chicago Manual of Style. “Chicago-Style Citation Quick Guide.” Accessed July 30, 2018. [https://www.chicagomanualofstyle.org/tools\\_citationguide.html](https://www.chicagomanualofstyle.org/tools_citationguide.html).
- Chomsky, Noam. *Media Control*. New York: Seven Stories Press, 1991.
- Chalmers, David J., and Andy Clark. “The Extended Mind.” *Analysis* 58 (1998): 10–23.
- Clark, Andy. *Being There*. Cambridge: MIT Press, 1997.
- Clark, Andy. *Natural-born Cyborgs: Minds, Technologies, and the Future of Human Intelligence*. Oxford: Oxford University Press, 2004.
- Codrescu, Andrei. *Posthuman Dada Guide: Tzara & Lenin Play Chess (The Public Square)*. Princeton University Press, 2009.
- Dijkstra, Edsger W. “The Humble Programmer.” *Communications of the ACM* 15, no. 10 (1972): 859-86. <https://doi.org/10.1145/355604.361591>.

- Davis, Joseph E. "The Commodification of Self." *The Hedgehog Review* 5:2, (2003).
- Debord, Guy. *Society of the Spectacle*. Detroit: Black & Red, 1970.
- Duchamp, Marcel. "Musical Sculpture." *Sound*, edited by Caleb Kelly, 168. London: Whitechapel Gallery, 2011.
- Freud, Sigmund. *An Outline of Psycho-Analysis*. New York: W. W. Norton & Co. Inc., 1940.
- Fromm, Erich. *Escape from Freedom*. New York: Avon Books, 1941.
- Gitlin, Todd. *Media Unlimited*. New York: Henry Holt & Co., 2002.
- Higgins, Dick. *Horizons*. New York: Roof Publishing, 1998.
- Ippolito, Jon. "Ten Myths of Internet Art." *Leonardo* 35, no. 5 (2002): 485-87.  
<https://muse.jhu.edu/>.
- Kelley, Kevin. *Out of Control*. Boston: Addison-Wesley Longman Publishing Co, 1995.
- Kellner, Douglas. *Introduction to The New Left and the 1960s by Herbert Marcuse*. New York: Routledge, 2005.
- Kelly, Caleb. *Sound*. London: Whitechapel Gallery, 2011.
- Kostelanetz, Richard. *Esthetics Contemporary*. Buffalo: Prometheus Books, 1978.
- LaBelle, Brandon, and Christof Migone. *Writing Aloud: The Sonics of Language*. Los Angeles: Errant Bodies Press, 2001.
- Landy, Leigh. *Understanding the Art of Sound Organization*. Cambridge: The MIT Press, 2007.
- Larson, Lars Bang. *Networks*. London: Whitechapel Gallery, 2014.
- Lippmann, Walter. *Public Opinion*. New York: Classic Books America, 1922.
- Lovejoy, Margot. *Postmodern Currents: Arts and Artists in the Age of Electronic Media*. Englewood Cliffs, N.J: Prentice Hall, 1992.
- Lucier, Alvin. *Music 109*. Middletown, CT: Wesleyan University Press, 2014.
- Max Planck Institute for Biological Cybernetics. "Visual Perception - Psychophysics, Physiology and fMRI Studies." Accessed July 24, 2018.  
<http://www.kyb.tuebingen.mpg.de/research/dep/lo/visual-perception.html>.
- McLuhan, Marshall, and W. Terrence Gordon. *Understanding Media: The Extensions of Man*. Berkeley, CA: Gingko Press, 2015.
- McLuhan, Marshall. *The Medium Is the Message*. Corte Madera: Gingko Press, 2005.

Median Kunst Netz. "Imaginary Landscape No. 4." Accessed July 18, 2018.  
<http://www.medienkunstnetz.de/works/imaginary-landscape-4/>.

Minsky, Marvin. *The Society of Mind*. New York: Simon & Schuster Paperbacks, 1988.

Packer, Randall, Ken Jordan, William Gibson, and Laurie Anderson. *Multimedia: From Wagner to Virtual Reality*. New York: W.W. Norton & Company, 2006.

Pariser, Eli. *The Filter Bubble*. New York: The Penguin Group (USA), Inc., 2011.

Penny, Simon. "Art and Artificial Life – a Primer." Accessed July 17, 2018.  
[http://simonpenny.net/texts/Resources/a\\_life.pdf](http://simonpenny.net/texts/Resources/a_life.pdf).

