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Relational Music: A Participatory Approach Towards Live Experimental Electronic Music

DISSERTATION

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DOCTOR OF PHILOSOPHY

in Integrated Composition, Improvisation, and Technology

by

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DEDICATION

To

my parents and my sister for their relentless love and support,

and

those friends whose affection, kindness and wisdom have lifted me in the hardest of times.

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I want to express my deepest gratitude to the designers and musicians who made *Space Within* a reality. Each of them dedicated an incredible amount of time and contributed immensely to the project, and they did so out of the goodness of their hearts.

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VITA

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ABSTRACT OF THE DISSERTATION

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Audience participation has appeared prominently as a critical response to spectatorship in various artistic fields since the second half of the twentieth century. In music, a variety of participatory approaches have been developed that provide the audience with varying degrees of creative agency. Each approach fosters certain relationships and communications among the participants, giving rise to a range of social dynamics and politics. The objective of this dissertation was, first, to develop a new approach that involved audience members interacting with a limited number of objects placed in a concert space to affect sonic characteristics and the performance of an ensemble that consisted of featured musicians, and second, to analyze the social dynamics and politics such an approach gave rise to.

Literature and creative works in the fields of music, visual arts, and theater were used to develop a method of viewing and assessing the politics of participation that was used to critique the creative portion of this dissertation that took the form of two concerts of interactive music titled *Space Within*. The production of the concerts involved development of hardware and software to enable audience interaction and mediation between the participants and the

ensemble. Scenic, lighting and projection design also played important roles in facilitating these aspects.

Several members of the audience were interviewed following the concerts while others were asked to respond to a survey to understand how they perceived their roles in the concerts and their impression of the social dynamics the event fostered. While most of them felt that their presence was consequential in the sonic outcome, not all of them were certain how exactly they affected the outcome. I conclude that while the audience may not have "co-authored" the sounds heard during the event, the event was successful in drawing their attention to and persuading them to reconsider their roles in a musical context.

INTRODUCTION

There are numerous ways of thinking about music. Some focus on the sounds that music brings about and how they are organized, some on how those sounds and/or the actions required to produce them are represented, and some on the social conditions surrounding and affecting the production of sounds. By no means are these the only areas of focus in the broad context of creative works and literature. But they are the ones that I have found to be most relevant to my work.

For most of my career as a composer, I have been concerned with the first two. In making music, I have paid close attention to the arrangement of pitches and timbres in time. When making music has involved other musicians in the production of sounds, I have attempted to provide them with clear instructions that would have allowed them to give sonic form to my otherwise abstract ideas. Another goal behind generating those instructions has been to make it possible to reproduce the performance that would have led to the desired sounds.

Before I began working on this dissertation, the third area of focus was less of a critical concern and more of a practical consideration for me. For example, if I wanted any of my creations to be performed, I would have had to make sure that there were musicians capable of producing the sounds that I was after. If such musicians were out of my reach, I needed to rework my compositional ideas. Creating occasions for performances of my work also involved dealing with the social context; I needed to work with event organizers and technicians and gather those who were my intended audience. Hierarchies in the social system I inhabited also affected my creative output. A few times, I had to abandon ideas simply because an authority figure did not find them suitable for the occasion for which I was composing.

It was through my preliminary research for this dissertation—especially through my exposure to Christopher Small's book titled *Musicking*—that I became aware of and interested in

the deep implications of social dynamics on the creation of music. By social dynamics, I am referring to the relationships between the groups of people that serve different roles in the coming together of a musical event. It dawned on me that the practical considerations I mentioned earlier were determining the nature of music-making in ways that could be as consequential as the compositional choices I was making. I had to ask the question: If the composer recognized that they were only a part of an ecosystem and that they could manipulate the relations between the subjects within it, what sort of musical scenarios could they instigate with such awareness? This very question is at the heart of this dissertation.

The creative project

Specifically, this dissertation is an attempt at reimagining the relationship the audience has to those who are closer to the process of creating the sounds in the context of live experimental electronic music, namely the performers and the composer. In my project titled "relational music," I have been interested in how the audience may affect the sounds in two different ways: 1) by directly affecting tonal, rhythmic, timbral and spatial qualities of electronically produced sounds; and 2) by affecting the performance of an ensemble consisting of featured musicians/improvisers. I developed technological tools that created an avenue for audience participation, assessed the utility and aesthetic capabilities of said tools, created works that made use of those tools to extend creative agency to the audience, and explored collaborative methods of producing interactive musical events with artists and designers. The creative work that these activities led to was *Space Within*—two concerts of interactive music—that may be thought of as a test to determine the viability of a particular model of "relational music" that features a system in which audience members directly affect sonic characteristics and performer actions through interaction with a finite number of "interactive objects"—physical interfaces that the audience could manipulate. Through the test, I

endeavored to understand the politics of the participation this specific model of "relational music" fostered.

A crucial aspect of the project was to design the system that was featured in this model. The system needed to 1) extend creative agency to the audience, 2) give the featured improvisers the opportunity to express themselves and to use their experience as trained musicians to make creative decisions about the formal structure of the performance, and 3) give rise to a social sphere that encouraged communication and collaboration among the subjects. Software programs that mediated between the musicians and the "interactive objects" were developed to achieve these goals. Designing the system and curating sounds that the system could affect in an observable way were my most significant contributions to the creative portion of this dissertation.

Chief among my other responsibilities was to collaborate with a team of designers who were responsible for scenic, lighting, projection and physical interface design. Their work centered around creating an inviting environment that encouraged the audience to participate physically.

Theory

Stating the obvious, audience participation has been a feature of works of concert music before. I refer to several pieces of music that include audience participation as a means of expression to understand some of the forms participation may take. The works that I discuss in this thesis engage the audience in various ways and establish different relationships between them and the performers. When analyzing these social dynamics and their politics, a framework to view participation through becomes necessary. For reasons that I can only guess, the literature on audience participation in music is much thinner than the literature on participation in visual arts and theater. Due to this fact, I refer to literary works of critics and theorists primarily concerned with visual arts and theater to develop a theoretical lens through which I view participatory music.

From time to time, I also seek assistance from works of art that are not strictly musical in nature to elaborate concepts related to participation.

In developing the theoretical framework, I focus mostly on the social sphere of the works that is where I find the most compelling effects of participation. This is to say that the tonal, timbral, rhythmic and structural characteristics of the sounds that the musical works produce are not my primary concern. The sounds themselves vary widely among the works and allude to music-theoretical conventions that are not directly influential to the practice I have been developing. The sounds do, however, play a crucial role in the communication between the audience and the performers and, therefore, work as a fabric that connects the subjects in the social sphere. It is this aspect of musical sounds that I am concerned with. In other words, I am interested in the sounds as an art object that the subjects interact with and exchange.

I use the theoretical framework I develop to assess my own creative project in terms of the relationships it fostered and their political implications. The works of Claire Bishop, Jacques Rancière and Pablo Helguera become indispensable to the development of this framework. Nicolas Bourriaud's seminal work on socially engaged art titled *Relational Aesthetics*, although not mentioned extensively in the paper, also serves as an important point of reference. In case it is not obvious, the title of this dissertation project was inspired by the term "relational art" that Bourriaud coined. He defines it as "an art taking as its theoretical horizon the realm of human interactions and its social context, rather than the assertion of an independent *private* symbolic space".[1]

Two apologies

My analysis of creative works is interwoven with my development of the theoretical framework since the works serve as a direct means of grounding the ideas that I discuss in tangible

[1] Bourriaud, *Relational Aesthetics*, 14.

occurrences. I apologize to the reader if this way of presenting theory and analysis is often hard to follow. For me, the creative works are examples that help me think through abstract ideas about participation in a clear way.

The reader may also notice that I often refer to works of music and those of other artforms in discussing the same idea, which requires shifting frames of reference frequently. This approach was inspired by Bishop's lack of discrimination between artforms in *Artificial Hells*. I encourage the reader to focus on the purpose of bringing works from disparate disciplines into the same space. I chose this approach to highlight a conceptual commonality in some cases, and a contrasting aspect in others.

Chapter breakdown

The first chapter is dedicated to developing a framework through which to view participation. A discussion about the social process of making music is followed by a critique of the dichotomy of "active" and "passive" participation. I suggest an alternative method of viewing participation that, I believe, is more comprehensive and can provide more insight into my own work.

The second chapter focuses on the development of the creative project of this dissertation. I detail the various technical and aesthetic considerations that my team and I had and how we addressed them.

The final chapter provides an account of the outcome of the creative project followed by an assessment. I use the theoretical framework that I develop in Chapter 1 as the basis for this assessment. Interviews conducted with concert attendees, and survey entries aid this assessment.

CHAPTER 1: Theoretical Frameworks of Viewing Participation

"Relational music" is aimed at developing a practice that lets musicians/non-musicians explore concepts that are more convenient to realize through a participatory and collaborative venture than a traditional concert. The last sentence brings up several questions: What is a traditional concert? It is true that the production of such a concert requires certain kinds of collaboration and participation. Yet we instinctively know that there is a big difference between a performance of Beethoven's fifth symphony at the Walt Disney Concert Hall, for instance, and a concert of Jason Freeman's *Glimmer* (2004) that utilizes audience interaction to affect the live performance at several levels. We can discuss the differences in the dynamics of these two events with the aid of literature on the kinds of art referred to as participatory art, social practice, socially engaged art, and "relational" art. Although it is hard to come by musical works that can be sufficiently and faithfully described using these terms, I believe that this body of literature is directly related to my project and I therefore refer to it frequently.

Parsing different forms of participation is an important part of analyzing and assessing participation. In this chapter, I provide an account of some of the common ways in which the audience functions in the creation of art. I draw examples from the world of music and visual arts to ground my crude map of participation in actual events. The map is essentially the same as the one Claire Bishop lays out in the introduction of *Participation* (2006)[2] that I adopt with musical works in mind. Along with distinguishing forms of participation, the map also deals with the goals of participation. I discuss, among other things, the relations between participation, agency and authorship, specifically dealing with the state of a musical work that allows for wide distribution of creative agency. I also juxtapose Pablo Helguera's classification of participatory structures[3]

[2] Bishop, "Introduction."
[3] Helguera, *Education for Socially Engaged Art*, 14–15.

with Bishop's disambiguation. This map provides a framework for analyzing and assessing the creative work accompanying this dissertation.

1.1 The social process of making music

I want to introduce an example to help us think of music as a social process. Even if we are not always aware, we agree to take part in a social process whenever we play or listen to music with others. The customs we adhere to in order to take part in this process vary depending on any number of internal and external (the distinction can be blurry) factors, including but not limited to practice, community and culture.

I had the opportunity to perform with several choirs while growing up in Bangladesh. We performed traditional and contemporary Bangla songs—mostly pre-composed—often with harmonization that members of the choir developed spontaneously during rehearsals. Our patrons, usually people who had accrued significant cultural capital, hosted rehearsals at their houses offering their spaces and resources. Many other members of my community were also invested in cultural organization; although they were no experts, they handled logistics, hospitality and publicity to the best of their abilities. The events we performed at varied widely—from casual social gatherings at our patrons' houses to extravagant concerts on more solemn occasions. We rarely received any compensation for our performances. However, it was a culturally accepted tenet that unless an artist had achieved the topmost level of local and national recognition, they did not need to be paid. This stemmed from the fact that being a musician was hardly considered a profession. It was expected that the members of our choirs had a 'real' vocation, and that singing and playing instruments were simply a means of deriving aesthetic pleasure.