Pierce, Amy Olivia, "Contributing Factors to Perfection Hysteria on the Bride's Experience in Contemporary American Wedding Culture." *Electronic Theses and Dissertations* 1929.  
<https://digitalcommons.library.umaine.edu/etd/1929>

Pierce, John R. *An Introduction to Information Theory: Symbols, Signals & Noise*. New York: Dover Publ., 1997.

Pollock, Jackson. "Lavender Mist." Accessed July 17, 2018. <https://www.jackson-pollock.org/lavender-mist.jsp>.

Postman, Neil. *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*. New York, NY, U.S.A.: Penguin Books, 2006.

Prophet, Jane. "Neuro Memento Mori." Accessed on July 19, 2018. <http://www.neuro-memento-mori.com/>.

Rosch, Eleanor, Evan Thompson, Francisco J. Varela. *The Embodied Mind: Cognitive Science and Human Experience*. Boston: The MIT Press, 1991.

Russolo, Luigi. *The Art of Noise*. Something Else Press, 1967.

Shanken, Edward A. *Systems*. London: Whitechapel Gallery, 2015.

Smith, Paul, and Carolyn Wilde. *A Companion to Art Theory*. Oxford: Blackwell Publishing, 2016.

Standage, Tom. *Writing on the Wall: Social Media: The First 2,000 Years*. New York: Bloomsbury, 2014.

Turkle, Sherry. *Can You Hear Me Now?* [www.forbes.com](http://www.forbes.com), 2007.

Weiner, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge: The MIT Press, 1975.

Wiener, Norbert. *The Human Use of Human Beings*. New York: Doubleday & Company, Inc., 1954.

Wikipedia. “2017 Barcelona Attacks.” Accessed July 20, 2018.  
[https://en.wikipedia.org/wiki/2017\\_Barcelona\\_attacks](https://en.wikipedia.org/wiki/2017_Barcelona_attacks).

Williams, Robert W. *Politics and Self in the Digital Age*.  
www.uta.edu/huma/agger/fastcapitalism, 2005.

## APPENDIX A: SELECTED ARTISTS' SCORES

### A.1 *Imaginary Landscapes No. 4*, John Cage

The image shows a page from John Cage's score for *Imaginary Landscape No. 4*. The score is written for twelve instruments, with ten staves visible. The notation is minimalist, consisting of short vertical dashes and small dots on a grid of horizontal and vertical lines. The first staff begins with a clef and a key signature of one sharp. The subsequent staves are mostly blank or contain very sparse, isolated notes. The overall style is abstract and non-tonal.

*Imaginary Landscape No. 4, page 19*

Figure A.1 *Imaginary Landscape No. 4*, John Cage. (1951) © John Cage

## A.2 *Secret Piece*, Yoko Ono

SECRET PIECE

Decide on one note that you want to play.  
Play it with the following accompaniment:

The woods from 5 a.m. to 8 a.m.  
in summer.

(The above is the later revision of the  
following original.)

*ff... with the accompaniment  
of the birds singing  
at dawn*

1953 summer

Figure A.2 *Secret Piece*, Yoko Ono. (1953). From *Grapefruit*. 1964. Artist's book (Tokyo: Wunternaum Press).

A.3 *Rock Piece*, Pauline Oliveros

## Rock Piece

Pauline Oliveros

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Each participant chooses a pair of resonant rocks to use as percussive instruments. After listening for environmental pulses each participant establishes an independent pulse with the rocks. The pulse is to be maintained steadily without any rhythmic interpretation or accents. While listening to the overall sound, if the participant perceives that s/he is synchronizing exactly, or in a simple multiple or division by 2 or 3 of another participant's pulse, s/he stops in order to listen and begin a new pulse which is independent in rate from all other pulses.

To begin the participants may be dispersed throughout the performance area.

Each participant begins independently, or on some agreed upon cue. The participants move slowly and freely, sounding out the environment in all directions with their rock pulses listening for each other and for echoes.

Participants may end independently, or on cue by gradually converging into a tight circle for the ending. *Rock Piece* might begin and remain out-of-doors, or move indoors. Conversely, *Rock Piece* might begin in a tight circle indoors and move out-of-doors with the participants gradually dispersing until the pulses can no longer be heard.

August 16, 1979

Lenox, MA

Figure A.3 *Rock Piece*. Pauline Oliveros. (1989) © Deep Listening Publications.