Our performances and the sounds we produced through them were just the most visible aspects of our practice, as is the case with most traditions/practices. The sociologist Howard S.

Becker argues, "Artists are some subgroup of the [art] world's participants who, by common agreement, possess a special gift, therefore make a unique contribution to the work, and thereby make it art."[4] In the system I described above, I was one of those who possessed "a special gift". It could be said that the gift of being able to sing was necessary for my work to receive the status of art. Nevertheless, the artists were only a part of the social system that made the creation of music possible. I could make very little contribution to the numerous other factors that constituted the art world. We depended greatly on our patrons for resources—instruments, sound systems, rehearsal spaces, etc.—which often meant that they had influence over what we performed, mostly not in a pervasive way. Since the patrons, organizers and the artists were part of the same community/neighborhood, they had personal relationships that also affected our work in numerous ways. It is fair to say that it was not the most professional enterprise. Nevertheless, knowing each other outside of work and occupying the same social space also meant that the different people taking on different responsibilities had similar stature; no one generally had disproportionate power over another. A culture of collaboration was fostered by this system. We certainly had leaders—such as the choir leader who was also frequently the person playing the harmonium in the group—but we always had the platform to express our thoughts and could expect to be heard. This openness allowed some radical decisions to be made when it came to performing traditional music. We often treated the songs very much like our own compositions, adding countermelodies, shuffling the sections, creating medleys and so on. We did so knowing full well that many traditionalists would criticize our efforts, but the highly supportive and collaborative environment meant that there were also those who backed our innovations. We start to see how the relationships fostered by the practice and the culture shape the sounds we hear.

[4] Becker, *Art Worlds*, 35.

The purpose of this preamble is to provide an example of how one may begin to think about the social dynamics of a practice as a determinant of sonic outcome. As I describe in the next chapter, the impetus for "relational music" is the realm of relationships; my goal has been to manipulate the social dynamics of a musical performance to affect the sounds produced during it. Facilitating audience participation has been my means of achieving this goal. In the rest of this chapter, I discuss the relevance of participation in contemporary art and how we may analyze it.

1.2 Participation as a critical response to spectatorship

Although the purpose here is different from providing an historical account of participation in art, it is important to recognize that in the latter part of the twentieth century, many artists deliberately challenged the status of the audience as spectators. This is not to say that participation was never a part of artmaking before but to emphasize that spectatorship was not a critical concern for artists. Writing about professional and amateur musicians playing side by side in European and American orchestras until the nineteenth century, Small points out that "…an important function of orchestras was to give people the chance to play together, and it was the job of the composers to give them something to play."[5] However, this kind of participation of amateur musicians in a space that is now dominated by professionals was inseparable from the practice and not intended to challenge any existing norms. On the other hand, we find the spectatorship-participation dichotomy being actively dealt with in a piece like Nam June Paik's *Participation TV* (1963/1998). Paik manipulates the circuitry of a CRT television screen to allow signals from two microphones to synthesize visual elements. The artist blurs the boundary between "art" and "non-art" by introducing the television screen (considered "non-art" in the critical discourse of the time) as not simply a device to watch uncritically but something to interact with and turn into "art". It is the

[5] Small, *Musicking*, 72.

participation of the otherwise assumed spectator that brings the art object and the underlying concept to life. The audience is treated as an important agent in the elaboration of the piece's meaning by means of careful consideration of their relationship to the television, to the space that the piece inhabits, and to the act of viewing art. The artist challenges the norms observed in these relationships by manipulating each of them, thereby signifying a critical approach to spectatorship and participation.

By similar standards, it is possible to distinguish between art preoccupied with challenging spectatorship, and "ritual art" that is defined loosely in the anthropological discourse as art that satisfies a religious, social or personal function. An example would be the Indian tradition of Kirtan that is a musical call-and-response between singers, usually sung in praise of Hindu gods and deities. Different groups of singers either repeat or respond to each other. It often involves the audience—usually followers of a Hindu doctrine, their musical background being irrelevant—as one of the singing groups. About "ritual art," Alfred Gell postulates that it is a means of continuing or advancing the social relationships between participating "agents," and that a work of art is an "index" of the "agencies" of those involved in its creation and reception.[6] This perspective is presented in contrast to the semiotic one that equates works of art with symbols. The distinction between these perspectives is analogous to Small's distinction between thinking of music as a thing and thinking of it as an activity involving participants with specific relationships.[7] In this sense, orchestral music up until the nineteenth century can be claimed to have a similar social function as some "ritual art." The emergence of the autonomous composer in the nineteenth century changed the nature of the activity calling for a more virtuosic and stringent approach towards performance, and a more passive approach towards participation for non-professionals,

[6] Gell, *Art and Agency*.
[7] Small, *Musicking*, 1–18.

matters I discuss later on. What is important to recognize here is that "ritual art" is not necessarily about identifying and challenging the social norms dictating the relationships between its participants. From Gell's study of "ritual art," we find that more often than not, it is a means of perpetuating existing conventions, including cases where active participation is involved. I am unaware of a tradition of Kirtan, for example, where the practitioners investigate their roles in the practice and attempt to alter them to engender alternative models of participation. In other words, the social dynamics of participation in this tradition is not a central concern for the practitioners.

1.3 Forms of participation and motivations behind the creation of participatory art

What sort of engagement do we refer to as participation? Is listening not a form of participation? Since listening does not affect the production of sounds, it may seem fair to say that it is a "passive" form of participation. Then the qualifier "active" may be used to refer to participation that does affect the production of sounds. However, this framing limits our understanding of the various ways in which participation may affect the process that creates musical sounds. It also does not give enough credit to the kind of active listening many works of music asks of its audience. We can view "passive" and "active" participation as two extremes of a spectrum. Works of art may display different levels of dedication towards involving the audience in critical or physical elaboration of meaning. However, caution is required when treating the matter as a spectrum because the issues that participation wishes to address are numerous, and a single linear spectrum may not be the best representation of this reality. Rather than suggesting an all-encompassing model of understanding different modes of participation, I lean towards dividing the task into two parts: first, determining how the participants engage with the work, and second, determining why participation is important to the work. The information we gather from these inquiries may give us a sense of the approaches artists take and their reasons for choosing those approaches. To

perpetrate these inquiries, I use examples from the world of music and other places that seem to satisfy the following condition: participation is one of their critical concerns and not just a facet of conventions.

- **Forms of participation**

It is nearly impossible to ignore the dichotomy of "active" and "passive" participation. There is clearly a difference between, let us say, sitting in a chair in a gallery full of audience members and listening quietly to a performance by an orchestra, and picking up glowing sticks and waving them in coordination with other audience members to effect changes in what the ensemble on the stage is playing, as it happens in Jason Freeman's *Glimmer*. The difference is physical involvement. As audience participants activate and deactivate glowing sticks in their hands, they affect what the performers on the stage play. However, physical involvement is hardly analogous to "active" participation. In fact, we need clarification on what we mean by "active" and "passive" to determine how this dichotomy is useful.

Following the dictionary definition of "passive," the only true form of passivity in reception is when there is a complete lack of physical or cognitive reaction to external stimuli. (For the sake of simplicity, I only consider conscious reactions.) Depending on the level of our attentiveness to the world of sounds around us, we may recognize the source of a sound or remember a specific occasion in the past where we heard the sound. Both scenarios exemplify cognitive engagement with sounds. While we may not call this kind of engagement "active," it is hard to argue that it is "passive" either. On the other hand, there are situations where even a carefully curated collection of sounds playing in our vicinity fails to register at a conscious level although we hear it, such as mild muzak playing through hidden speakers at a mall. Our obliviousness to those sounds is by design; the muzak is there to merge with the environment, not

to attract our attention. One can argue that such situations invite passivity. But going to a concert to listen to music that has been created for listening is a different scenario altogether.

Listening, as opposed to hearing, is hardly a "passive" activity. The word "listen" itself implies a high level of attentiveness to what one hears. Eric Clarke writes in *Ways of Listening* (2005) that "…[t]here really is no such thing as passive listening or the 'rapt contemplation' that is its more loftily expressed counterpart, but only different varieties of more or less concealed or sublimated active engagement."[8] Contemplation is an important aspect of how we experience many forms of music, including Western "art" music, or at least that is the expectation. The depth and form of contemplation depends greatly on the receiver's familiarity with the tradition under whose umbrella musical production takes place. Someone with knowledge of North Indian "classical" music may have an awareness of the mathematical foundation of a highly sophisticated "tihai" that denotes the end of a performance. Others may engage with the music at a more affective level, being aware of the emotions or the atmosphere a "raga" evokes. It is hardly justified to deem such engagement "passive" simply because it does not involve physical intervention.

If we expand our gaze beyond the sounds, we can also say that engagement begins when one decides to visit a concert venue to listen to sounds produced by a group of musicians. It involves investment of time and, in many cases, money. The act of traveling to the venue is no less a form of physical engagement than intervening in the creative process that has important consequences for the performance (such as the size of the crowd) and the practice (the enthusiasm and the size of the audience affect the support the practice receives). It is truer in this age of digital reproduction and streaming services when no extra physical labor is needed to have access to

[8] Clarke, *Ways of Listening*, 205.

sounds that one wants to listen to. The commitment to experiencing a musical performance in person is, therefore, a form of "active" participation that often gets ignored.

A compelling debate surrounding "active" and "passive" participation has unfolded in the world of theater. To a great extent, it is this debate that has informed Claire Bishop's elaboration of participation in art and, by inference, mine. The precursor to the debate is the recognition that theater invites spectatorship. Jacques Rancière identifies the two supposed evils of spectatorship that have been at the forefront of the debate: "First, viewing is the opposite of knowing: the spectator is held before an appearance in a state of ignorance about the process of production of this appearance and about the reality it conceals. Second, it is the opposite of acting: the spectator remains immobile in her seat, passive. To be a spectator is to be separated from both the capacity to know and the power to act."[9] Rancière also identifies two critical approaches that have emerged to respond to these evils: The Brechtian approach is to offer the spectator a strange scenario or a dilemma that they have to engage with critically while Artaud's way (known as "theater of cruelty") is to abolish this "reasoning distance" and compel the audience to "exchange the privilege of rational observer for that of being in possession of all her vital energies."[10] Artaud's model calls for physical engagement of the audience while Brecht's does not do so explicitly. A parallel to Artaud's approach is that of the co-founder of the Situationist International, Guy Debord, who endeavored to construct scenarios that "would involve the audience function disappearing altogether in the new category of *viveur* (one who lives)" and "produce new social relationships and thus new social realities."[11] It is important to note that Debord sees the construction of "situations" as a development of Brecht's ideas about critical engagement rather than a reaction.