#### A.4 *Sculptures Musicales*, John Cage

Sculptures Musicales "Sounds lasting and leaving from different points and forming a sounding sculpture which lasts" (Marcel Duchamp) An exhibition of several, one at a time, beginning and ending "hard-edge" with respect to the surrounding "silence", each sculpture within the same space the audience is. From one sculpture to the next, no repetition, no variation. For each a minimum of three constant sounds each in a single envelope. No limit to their number. Any lengths of lasting. Any lengths of non-formation. Acoustic and/or electronic.

A handwritten signature in cursive script, appearing to read "John Cage 1989".

Copyright © 1989 by Henmar Press, 373 Park Avenue South, New York, NY 10016

Figure A.4 *Sculptures Musicales*, John Cage. (1989) © Henmar Press.

## **APPENDIX B: ANCILLARY MATERIALS FOR *I AM SITTING...***

### **B.1 Text Score of *I Am Sitting...*(v.4)**

#### *I Am Sitting... (2018)*

For one performer with EEG output, live sonification, and audience. The EEG performer is seated in the center, with the audience moving throughout the space. The EEG performer moves through the following sequence of brain states, holding each for 90 seconds before moving on.

*I am sitting...*

*I am breathing...*

*I am listening...*

*I am remembering...*

*I am reasoning...*

*I am imagining...*

*I am cybernetic.*

*I am imagining with you...*

*I am reasoning with you...*

*I am remembering with you...*

*I am listening with you...*

*I am breathing with you...*

*I am sitting with you.*

(© Alicia Champlin. April, 2018)

## B.2 Poster, *I Am Sitting... (v.2)*

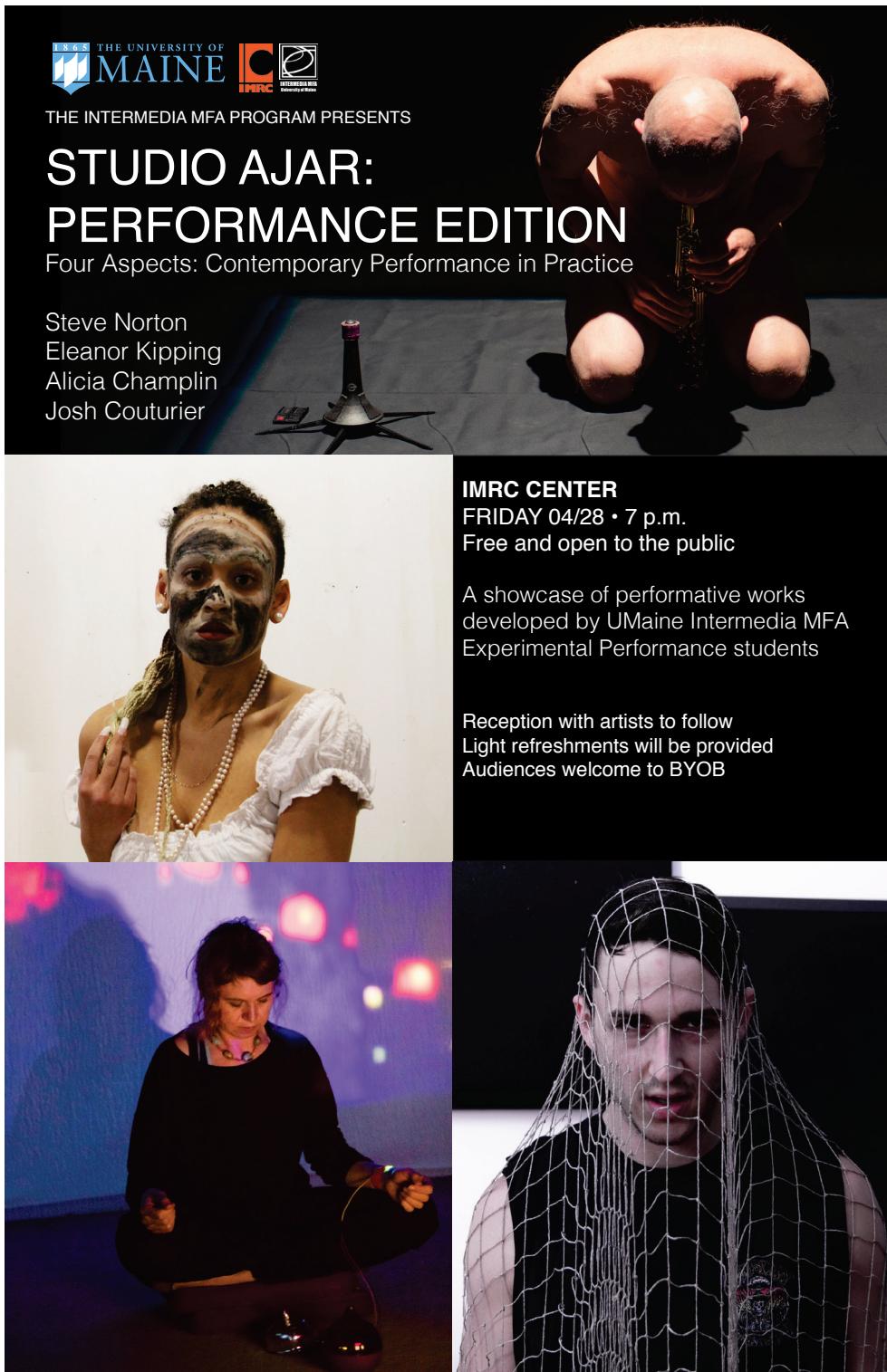


Figure B.1 Event poster, *Studio Ajär*, featuring *I Am Sitting... (v.2)*, Alicia Champlin, 2017. Poster: Eleanor Kipping, 2017.

### B.3 Poster, *I Am Sitting... (v.3)*, Barcelona, Spain

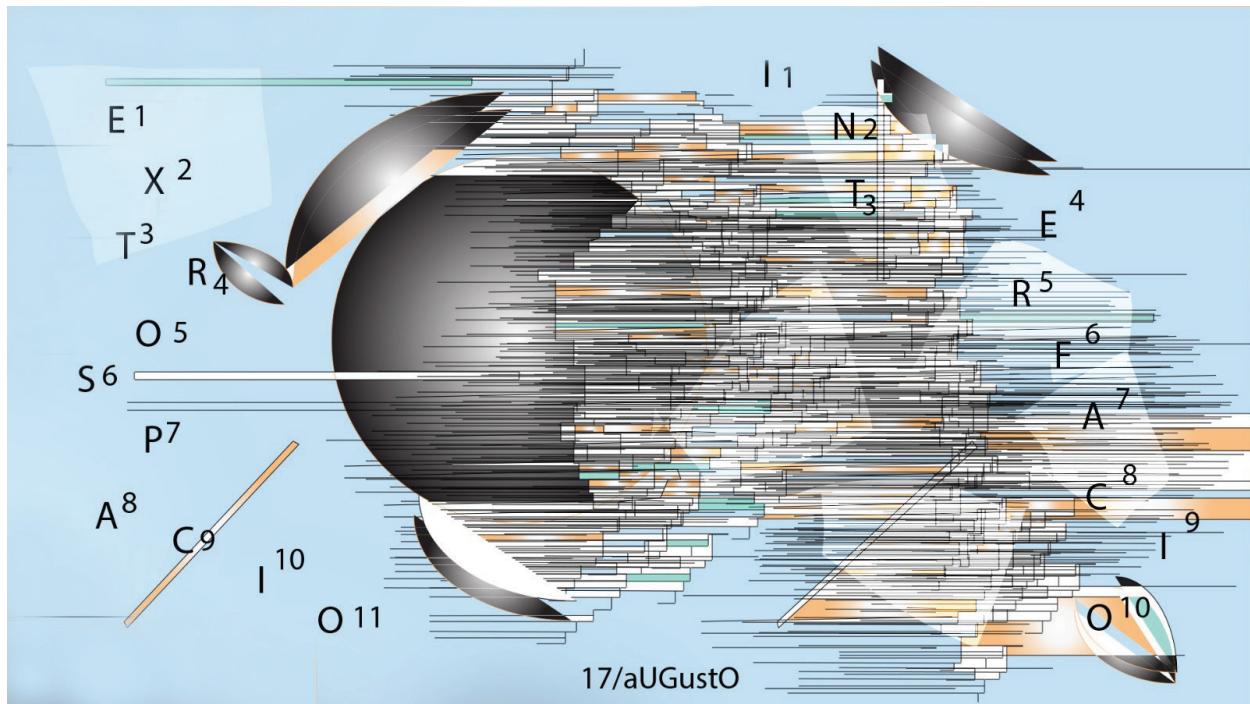


Figure B.2 Event poster, *Extrospacio/Interfacio*, 2017, featuring *I Am Sitting... (v.3)*, Alicia Champlin, 2017. Poster: Daniel Alexandru.