[9] Rancière, *The Emancipated Spectator*, 2.
[10] Rancière, 4.
[11] Bishop, "Introduction," 12–13.

Rancière argues that the "active-passive" binary is forced by assumptions about the state of being a spectator and that of being an actor, and advocates a new approach, drawing from the history of education, that does not deem spectatorship a "passive" form of engagement but an activity that lets us interpret and re-interpret a work of art in ways that diverge from the artist's intentions.

The sort of engagement Brecht advocates is frequently asked of listeners in Western "art" music. When a composer calls for this kind of engagement, it is usually to inspire close listening that is supposed to reveal some deep truth about the sounds themselves or their relationships to each other (such as Pierre Schaeffer's musique concrète or Gérard Grisey's spectralist works), or it is to draw attention to extra-musical phenomena that the sounds refer to (Salvatore Martirano's 1967 piece *L's G.A.* or Salvatore Sciarrino's 1981 piece *Efebo con Radio*, for instance). Using Pablo Helguera's classification of participatory structures, this sort of engagement may be called "nominal participation."[12] Examples of musical works that are closer to Artaud or Debord's model are, however, rare. The creative process in music is generally the privileged space of professionals that is hard for others to enter. Small describes how various shifts since the nineteenth century have led to this situation where music and our daily lives do not overlap very often;[13] The process of making music has been made into an esoteric enterprise that only a select few have access to. While we are noticing signs of democratization of the knowledge and technology necessary to produce many modern forms of music (the availability of affordable and portable professional equipment and free online tutorials on electronic production techniques, for example), the cultural and financial capital held by professional institutions (such as orchestras, venues, studios and labels) still outweighs that held by those we often refer to as "amateurs".

[12] Helguera, *Education for Socially Engaged Art*, 14.
[13] Small, *Musicking*, 30–38.

In rare cases, composers have dealt with audience participation as Artaud or Debord advocates. A popular approach has been to produce parts for audience members to play along with featured musicians. An example of this is Christian Mason's *In the Midst of the Sonorous Islands* (2016) that features parts written for five groups of instruments (aluminum foil, chains, baoding balls, glass bottles and harmonicas) played by audience members. The audience participants are divided into two groups: group A consists of those playing the unpitched percussion instruments while B consists of those playing the pitched instruments. Players in group A do not need to attend any rehearsals while those in B do. Mason also states that those in group B may benefit from having prior musical training.[14] The audience participants do not read from their parts during the performance but are guided by the conductor. We observe a form of physical participation here, but it does not necessarily put an emphasis on creative/critical engagement. The sound, when thought of as a conceptual art object, permeates through the social space primarily in one direction: from the composer to the performers and the audience participants. The task of the sound-producing agents is to faithfully realize the sonic concept that the composer has provided. In Helguera's terms, this is "directed participation" where the artist specifies what the participants should be doing.[15]

Frederic Rzewski's *Les Moutons de Panurge* (1969) operates a little differently. It features a part for the "musicians" and another for the "nonmusicians". However, Rzewski expects both groups to improvise with whatever instruments they have. The "musicians" play a written-out melody in a nonlinear way keeping a steady pulse. The register of the melody is unspecified. For the "nonmusicians," he specifies the pulse that their leader should maintain and the others should

[14] Mason, *In the Midst of the Sonorous Islands*.
[15] Helguera, *Education for Socially Engaged Art*, 15.

follow. He also dictates that the sounds they produce should be loud.[16] The sound, in this case, becomes an object that the composer, the performers on stage, and the audience members all leave marks on. More specifically, the composer decides some aspects of the marks that the performers and the audience should leave on the sound while he leaves the rest of the decisions up to them. The audience have a say on the concept of the object as well as what is heard. Helguera might place this sort of participation closer to "creative participation" that involves the audience contributing a creative component to a structure determined by the artist.[17]

Another approach is giving the audience the opportunity to affect the course of a performance through physical involvement and improvisation with the hope that it would lead to creative/critical engagement. Electronic interfaces and computer mediation have been used in works that originated because of this approach. Jason Freeman's work may serve as an example. He provides this context for one of his pieces: "*Glimmer* (2004), for chamber orchestra and audience, engages the concert audience as musical collaborators who do not just listen to the performance but actively shape it. Each audience member is given a battery-operated light stick which he or she turns on and off over the course of the piece. Computer software analyzes live video of the audience and sends instructions to the orchestra via multi-colored lights on each player's stand."[18] The audience members are divided into groups that correspond with groups of players in the chamber ensemble. The percentage of sticks activated within each group controls the dynamic level of the corresponding group of players. To make sure that participants in a group do not simply leave their lights on all the time, the software was designed to reward high rates of change in the activation of the sticks by increasing the dynamic range of the corresponding

[16] Rzewski, *Les Moutons de Panurge*.
[17] Helguera, *Education for Socially Engaged Art*, 15.
[18] Freeman, "Glimmer for Chamber Orchestra and Audience," 1.

ensemble groups and the rate at which they change pitches.[19] These rather straightforward relationships have the potential to give rise to intricate group dynamics. There is an implicit expectation that coordination among the audience participants in a group will emerge as groups compete to make their corresponding players sound more prominent in the mix of sounds. It should also be noted that individual action does not have much effect on the outcome as the software is concerned only with collective activity.

Bringing back the concept of sound-as-art-object, here, the object is constantly exchanged between the performers on stage and the audience members. The performers leave some mark on this object and present it to the audience. The collective action of the audience leaves a mark on the conceptual paradigm of the sound that is used by the performers to produce new sounds. However, it is not just one object that is being exchanged. Each group—consisting of audience members and assigned performers on stage—continuously exchanges their own object that the audience members are encouraged to compare with the other objects. The comparison is expected to lead to a sort of competition among the groups.

Voting systems have often been used to foster audience participation as well. Kevin Baird's *No Clergy* (2005) takes audience input through a webpage that asks participants to vote on particular musical parameters. The data is then used to generate notation that is read by musicians. Audience preferences guide the future of a performance as well as future performances.[20] A similar path is taken in Jordan Watson's *All These Worlds are Yours* (2016). The program notes tell us that audience members vote on various musical parameters on their internet-connected mobile devices. Sounds are produced by featured performers and a computer, both of which are controlled

[19] Freeman, "Glimmer: Creating New Connections," 275.
[20] Baird, "No Clergy: A Piece for Flexible Small Ensemble Generated in Real Time Based on Audience Feedback," 13–14.

by audience preferences.[21] Voting is essentially an individual action that can be harnessed by voters to achieve something collectively. Again, there is an implicit expectation that coordination will take place among individuals that would result in sounds desired by a majority.

In these pieces, the art object is treated is a similar way as it is in *Glimmer*. The audience members express their preferences through a voting system that leave marks on the concept that the featured performers use to create new sounds. However, the art object in these pieces is treated as a unit. The marks left by individual audience members on this object are not all expressed in the sounds produced. Due to the nature of the systems, the average of the marks is used as an indication of what the entire group of audience members might want to hear.

Technologically mediated works such as the last few examples tend to use interfaces that are very different from conventional musical instruments. Freeman states that his reason to go this route is to increase accessibility as *Glimmer* is meant to involve audience members whose musical capabilities are unknown to the composer.[22] Voting systems also make otherwise complex structures of musical parameters more accessible. They make possible for the composer to simplify the parameters they present to the audience. Nevertheless, the audience activity in *Glimmer* requires a kind of bodily engagement that the pieces featuring electronic voting systems do not. I would argue that the manipulation of physical objects can foster coordination as it makes one's actions clearly visible to others making it available for replication.

Unlike Mason's *In the Midst of the Sonorous Islands*, Freeman, Baird and Watson's works do not require any of the participants to attend rehearsals. The improvisatory nature of these works makes the audience responsible for the creative process to a large extent. At the same time, the collective nature of the activities fostered by these works renders individual actions less effective

[21] Watson, *All These Worlds Are Yours*.
[22] Freeman, "Glimmer for Chamber Orchestra and Audience," 23–24.

in bringing about changes. As such, in Helguera's classification, this form of engagement is "creative participation" and not "collaborative participation" since the audience does not share with the composers the authority to structure the social interactions the pieces allow.[23]

On the one hand, we cannot ignore the fact that the technological mediation we observe in Freeman, Baird and Watson's works creates a vast separation between how directly the featured performers and the audience affect the art object. The simplification that technological mediation allows also obfuscates the process through which the audience's effects on the concept of the sounds get translated to audible sounds. On the other hand, Mason and Rzewski's pieces reduce such separation to a great extent as the performers and the audience both use physical interfaces that produce sounds mechanically.

- **Motivations**

"Recurrently, calls for an art of participation tend to be allied to one or all of the following agendas. The first concerns the desire to create an active subject, one who will be empowered by the experience of physical or symbolic participation…The second argument concerns authorship…The third issue involves a perceived crisis in community and collective responsibility."[24]

Bishop's work on participation not only gives us an historical account of art critically addressing spectatorship; it also identifies continuities and divergences in the reasons that motivated the creation of such art. In *Artificial Hells* (2012), Bishop outlines how attempts at facilitating participation have always been intricately linked to immediate and broad political motivations.[25] Diverse populist movements such as Italian fascism, Bolshevism and French anti-

[23] Helguera, *Education for Socially Engaged Art*, 15.
[24] Bishop, "Introduction," 12.
[25] Bishop, *Artificial Hells*.

nationalism gave birth to streams of theater and visual art that challenged spectatorship. In the latter part of the twentieth century, the broad reasons for creating participatory art shifted greatly; Critiquing the consumerist and individualist drive of modern capitalism and urbanism became an important task for many artists, as postulated by Nicolas Bourriaud.[26] However, Bishop argues that continuity in the more immediate motivations can be found between the two halves of the century. According to her, activation, authorship and community are the three concerns that have inspired most attempts at participation.[27] These concerns still dominate the relevant discourse as the spectacle continues to be an isolating and devitalizing weapon for the status quo.

The impetus for participation in many musical scenarios has been one or more of the three matters stated by Bishop. Those composers/producers who have expressed their views on their participatory work tend to recognize the fact that the audience do not often have the opportunity to engage with the creative process in a direct and physical way, and that they do not have an interactive enough relationship with the sounds that are heard. Freeman writes, "Imagine, for example, that you are listening to an old historical recording of a Beethoven symphony. The composer wrote the score, *then* the performers interpreted the score, *then* you reacted to the performance. There is no way that your activities as a listener could influence the composition or the performance to which you are listening."[28] Jutta Toelle and John Sloboda point out that there has been an increasing interest among the proponents of Western "art" music in fostering participation because the insistence on critical engagement or listening is at odds with our modern strenuous lifestyles.[29] From these statements, we can surmise that there are artistic and practical motivations for increasing participation.

[26] Bourriaud, *Relational Aesthetics*.
[27] Bishop, "Introduction," 12.
[28] Freeman, "Glimmer for Chamber Orchestra and Audience," 4.
[29] Toelle and Sloboda, "The Audience as Artist?," 2.

Practical motivations, however, eventually lead us to discussions about the recuperation of radical approaches to participation and collaboration in the sustenance of the divisive and disempowering forces of the state and/or the capitalistic system we inhabit. Bishop observes, "Participation is used by business as a tool for improving efficiency and workforce morale, as well as being all-pervasive in the mass-media in the form of reality television."[30] Discussing the push for "socially *inclusive*" art by European political entities in the 90s and the early 2000s, she sheds light on the fact that participation has been used to propagate conformist political agendas to "conceal social inequality, rendering it cosmetic rather than structural"; the imperative was reducing opposition to austerity policies.[31] Such perspectives help us comprehend the crucial distinction between art that facilitates participation to challenge existing social dynamics and power structures, and art that does the same to encourage superficial engagement but does not interfere with the existing norms. While these perspectives are important in fully comprehending the political potential of and the political motivations behind participation, they are rather widespread and, therefore, beyond the scope of this dissertation. I bring it up to stress the importance of possessing tools for the aesthetic evaluation of participatory art to counter the tendency of placing all such art in the same category.[32] In this section, I focus on the creative motivations.

The term "situation" shows up frequently in conversations around spectatorship and participation. It takes on different meanings depending on the context, but they all refer to the realm of interactions that happen between subjects and objects in a work of art. Helguera specifies that socially engaged art is concerned with "situations that lead to a mode of social exchange—

[30] Bishop, "Introduction," 11–12.
[31] Bishop, *Artificial Hells*, 13–18.
[32] The erasure of distinctions in important facets of participatory art has been a political tactic in the dilution of the seriousness of social inequalities and the utilitarian recuperation of radical approaches. See Bishop, 13–18.

that is, interpersonal situations."[33] Relationships between participants take on more importance than the art object that they interact with. Artists often insert themselves in existing "situations" to either intervene and question them, or to flourish and support them. In both cases, the art object, mediated through a process of production and dissemination, is secondary to the interpersonal relationships. Debord's criticism of the spectacle highlights that it is the immutable object or image created through mimesis that encourages inaction and conformity: "Where real world changes into simple images, the simple images become real beings and effective motivations of hypnotic behavior…[The spectacle] is the opposite of dialogue."[34] For him, the way to challenge this reliance on images is to construct "situations" that reshape social relationships in an attempt to rebuild the bonds severed by rigid urban structures. "Situations" give us a frame to talk about the social realities of producing art. Different "situations" place different levels of emphasis on activation of the audience, distribution of authorship, and building community.

Activation: Unsurprisingly, audience activation—engaging the audience in physical participation—is a common denominator in participatory musical works. The fact that the musical performances we experience in concert halls largely feature professional musicians who have had the privilege of decades of training is a demonstration of the division that exists between those included in the creative process and those who are not. Whose intervention in the process of making music is worth our attention? In other areas of art, practices have emerged that do not make such a strong distinction or question it where it exists. The profound existence of this division in music means that it is usually this factor that is apprehended first in participatory works. In all the musical examples we have looked at so far, activation of the audience is featured prominently. The rarity of participatory approaches in music also means that audience participation defines and gives

[33] Helguera, *Education for Socially Engaged Art*, 30.
[34] Debord, *The Society of the Spectacle*, 18.

unique identities to these pieces. They stand out from the crowd of musical works that rely solely on critical engagement for their elaboration of meaning. The composers construct "situations" that invite the audience to take part in the production of sounds and, therefore, contribute to the work in a physical way. It involves temporarily setting aside the widely accepted sentiment that the creation of music is the avenue of those with special knowledge and skills in the area. Otherwise, the stigma of an untrained or amateur musician may prevent a member of the audience from participating.

We see different composers employing different approaches to address this matter. Mason prescribes instruments with relatively simple mechanisms to the audience members to increase accessibility. Freeman goes further and uses an interface that is far removed from the complex mechanisms of most musical instruments. It offers a rather simple and unsophisticated way of being physically active that does not have a very direct relationship to the sounds heard. The glowing lights in the darkness of the concert space establishes an ambiance akin to that of a night club where social interaction happens more freely than in a modern concert hall. The fact that it is a piece for mass-audience participation also lowers the stake for an individual participant. Whether the lower stake encourages the participant to be more active or less so is a complicated matter and not clearly addressed by the composer. However, Freeman states that he has built into the mediating software a process that is intended to create competition between audience groups. He does so to sustain interest in the participatory activity that affects the sounds.[35] Here, we notice the composer taking an interest in shaping the social relationships between the participants. The factors he decides to manipulate might have a significant effect on the audience's willingness to be activated. Watson and Baird make use of other consumer electronics that the audience is likely

[35] Freeman, "Glimmer for Chamber Orchestra and Audience," 25–26.

to be familiar with through their daily experiences, therefore, increasing the chances of their activation.

However, activation of the spectator in and of itself is not usually the goal in participatory art. Bishop makes a clear distinction between participation that is concerned with social interactions, and "activation of the individual viewer in so-called 'interactive' art and installation."[36] An example of an interactive installation would be *Urban Lights Contacts* (2015) by the French artist duo known as Scenocosme. Their website describes the installation as follows: "This artwork is composed of a small interactive shiny ball. A first person is invited to put his hand on the shiny ball. In contact with this object, his body turns sensitive and reactive to other living bodies. If the person remains alone, nothing happens, there is no reaction. He must invite another person to touch him. Each contact generates variable sounds. The various sonorous vibrations change with the proximity of the contacts and of the spectators."[37] The piece does not limit itself to activating the individual viewer but encourages individuals to interact with each other. In this sense, it is concerned with the social dimension. However, the participants did not play a role in the process of creating the system that is at the heart of the work. There is no conscious sound-producing agent present to interact with either. The participants are further removed from the creative process by the not-so-obvious causal relationship between the sensor and the lights and sounds. We need to turn our attention to authorship to discuss such matters.

Authorship: It is often difficult to define what it means to "author" a piece of music. A producer of electronic music might have all the resources they need on their computer storage and not need to interact with another human being in order to create a track. The creative labor can be attributed entirely to the producer unless we believe that the developers of the software that the producer

[36] Bishop, "Introduction," 10.
[37] Lasserre and Ancxt, "Urban Lights Contacts."

uses are also responsible for how the track turns out. The functionalities and the interface of the software dictate the producer's workflow to some extent and, therefore, have an effect on the outcome. If we assume that this producer creates their own sounds and patterns using the software tools at their disposal and does not simply recycle existing assets, it is fair to say that the producer is closer to the process that results in the track than are the software developers. On the other hand, the predominant model for musical creation in the Western "art" music sphere involves the composer writing instructions for the performer so they can produce the sounds intended by the composer. The skilled performer produces the sounds and also has a level of freedom in interpreting the instructions that allows them to make a creative contribution during performance. The audience generally do not have the chance to influence the sounds themselves. These three categories of people—composer, performer and audience—can afford different extents and forms of proximity to the process that produces the sounds. But we attribute the authorship of the piece to the composer and not the others. It might seem strange that a piece like *No Clergy* is also attributed solely to its composer.

This upholding of an autonomous authorial figure is closely related to the "work-concept" that Lydia Goehr provides a historiological account of in her seminal work *The Imaginary Museum of Musical Works* (1992). She postulates that thinking of musical works as objects leaves us with an ambiguous notion of where these objects exist and in what form. The alternative she offers is the "work-concept"—an "open concept" that serves as a container for musical works within a practice while its specifications may be left sufficiently open to include a wide variety of forms that musical works might take. This concept, as Goehr claims (and I oversimplify), came into being during the nineteenth century resulting in the defining of a musical practice using the works it produced, the idolization of music as a pure form of art free from the influence of the extra-musical,

and the reimagining of the roles of the composer and the performer placing the bulk of authorial responsibilities on the composer while assigning to the performer a purely interpretive role. Even when it started shaping the practice, awareness of the concept and its ontology were not necessary for the practice to continue. At every transition of the defining factors of this concept, there was continuity that allowed us to connect its new purpose to its old one. This continuity has allowed the nature of works to change significantly while the "work-concept's" ties to the idea of the autonomous composer remained instrumental even though new relationships were forming between the practitioners.[38] We may think of participatory works of music as a shift in the specifications of the "work-concept" that builds new bridges between practitioners but still continues the composer's authority over the abstract notion that defines a work.

Instead of indulging in a philosophical discussion about what the act of composing, performing or listening means for authorship, I want to focus on what authorship means for the creation of participatory music. Bishop observes that "the gesture of ceding some or all authorial control is conventionally regarded as more egalitarian and democratic than the creation of a work by a single artist, while shared production is also seen to entail the aesthetic benefits of greater risk and unpredictability. Collaborative creativity is therefore understood both to emerge from, and to produce, a more positive and non-hierarchical social model."[39] It is not uncommon in Western "art" music, especially since the twentieth century, for the composer to share authorial agency with the performer. An extreme example would be Earle Brown's *December 1952* (1952) the score of which is more akin to an arbitrary arrangement of finite orthogonal straight lines of varying thickness than a musical score. Brown expects the performer to have a musical interpretation of this image without providing any hard and fast rules to follow in said interpretation. The performer

[38] Goehr, *The Imaginary Museum of Musical Works*.
[39] Bishop, "Introduction," 12.

is, therefore, compelled to make creative decisions about the sounds to use and how they will be arranged in time without much guidance from the composer. Whether this is always the motivation or not is hard to say, but "open-form" pieces like Brown's allows the performer to not only contribute as interpreters but also as consequential creative agents. The relationship this "situation" fosters between the composer and the performer is close to what Helguera calls "collaborative participation": "The visitor [in our case, the performer] shares responsibility for developing the structure and content of the work in collaboration and direct dialogue with the artist [in our case, the composer]".[40]

It is hard to come by a musical work where authorial control is shared with the audience to this extent. In Baird, Freeman, Mason, Rzewski and Watson's works, we notice that the composer creates a system that is adopted in its entirety by performers and audience. While the composer may not be determining the exact pitches, note lengths, dynamics, etc. for every moment of the performance, they are solely responsible for determining the relationships between the practitioners and the processes that mediate their communications. The mediating processes are crucial in understanding how each practitioner functions in the system and what agency they have. Goehr writes about the mediating role of the score in the early 1800s: "The relation [between the composer and the performer] was mediated by the presence of complete and adequate notation. The only duty of liberated composers was to make it possible for performers to fulfil their role; they had a responsibility to make their works performable, and they did this by providing complete scores."[41] Consider how the emergence of graphic scores ushered in a new mode of interpretation for the performer that enhanced their creative agency. It also allowed the composer to express their

[40] Helguera, *Education for Socially Engaged Art*, 15.
[41] Goehr, *The Imaginary Museum of Musical Works*, 231.

ideas differently and to express different ideas. The score acts as a mediating technology between the composer and the performer.