B.4 Poster, *I Am Sitting...(v.3)*, Orono, ME



Figure B.4 Poster for *I Am Sitting...(v.3)* lecture. Alicia Champlin, 2017. Poster: Alicia Champlin.

**B.5 Poster, *I Am Sitting...(v.4)*, Bergen, Norway**

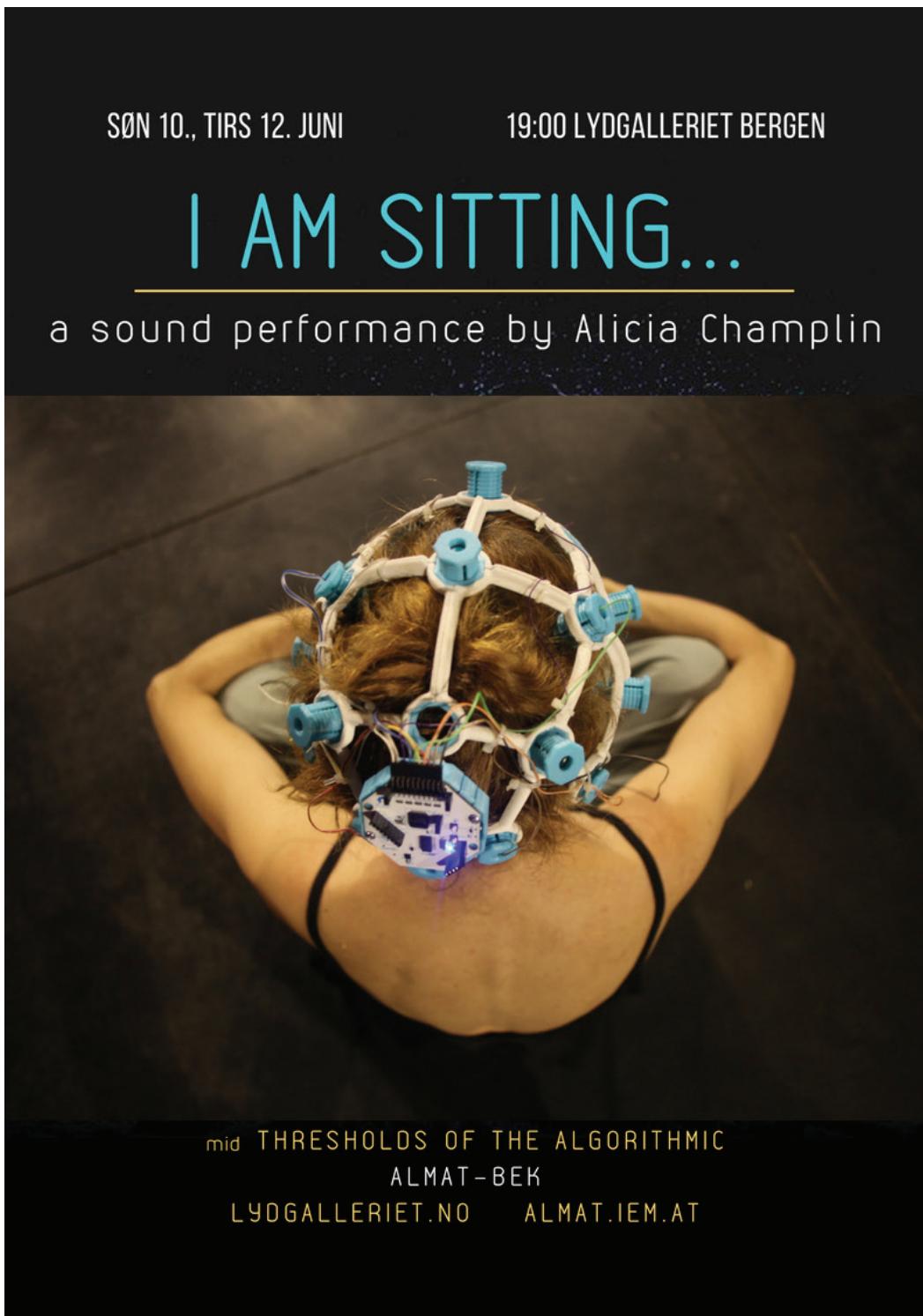


Figure B.4 Poster for *I Am Sitting...(v.4)*. Alicia Champlin, 2018. Featured in Thresholds of the Algorithmic. Poster: Alicia Champlin.