Georgina Born takes Goehr's ideas on mediation further and incorporates how music is mediated in the digital age. She emphasizes the distributed nature of musical creativity with reference to how the recording studio and a technique like sampling mediate between people existing in different locations and times, and how electronic music often encourages or demands the creation of new musical material through technological mediation during a performance (e.g. the use of EEG to create notation in Bruce Gilchrist's *Thought Conductor #2*), or gives creative agency to machines so they may collaborate with human agents (e.g. the computer technology and piece developed by George Lewis known as *Voyager*).[42] Each of these scenarios showcases its own mediating process. Born observes, "In experimental electronic music the emphasis is on open processes and unpredictability in performance, and on the design of circuitry as itself a mode of 'composition'; both point to a refusal of the telos of the finished work."[43] Along with distributing creative agency and placing importance on the process through which the work comes alive, this form of music questions what it means to compose. Therefore, mediation not only influences the relationships among practitioners but also dictates how each practitioner contributes. We notice that "designing" the system that engages the practitioners becomes a meaningful task for the composer. The other practitioners populate that system with their interactions but do not generally have the opportunity to alter it. This is the case in all the musical works with participation we have looked at. The composer acts as a facilitator, much like Roland Barthes's description of the role of a literary author—"…To write is to reach, through a preexisting impersonality … that point where

[42] Born, "On Musical Mediation."
[43] Born, 31.

language alone acts, 'performs', and not 'oneself'."[44] The description aligns well with the purpose of the composer envisioned by those advocating comprehensive distribution of agency as the composer needs to relinquish their personal agenda to some extent to invoke the sort of social dynamics they desire.

In this scenario, the composer's role is also similar to that of a music producer in the popular music arena. As elaborated by Virgil Moorefield, the producer's role has evolved gradually from the early 1930s until the beginning of the twenty-first century encompassing responsibilities such as bringing talents into a creative space, mediating and overseeing collaboration between songwriters, performers and technicians, establishing stylistic features of a record, becoming a technician, developing new technology, composing, and performing.[45] Many of these responsibilities are essentially concerned with relational aspects of making music and not so much with establishing a single authorial voice. The producer guides the creative process without claiming control over every detail of the process. They also often create the interfaces that artists use to express creatively; It is similar to authoring the system through which sound producing agents interact in a live performance setting.

The mediation processes featured in the musical works we looked at distribute authorial control to varying degrees. Mason's *In the Midst of the Sonorous Islands* allows the audience to participate physically but does not let them add anything that the composer would not have wanted. Rzewski's *Les Moutons de Panurge* lets the non-musicians improvise giving them the opportunity to contribute their own musical ideas. Baird, Freeman and Watson all encourage collective participation in their pieces making it difficult for any individual to gauge accurately how they are contributing to the sounds, thereby curbing individual agency. The fact that the pieces these

[44] Barthes, "The Death of the Author."
[45] Moorefield, *The Producer as Composer*.

composers have created use computer mediation that is not entirely transparent (unless the audience knows and understands the code running the software and how to use it to their advantage) also has the potential to shape the form of agency the audience members experience.

As Born primarily considers the work of John Cage and that of his disciples in her discussion of experimental electronic music, she focuses on indeterminacy. Nevertheless, indeterminacy is usually a byproduct in more recent works of participatory music. Composers establish mediating processes that facilitate the extension of creative agency to the audience for broader purposes. Among those purposes are examining, critiquing and building communities.

Community: "Not only does each [socially engaged art] project depend on a community for its existence, but such projects are, most people agree, community-building mechanisms."[46] Works featuring participation are a subset of what Helguera refers to as "socially engaged art" (SEA). The projects under the very broad umbrella of SEA generally attempt to engage in a dialogue with a group of people who are likely not as deeply entrenched in the art world as the artists who conceive of such projects are. The reasons these artists choose to interact with those groups/communities are various. Helguera provides two extreme examples, one in which the goal is to uphold the community's identity by affirming their existing norms and social dynamics, and the other in which the artist introduces a difficult and uncomfortable concept to highlight an existing practice of labor exploitation.[47] The two projects treat the social situations they pertain to in very different ways that have different implications on the goal of community-building. The affirmative approach increases the chances of a respectful and productive dialogue between the artist and the community while running the risk of the exchange not being completely honest. It makes it easier for the community to be interested and invested in the creation of the artwork. The

[46] Helguera, *Education for Socially Engaged Art*, 9.
[47] Helguera, 10–11.

interventional approach may have the opposite effect making it difficult for the community to accept the artwork as something desirable. However, the artist might have an educational purpose in mind; the goal may be to make the community aware of its own biases or malpractices, in which case, the difficulty in gaining the support of the community becomes an important aspect of the work. Such a case may shed light on the broad purpose of making art through engaging with a community; It is not the outcome that is the central concern but the social process through which the work comes to exist and/or how it continues to engage the community once it is created. Astrid Breel makes this crucial distinction in discussing the aesthetics of participation in performance: "Performances with a participatory *process* involve the participants in the creation of the work and tend to reside within the socially engaged or applied sphere. … In contrast, performances that offer participation in the *outcome* are constructed by the artist, but need the audience to execute the work fully."[48]

Understanding of the workings of a community is required to engage with it fruitfully. If the community as a whole is not interested in "high art," it is unlikely that a highly conceptual idea will be received with enthusiasm. The community and the artist must have a shared understanding of what each of them is offering and what they want in return. Helguera explains how a lack of alignment in expectations might lead to either one or both entities being less than satisfied with the results.[49] If the idea is to challenge and educate the community, careful consideration must be given to how this experience could be made productive for those who the work is intended to educate. Direct and uncalled-for intervention may not always be the best approach because the community may simply not be ready to have their beliefs and customs overturned. The artist must

[48] Breel, "Audience Agency in Participatory Performance: A Methodology for Examining Aesthetic Experience," 369.
[49] Helguera, *Education for Socially Engaged Art*, 27–32.

find a way to facilitate a productive dialogue that does not involve disrespecting or offending the community while being critical of the things that the work is intended to challenge. On many occasions, the artist becomes indistinguishable from a social worker. The difference lies in the fact that an artist, as Heguera puts it, often "ironizes, problematizes, and even enhances tensions" to bring attention to the subjects they want to address while a social worker is focused only on the betterment of a community through actions that align with the values the social worker subscribes to.[50]

Bishop illuminates another dimension of community in her comparative examination of two British movements that developed in the 60's and the 70's.[51] The Artist Placement Group (APG) sought employment opportunities for established artists in private and public industries. Once they were placed, the artists worked with the employees to understand their needs and wants and to somehow address them creatively. APG's stated goal was to bridge the gap between industry and art, and to develop a mutually beneficial relationship. It is hard to ignore that APG found an alternative means of supporting artists financially so that they were not dependent on conventional patronage. Nevertheless, some of the artists were not happy with APG's preoccupation with management rather than the creation of interesting art. On the other hand, a movement of community arts flourished around the same time that emphasized the need for creative engagement of the commons. "It was positioned against the hierarchies of the international art world and its criteria of success founded upon quality, skill, virtuosity, etc., since they conceal class interests."[52] Both movements illustrate aspects of the politics of the art world itself. They deal with the status

[50] Helguera, 35.
[51] Bishop, *Artificial Hells*, 163–91.
[52] Bishop, 177.

art and artists have in various communities and wish to tweak it in some way. Many musical works featuring participation function in a similar self-reflective manner.

Freeman identifies that the emphasis on playing and singing skills in music often creates hesitation among audience members to take part in music-making while audience participation itself can often lead to interactions that are not artistically fulfilling.[53] The community of concert-goers becomes his subject in *Glimmer* as he endeavors to provide them with an environment that eases their doubts about participating (with the use of an interface that does not require specialization) as well as encourages them to stay vigilant and active during the performance (with the software component intended to boost competition). Freeman's observation and approach speak to his intentions of understanding how the community operates within the concert space, and transforming the relationships the participants have with themselves, with the musicians, and with the sounds.

However, we should be careful equating the composer's intentions with the experience of the participants. Although Freeman's evaluation of *Glimmer* does not involve a formal survey of the audience, he mentions that what he intends for the piece can be realized fully with more iterations of the performance. He specifically mentions that the activities and movements in the sounds do not always match the enthusiasm of the participants and is a disconcerting feature for some.[54] This assessment points to the crucial fact that an aesthetic evaluation of a work of art that features audience participation may need to consider the correlation between the artist's intention and the audience's experience.

Baird and Watson's use of voting systems to guide a musical performance speaks metaphorically to the lack of creative agency audience members usually have at a concert. Both

[53] Freeman, "Glimmer for Chamber Orchestra and Audience," 12–14.
[54] Freeman, 43.

composers make use of social choice on the audience's part to affect the sounds produced during performance. The "situations" they create both allow the community of concert-goers to collectively have a say in what they hear being performed, a different kind of collective approach than that employed by Freeman. His motive was not to create a platform for the audience to express their opinions but to offer a video-game-like "situation" in which different "player" groups (audience groups) control different characters (ensemble sections) and compete with each other to produce the most compelling sounds.[55] On the other hand, Baird and Watson's interest was to let real-time feedback on the sounds heard by the audience affect a real-time process that generates the sounds (or symbols that human performers use to produce the sounds). An interesting play takes place between the performers who offer an art object and the audience who get to express how desirable that object is through a rather direct action like voting. In *Glimmer*, if the audience does not desire what is heard, they do not have such a straightforward way of expressing that opinion. They may attempt to play the system to get the results they want, but it is a roundabout way of achieving them. In this sense, there is a kind of transparency in Baird and Watson's approach that Freeman's does not have. But then again, it is not a fair assessment as Freeman's motivation is not the same as those of the other two.

More importantly, the use of a voting system in *No Clergy* and *All these Worlds are Yours* suggests preoccupation with another dimension of community: coordination. The individual act of voting is not consequential to the pieces. It is not hard to imagine that to make any strong musical statement (such as a moment where all performers play in rhythmic synchronization with each other or make a loud gesture together), enough participants need to want it first. Moreover, in each of these pieces, the participants are voting on multiple parameters at the same time. At any given

[55] Freeman, 21.

moment, the chances of all participants wanting similar results across all parameters are minimal. This increases the chances of the dilution of any coherent and recognizable musical idea. Baird and Watson do not provide any information about how the process has unfolded in previous performances, but an educated guess tells us that a coordinated action among the voters cannot be presumed. At best, there may be moments of coordination that may be coincidental or a result of conscious effort on part of the participants. Those may be the moments that these pieces strive to bring about.

In this chapter, I have tried to provide a framework to view participation through by discussing some of the forms it may take and why artists are concerned with them. Considering the wide variety of participatory approaches that have been developed since the second half of the twentieth century, the account I provide barely scratches the surface. But it is enough groundwork to discuss the creative portion of this dissertation which was a concert of interactive music that I produced in May of 2022. The next two chapters are dedicated to describing how the work developed, the design considerations I and my collaborators had, and how successful the event itself was. The theoretical exploration in this chapter informs this discussion.

CHAPTER 2: *Space Within* – Development

Space Within (2022) was an event of live interactive music held in the black box theater of the Experimental Media Performance Lab (xMPL) at the University of California, Irvine. My team and I produced two shows that took place on May 13 and 14, 2022. Each show was attended by an audience of roughly fifty members. An ensemble of four musicians—including myself—were responsible for the creation of most of the sounds heard during the performances. "Interactive objects" let the audience influence the sounds in direct and indirect ways. The "interactive objects" formed the sensory unit of a system that gathered audience interaction data, parsed and relayed information to the performers, produced electronic sounds, and affected all sounds with effects processing. This chapter describes the system of subjects and objects at the heart of the work, considerations my team and I had while designing various aspects of the system, and how the team collaborated. The theoretical discussion of the previous chapter will be relevant when discussing our motivations and goals, and in the assessment that I provide in the next chapter.