## B.6 Postcard, *I Am Sitting... (v.4)*, Bergen, Norway



Figure B.5 Postcard for *I Am Sitting... (v.4)*. Alicia Champlin, 2018. Featured in *Thresholds of the Algorithmic*. Card design: Alicia Champlin.

## **APPENDIX C: SONIFICATION SCHEMA FOR DIGITAL SYNTHESIS IN *I AM SITTING...4***

*I Am Sitting... (vers. 4)* utilized an array of 40 simple synthesizers to sonify incoming EEG data. These were all built on the same logic. The reason for having 40 of them is due to having 8 channels of data (from 8 sensors), and each channel representing the spectrum of 5 types of brainwaves.

The raw incoming data contains a numerical label for each channel followed by a string of 127 separate values per line. These values represent a measure of signal strength in microvolts, one number for every ordinal frequency between 1-127hz. My software first sorts these lines by channel number into 8 streams (one for each sensor), then further sorts the 127 values into 5 different streams (one for each brainwave type), ending up with 40 separate streams of variable values. The sorting of these signal strength values is broken down according to frequency as follows:

1-4Hz:	Delta
5-8Hz:	Theta
9-16Hz:	Alpha
17-32Hz:	Beta
33-127Hz:	Gamma

Next I identified a representative frequency for each of these 5 bands that would be scaled up into an easily audible range. Because of the natural octave intervals presented by the above brackets, I chose 4, 8, 16, 32, and 64Hz, respectively. (Gamma range typically stops at 64Hz because waves above 64Hz tend to be minuscule in signal strength, and are thus ignored in

most models, so in keeping with the rest of the intervals, 64Hz is used as the representative frequency for the top of the audible range.)

Using these 5 representative frequencies (at a scale of  $10^1$ ), I made 5 synthesizers for each channel. Each of these 40 synthesizers uses simple amplitude modulation to apply the variable signals coming from the EEG data, which have already been sorted into signal streams for each wave type on each channel. Basic amplitude modulation synthesis combines 4 values: the carrier wave (main frequency), the modulating signal, the modulation depth (between 0-1), and the amplitude of the synthesizer (between 0-1).

For each channel's 5 synthesizers, the carrier waves are set at each of the 5 representative frequencies. Each channel is now represented by 5 oscillators playing octaves at 40, 80, 160, 320, and 640Hz. The incoming EEG signal strength values are used as the modulating signal. In each synthesizer, the carrier wave is directly multiplied by the constantly-changing modulating signal, creating timbral effects and defining the morphology of the sound.

The modulation depth (which is essentially the amplitude of the modulating signal) is hard-coded and scaled for each synthesizer so that lower frequencies have a stronger mod (0.8) than higher frequencies (0.2), making sure that the subtle low frequencies can still be heard and the high pitches do not become dangerously high.

The final amplitude for each synthesizer is again hardcoded and scaled (lower at the higher frequencies), and the 5 synths per each channel are then combined in basic additive synthesis. This produces a single mono output signal for each sensor's data stream with a combined amplitude of 80%, making certain that no matter how much the data may spike, the signal will never clip or reach a range that is dangerous for the monitors or the human ear.

## BIOGRAPHY OF AUTHOR

Alicia Champlin (b. 1975, Portsmouth, NH) has exhibited nationally and internationally, including solo shows in Orono (Maine, USA) and Barcelona (Spain). In addition to her work in performance and installation, she also presents her research and custom interfaces in hands-on workshops and demonstrations of open-source technologies.

Drawing upon an academic background in Critical Methodologies and Japanese/Buddhist Art History (University of Maine and Sophia University, Tokyo, Japan), and a professional history in data processing and web technologies, Champlin joined the University of Maine's Intermedia MFA program in 2015. Much of Champlin's research prior to 2015 centered around pilgrimage, travel, and landscape as ways to communicate identity and make sense of our social environments. Aiming to be more than a tourist, she has visited sacred and secular destinations, followed pilgrimage routes, and taken on the role of pilgrim, seeker, and pathfinder.

Since beginning her MFA studies, Champlin's research & creative practices have come to focus on feedback-driven, generative systems in pursuit of the phenomenological intersection of networked communication and identity. Drawing influence from the provocations of Alvin Lucier, Nam June Paik, Marina Abramović, and mentor N.B.Aldrich, her work aims to explore issues of agency, vocabulary, and interaction, with process-based, generative methods.

Alicia Champlin is a candidate for the Master of Fine Arts degree in Intermedia from the University of Maine in August 2018.

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