The personnel involved in the production of the event were as follows:

Scenic designer: Melissa Tobar

Lighting designer: Jacob Nguyen

Projection designer: Steven Lewis

Live and documentation audio engineer: Blake Harrison-Lane

Documentation videographer: Jiryis Ballan

Ushers: Bella Pepke and Angela Shen

Interactive object enclosure designers: Niloufar Shiri and Melissa Tobar

Director, publicity manager, and software and hardware developer: Teerath Majumder.

The ensemble of featured musicians consisted of

JoVia Armstrong: percussion and electronics

Matthew Nelson: tenor saxophone and electronics

Prawit Siriwat: electric guitar and electronics

Teerath Majumder: electronics and data routing.

2.1 Motivations

Audience participation had never been a feature of my work until 2019 when I included a participatory element in a concert of improvised music titled *Kingdom of Diamonds*. I used participation to demonstrate how the 2018 general election in Bangladesh did not give the voters options to choose from; instead, the election was a way to legitimize an authoritarian government formed by a political party with no effective opposition.[56] Following that concert, I began researching the relations between popular music and political movements in the United States in the 1940s and 1960s. At the time, my general goal was to develop a practice that would allow me to talk about the socio-political issues I cared about in an engaging way. Through Rob Rosenthal's writings,[57] I came across Pete Seeger's participatory approach: singing *democratically* while singing *about democracy*. Seeger was passionate about involving the audience in his performances and innovated methods (such as projecting words on a screen and hanging a banner with the lyrics) to facilitate participation. Seeger's work was particularly influential in my decision to feature participation as a subject of political exploration in music.

My initial plan was to create pieces of participatory music that dealt with specific social issues. When I first began narrowing down the subjects I wanted to explore, I began to realize that I did not have enough experience making participatory music to effectively convey complex

[56] "Bangladesh Elections 2018: What You Need to Know."
[57] Rosenthal, "Pete Seeger and the Politics of Participation"; Rosenthal and Flacks, *Playing for Change: Music and Musicians in the Service of Social Movements*.

political ideas through physical engagement. Moreover, the participatory musical pieces I came across at the time seemed less concerned with extra-musical concepts and more with the status of the audience, performer and composer within the context of concert music. In other words, those musical works reimagined the relationships among different participant groups rather than imitating or commenting on relationships among people in the world outside of the assumed independent space of a musical performance. My simultaneous preoccupation with Claire Bishop, Nicolas Bourriaud and Pablo Helguera's work informed me of the deep political implications of participation itself; even when an artist does not concern themselves with any broad political motivations that extend beyond the artwork, the immediate motivations for incorporating audience participation can themselves give rise to complex social dynamics that are worth investigating. With these considerations, I decided to use this dissertation as an opportunity to create technological tools that would foster audience participation, assess the utility and aesthetic capabilities of said tools, create works that would make use of those tools to extend creative agency to the audience, and explore collaborative methods of producing interactive musical events with artists and designers. *Space Within* may be thought of as a test to determine the viability of a particular model of "relational music"—a system where audience members directly affect sonic characteristics and performer actions through interaction using a finite number of "interactive objects"—without relating this model to extra-musical socio-political issues. Through the test, I wanted to better understand the politics of the participation the model fostered.

Not unlike some other attempts at incorporating audience participation in a live musical performance, the objective of *Space Within* was to reimagine the relationships between groups of people who are generally involved in the creation and reception of music. I wanted to encourage audience members to take physical roles in shaping a performance. By providing the audience with

ways to affect sounds in real time, I expected to foster a two-way communication between them and the featured musicians. I was interested in the idea of co-creating with people who were just introduced to some novel means of manipulating sounds without any prior knowledge of those means, and whose musical capabilities I would have no knowledge of as a composer and performer. I imagined that it would give rise to a "situation" that would encourage improvisation and communication as both parties tried their best to understand how they affected each other's decisions. Sound was the channel through which communication could take place. The sound can be thought of as an "index"[58] that was exchanged between different groups, each group leaving some mark on it and passing it on to the other group. Through this mode of exchange, I intended to activate the audience, offer them creative agency, and challenge their perceived status as receivers in the realm of concert music. I was also concerned with the effect this "situation" would have on the roles of the featured musicians involved. The task of the composer would be to create scenarios where said exchange could take place and to determine the relationships between different groups. I became interested in how this new role would allow me to create distinct and recognizable scenarios that could be called "pieces." On the other hand, the featured performers would not only be listening to other members of the ensemble but also paying attention to how the audience was affecting the sounds, and adapting to the dynamic instructions they were receiving as a result of audience interaction. This restructuring of relationships was meant to emphasize the interdependence of different participant groups in the creation of music and to encourage coordination.

In the production of *Space Within*, I also explored how collaboration among artists and designers may also become a feature of "relational music". I involved the musicians and designers

[58] As used in Gell, *Art and Agency*.

in the project as early as possible so that we had enough time to discuss aesthetic and logistical matters and develop the project as a unit. As the producer of the event, I tried to make my goals as clear as possible to the musicians and designers without providing strict directives. Everyone brought their ideas to the discussions and workshops where we gave each other feedback and refined the concepts. The collaborative nature of how we worked also made it possible to fine tune the technologies we used for the event. This was especially true of the interfaces the musicians used during performance. The collective contribution of the people involved in the production is something I have tried to emphasize in the publicity campaign leading up to the event, at the end of the performances, and in this paper.

2.2 The system

At the heart of *Space Within* was a system that regulated the production and reception of sounds and visuals. *Figure 1* provides a representation of the different subjects and objects that populated the system and how they affected each other. The subjects were the featured musicians and the audience members while the objects were the sound produced, the visual elements in the projection, and the "interactive objects". The system may be interpreted as a feedback loop.

1. The performance by the featured musicians contributed to the sound.
2. The sound affected the choices made by the audience members; The projection also affected audience choices.
3. Audience choices created interaction data that directly affected musical parameters and suggested changes in the performance to the musicians; Audience interaction also affected the elements in the projection.
4. The musicians made choices based on the suggestions they received and the sounds they heard.

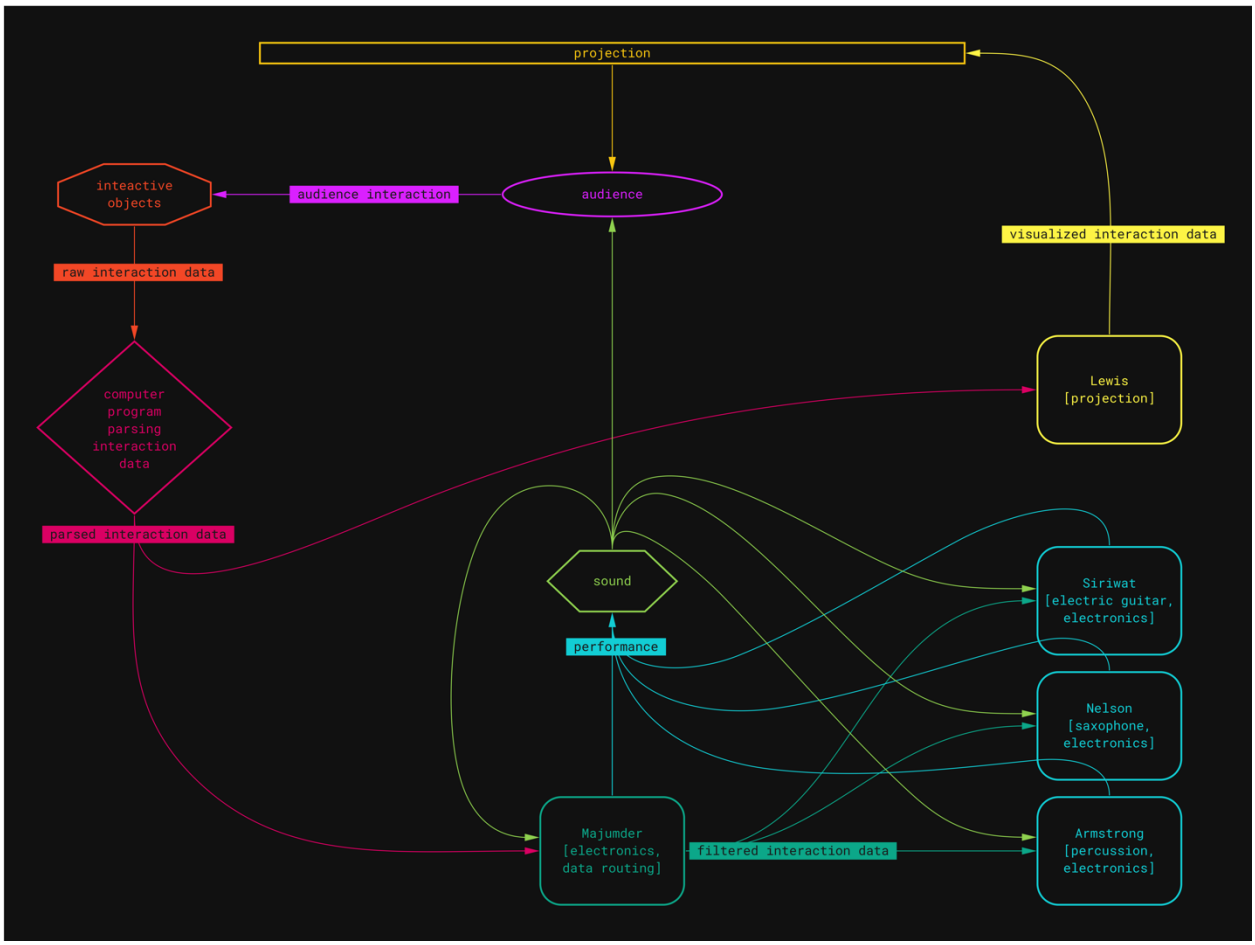

Figure 1

In this section, I present details about the components of this system and how they function together.

- **Interactive objects**

Four "interactive objects" (see *Figure 2*) were placed in the concert space, each with its own station. Audience members interacted with these objects to affect the performance. The objects are as follows:

Cube: A 6" x 6" x 6" cube that hosts a MUGIC® sensor. The sensor consists of an inertial measurement unit (IMU) that measures nine variables related to motion and orientation, namely linear acceleration along the three principal axes, angular acceleration around the axes, and angular

displacement around the axes. These data points are used to determine the rotational state of the cube, and the linear and rotational forces acting on the cube. The magnitude of the forces is used to derive the “energy” parameter—an indication of how vigorously the cube is being moved.

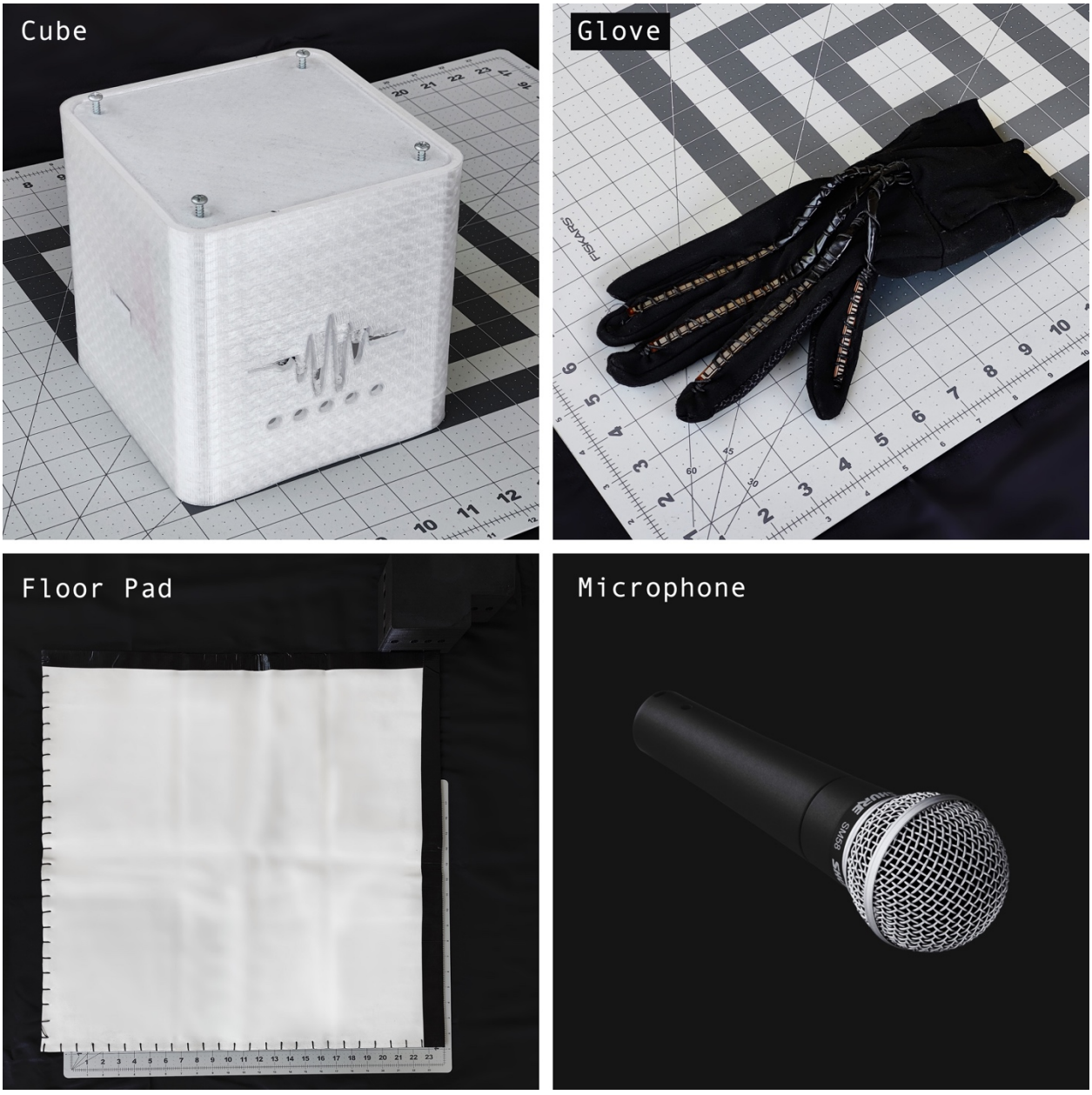

Figure 2

Glove: A one-size-fits-all right-hand glove lined with flex-sensitive resistors (FSR) along the fingers (except for the little finger). When the user flexes any finger, the bending of the

corresponding FSR causes a change in the potential difference across it. This change is used to track the movement of the finger. The glove mostly affects synthesis parameters such as wavetable position, filter cutoff, low frequency oscillator (LFO) rates, and modulation amounts.

Floor pad: A 25" x 25" floor mat lined with a 16 x 16 force-sensitive matrix. A thin sheet of "velostat"—a kind of conductive plastic whose resistance changes based on the amount of pressure applied—is sandwiched between two arrays of conductive strips that are perpendicular to each other. When someone steps on the mat, the regions of the "velostat" where pressure is high become less resistant allowing current to flow between the arrays. A relative measurement of the voltage across each of the 256 matrix cells gives a notion of where the person is stepping and how much pressure they are applying. Changes in overall pressure—"delta"—are detected to trigger sounds and effects. A centroid (that can be thought of as a projection of the center of mass of the person on the two-dimensional plane of the mat) is also calculated based on the amount of pressure applied on each cell.

Microphone: A Shure SM58 dynamic microphone. Changes in amplitude of the microphone signal are used to detect transients; The transients are used to trigger sounds and effects. Fourier analysis is also performed on the signal for vocoder effect.

- **Mediation**

The system facilitates a two-way communication between the performers and the audience. This means that not only does information flow from the performers to the audience but also the other way around. In a non-participatory context, sounds produced by the musicians would be heard and possibly interpreted by the audience. In this scenario, the audience not only receives the sounds produced by the performers but also affects them. Software programs and a performer mediate this process.

Figure 3

There are two stages of interpretation that take place before audience interaction can have any effect on the sounds. The raw data from the "interactive objects" is first parsed by individual Max patches communicating with the objects (see *Figure 3* for the user interfaces). The parsed data is then sent to two programs:

Data router: This Max patch (see *Figure 4* for the user interface) is used to determine three things: 1) how the data affects certain musical parameters including effects processing, 2) how the data is translated to instructions for the ensemble musicians, and 3) how the intensity/frequency of audience interaction shapes the structure of the performance. The performer in charge of data

Figure 4

routing affects and oversees the operation of this program. They assign “interactive object” parameters (or combinations of them) to musical parameters and graphical elements on the performer interfaces and can make executive decisions to drastically affect the course of the performance if they believe that is what the music requires. Changing the set of parameters represented by the XY window, for example, can at once change the musical parameters that the featured performers vary and the timbre of the electronic sounds by freezing every parameter other than those associated with XY. The data router communicates with the performer interfaces via a wired local area network (LAN). It also sends parsed interaction data to the computer generating the projections.

Performance patch: A Max patch is used to electronically produce sounds that serve as the foundation of a “movement”. Each “movement” starts with its own unique sound palette. The parsed interaction data affects the synthesis of the sounds and the effects applied to them. Although

Figure 5

the data router controls a few aspects of this program, the assignments in the performance patch are mostly hardwired and cannot be changed during performance. The person in charge of data routing also monitors and performs with this program. External hardware instruments and/or MIDI controllers are needed for the patch to function.

Once the interaction data is parsed and routed to the different programs using it, the data starts affecting the performance, the sounds and the projection elements. The performers have the ability to choose how much their performance is affected by this data while the projection designer moderates how the data affects the visuals.

- **Performer interface**

Except for the person in charge of data routing, every performer in the ensemble sees a version of the performer interface (see *Figure 5*) displayed on their computer monitor. The interface is part of a Max patch that does the following:

1. displays instructions generated by audience interaction and subsequent mediation,
2. applies effects to the sounds produced by the performer,
3. displays (through movement of the dials) how the effects are being affected by audience interaction,
4. lets the performer control some of the effects parameters,
5. displays rhythmic information when a steady pulse is involved, and
6. allows the performer to choose their input/output and data reception settings.

Effects: The audio signal from a performer's instrument passes through a chain of effects. The effects that are affected by audience interaction are vocoder, reverb, bandpass filter, gate, overdrive and grain delay. The changes in the parameters of reverb, bandpass filter, gate, overdrive and grain delay effects are almost always linked to the movement of the ball in the XY window. The vocoder

uses the audience microphone input as the carrier while the instrument input is used as the modulator. The sidechain compressor takes its input from an electronic kick drum feed sent from the performance patch. The sidechain compressor, compressor, EQ and delay parameters are set by the performer according to their needs.

XY: This window suggests changes in the parameters shown on the axes. These parameters change based on the intensity/frequency of audience interaction and when the performer in charge of data routing chooses. The ball in this display moves based on the orientation of the cube and the centroid derived from the floor pad. How much each of these parameters affect the XY display is determined in the data router program. The relationship between XY and the effects depends on the parameters represented by its axes. For example, when the X-axis reads "wash," the rightward movement of the ball will increase the wet output of reverb among other parameters. The performer adjusts their playing to complement this change in effect. Depending on the context, they may choose to play longer notes or create a blur of pitches using the effects. Through workshops and rehearsals, the performers come to an understanding about what the terms displayed on the axes mean or refer to in different contexts. The XY window shows the same information for all performers and reflects the XY window of the data router program.

Prompt: This window displays two pieces of information in two lines. The top line indicates what musical parameter the bottom line pertains to. The bottom line provides a suggestion for how that parameter should be treated by the ensemble as a whole. For instance, when the top line reads "melody/harmony" and the bottom line reads "united," the ensemble might choose to interpret the prompt as "homophony," "monophony," "not atonal/polytonal," etc. depending on the context. The performers discuss how they would interpret the terms in the prompts during workshops and rehearsals. The prompt changes based on the intensity/frequency of audience interaction and when

the performer in charge of data routing chooses. The prompt window shows the same information for all performers and reflects the prompt window of the data router program.

Metro: When a "movement" is pulse-based, this metronome display highlights in green the current position in the bar. The way the bar is divided depends on the Euclidean necklace[59] generated for the specific performer by audience interaction or the performer in charge of data routing. When no division is highlighted in red, no specific rhythmic pattern is asked of the performer. When a performer is asked to play on or emphasize certain divisions, those divisions are highlighted in red. The patterns are created using the Euclidean algorithm on the data router program. The performer in charge of data routing does not usually affect these patterns but may choose to do so if they think it is required. The parameters for generating the patterns are governed by audience interaction. The gate effect derives its rhythmic pattern from the Euclidean necklace assigned to the performer.

Background color: A change in the interface's background color tells the performer that the performance is entering a new section that is supposed to sound different from the previous one. The change in color is accompanied by a change in the parameters represented in the XY window, the prompt, and the parameters of the effects. The colors themselves do not mean anything specific. The change in color is simply a means to draw the performer's attention to the other changes.

- **Projection**

The parsed interaction data is used to generate visual elements displayed on the projection screen. Two separate windows present the visuals. In the right window, the cube is represented as a solid cube that rotates based on the orientation data. Increase in "energy" is represented as dynamic distortion of the cube's shape and overall enlargement. The background shows the areas of the

[59] Godfried Toussaint, "The Euclidean Algorithm Generates Traditional Musical Rhythms."

floor pad that are activated. Changes in the glove's flex positions result in distortion of different areas of the background. The left window shows a highly stylized representation of the audio signal from the audience microphone. This element reacts to changes in amplitude of linearly spaced frequency bands.

2.3 Development timeline

The planning for the event began in January 2021. By June, 2021, the venue for *Space Within* was finalized. The three main areas of the project's development were 1) visual and spatial design, 2) software and hardware development, and 3) performance preparation. As we approached the event, the three areas became more and more intertwined.

- **Visual and spatial design**

At the initial stage of planning, it was unclear what kind of technical support I could expect from the department/school as the xMPL was understaffed at that point. I recruited Melissa Tobar (scenic designer) and Jacob Nguyen (lighting designer) in November as I suspected that scenic and lighting design were the two areas where I would require the most assistance. Along with being a practical consideration, bringing these designers on board early let us think carefully about how to best utilize the xMPL space to encourage audience participation. I also recruited Steven Lewis (projection designer) in November. The four of us began sharing ideas about the visual and spatial aspects of the event. By December, a first draft of the scenic design was achieved and tentative decisions were reached about what kinds of light would be used and how they would be operated. A second draft of the scenic design was completed by March 2022. Between April and the event dates in May, I worked with Lewis to finalize the projection elements and how they were going to be controlled by the "interactive objects". Between May 2 and 12, Tobar, Nguyen and

Lewis realized their designs using equipment and material available at the venue, and those that were borrowed or purchased for the event.

- **Software and hardware development**

I began designing the circuitry and the software for the "interactive objects" in January 2021. By September, the hardware and firmware designs for the glove and the floor pad were completed. With the help of Niloufar Shiri (enclosure designer), the two objects were assembled by March 2022. Between February and April 2022, the objects were tested in rehearsal settings; The tests led to minor changes being made to the firmware. During the same period, the Max patches communicating with the objects, routing data between computers, generating performance instructions, and producing electronic sounds and effects were developed and tested in rehearsal settings. I worked individually with the professional performers to identify their software needs. Feedback from the ensemble musicians and test audience members inspired significant changes to some features, deletion of some old ones, and creation of new ones. Simultaneously, Lewis was developing and testing the Max patches he used to generate projection elements. Enclosures for the cube and the outboard circuitry of the floor pad were designed and 3D-printed by Tobar (enclosure designer) in May.

- **Performance preparation**

In December 2021, I sent out a call to several musicians at the University of California, Irvine (UCI) informing them about my project and asking if they would be interested to be part of the ensemble of featured musicians. Based on interest and availability, I chose three of those who responded. The ensemble began meeting in February 2022, initially realizing simple verbal prompts. Progressively, we incorporated the Max patches and the "interactive objects" in our rehearsals, moving from verbal prompts to prompts received through performer interfaces. By the

end of March, the ensemble had decided to create performances based on three distinct sound palettes. Between April and the show dates, we workshopped those three performances, refining and fine tuning the sounds, performer interfaces, data routes, effects, etc.

2.4 Design considerations

I began conceptualizing the project with the awareness that I was inserting myself into a well-established "situation": a concert. The specific relationships this "situation" calls for vary widely among genres, cultures and eras. I had operated within versions of this "situation" as a composer, a performer and an audience member before. The relationships I had experienced with other people in those scenarios varied a great deal not just because of the different roles I assumed but also because of the conventions I had to adopt. One aspect that was almost always constant was the relationship between the performer and the audience; it was a one-way street. Even though I had come across variations of the relationship between the composer and the performer, the audience was never asked to contribute to the process of producing sounds. With "relational music" and *Space Within*, I have been aiming to complicate this relationship. The choices the designers and I made in producing the event were largely dictated by the experience we wanted the audience participants to have.[60]

At the same time, I was concerned with how the system we were working towards could give rise to compelling sounds and forms. As a composer, I had been tasked with producing instructions for professional performers before, often in semi-improvisatory contexts. I have had to rethink my task in the context of "relational music" where I needed to formulate a system that was open enough to allow the audience to contribute significantly but also rigid enough to preserve

[60] I am aware that my usage of the word 'experience' is similar to how it is often used in the context of marketing commercial products. However, I believe artists should reclaim the term without shame to refer to the multitude of sensory-cognitive effects a work of art can have on its receivers.

the musical aesthetics that the featured musicians and I had developed through years of training and practice. Therefore, being aware of the different practices and traditions we have been part of has been as important as being aware of the status of the audience.

The overarching design principles were as follows:

1. The audience should be able to affect the sounds and the performance in a significant way.
2. The system should be transparent enough for the audience to perceive the effects they have.
3. The means through which the audience participates physically should be easily accessible and have a gentle learning curve.
4. The audience should not feel pressured but encouraged to participate physically.
5. The creative agency over the production of sound should be distributed enough for both the audience and the professional ensemble to claim ownership of the sounds produced.
6. The event should be perceived as a casual and communal gathering where the participants are free to engage with the "situation" as they please.

- **Interactive objects**

Perhaps the most complicated task in this project was designing the system described in section 3.2. I started by developing means for the audience to participate physically. Since one of the goals was to facilitate a participant's understanding of how they were affecting the sounds, I chose to have a finite number of interfaces through which the audience could participate—as opposed to utilizing social choice where every participant would have an interface, for instance. When a few agents affect the sounds, the relation between one's action and changes in the soundscape are more apparent. Another reason behind this choice was that sharing the interfaces would facilitate conversations among the participants. Something I envisioned would happen was the transference of knowledge about the interfaces from one participant to the next. A third consideration was that

a few interfaces might also enable coordination among participants using different interfaces. When the participants are able to connect the results to their actions, they are more likely to make conscious and creative decisions.

Designing interfaces for audience participation poses a unique challenge that is quite different from that of designing a musical instrument that will be used by a musician. Unlike professional musicians known to have spent many years learning their instruments, the audience is a group whose experiences and capabilities are unknown. Learning to play a musical instrument takes time and effort. It is not simply a matter of understanding the physical mechanisms of the instrument but building an intuition for them that allows the player to focus on higher-level concepts. A professional violinist is unlikely to be consciously thinking about where they need to stop a string for good intonation. Their focus is likely on the shape and contour of the musical phrase they are about to play. High-level concepts like these are typically what interest performers and audience members. I wanted the audience to be able to think about these concepts as quickly as possible without having to spend too much time learning how the interfaces work.

The complexity of learning an instrument, however, does not depend just on the apparent mechanical attributes of its interface. Judging by appearance, the sophisticated system of keys and holes of a bassoon might be challenging to a beginner. To create a musically desirable sound, the player needs to master this system before they can concentrate on the high-level concepts. But when the mechanics of an object are not apparent, it can be difficult to gauge even its most fundamental characteristics. A digital IMU can come in many forms, none of which would suggest what it does or how it works to a first-time user. In fact, knowing its basic function—measuring nine parameters related to motion and orientation—would also not be very helpful in understanding what part it might play in a musical scenario. This is because its parameters are not

readily linked to parameters of sound production. There is a world of possibilities that stems from interfaces that take measurements of physical quantities and make them available digitally; the information can be scaled and assigned to musical parameters in countless ways. In this sense, the apparent simplicity of an IMU is deceptive. A logical method was needed to establish the assignments.

The concept of "cross-domain mapping" has been useful in deciding links between the "interactive objects" and musical parameters. It explores the various connections we make between physical properties (used as metaphors) and musical concepts and why. In Western music, pitch is often related to height. Investigating relations of this sort, Lawrence Zbikowski notes that the metaphor (in this case, height) and the musical idea (pitch) are linked by an abstract structure, and that this structure consists of attributes that both the metaphor and the musical concept share.[61] The more well-formed the abstract structure, the better the metaphor. The reason the pitch-height relation works is that both parameters are "… continua that can be divided into discontinuous elements … Mapping *up-down* onto pitch allows us to import the concrete relationships through which we understand physical space into the domain of music and thereby provide a coherent account of relationships between musical pitches."[62] Despite this apparently robust connection, the pitch-height relationship is hardly universal and very much culturally mediated. Nevertheless, as Zbikowski argues, it is likely that someone used to the up-down metaphor will find it rather easy to adopt a different well-established metaphor such as that of small-large and vice versa if the abstract structure holds true.[63]

[61] Zbikowski, *Cross-Domain Mapping*.
[62] Zbikowski, 71.
[63] Ibid.

Zbikowski mentions that "cross-domain mappings are grounded in repeated patterns of embodied experience".[64] I began considering actions we performed in our everyday lives that were not thought of as musical but could be mapped on to musical variables.[65] This inspired the designs of the "interactive objects". The kinds of physical movements needed to manipulate the objects were not sophisticated: flexing one's fingers, stepping on a mat, holding and moving a box, and speaking are some examples. The next step was to define the abstract structures that would connect the objects' physical domain to the musical domain. An example of a connection derived this way was the assignment of the cube's "pitch" (the orientation variable) to the center frequency of a bandpass filter; I utilized the fact that both variables are continuous and that there is a well-established relation between musical pitch and height.[66] A more complex mapping was that of the cell positions of the floor pad to the frequency bins of a spectral filter. The abstract structure was that both parameters were discrete representations of continuous variables. However, the floor pad was two-dimensional while frequency bin was one-dimensional. I decided to evenly divide 256 bins into 16 groups and map each to a row of cells starting from the bottom. Activation of cells left-to-right and bottom-to-top both increase the bin index activated but by different increments; Moving one cell to the right increases the index by 1 while moving up increases it by 16.

Every interface limits a user's actions. One of its purposes is to focus the user's activities towards achieving specific goals, especially when the user is likely to use the interface for a short span of time. The objects and the mappings needed to be simple enough to fulfill this purpose. However, simple and intuitive mappings ran a risk of not sustaining a user's interest long enough.

[64] Zbikowski, 71.
[65] An inspiration was Rirkrit Tiravanija's participatory works incorporating the daily activities of cooking and eating.
[66] An IMU's "pitch" is not the same as height. However, it is rather straightforward to map linear displacement onto angular displacement.

But during the tests my ensemble and I performed, it became clear that even the most straightforward one-to-one assignments lead to complex modulations of our performance when more than one object was being activated. Moreover, each object had multiple variables that could be manipulated. The number of possible combinations of all the variables was immense. The mappings between the objects and sounds were also dynamic; They changed between "movements" and within each "movement". Apart from being a means to sustain the audience's interest, this was also a compositional choice as I explain later.

The concepts and approaches explained above could not guarantee that the audience would have a rewarding experience using the objects. The ensemble and I realized that the audience would have to engage in close listening to, first of all, realize what part they are playing in the system, second, understand their interaction with other agents, and third, play with the system. We did our best to make those three things possible, but we had to put trust in the audience that they would listen. Two choices I made to facilitate their listening were 1) using the first thirty minutes of the shows as an installation when no performers were on stage allowing the audience members to get to know the "interactive objects," and 2) taking the assistance of ushers to explain the workings of the objects to the audience members during the installation.

- **Mediation and composition**

In discussing mediation in the previous chapter, I referred to Georgina Born's statement that in technologically mediated works of music, designing the process that produces sounds may itself be a meaningful task for the composer. This has certainly been my experience developing "relational music". I found that designing the system and composing for it were two intricately linked tasks. In fact, a big part of composing for the system was making choices about mediation. As I have mentioned earlier, the objective of the practice I have been developing is to treat the

social dimension of performance as a variable. Mediation is the single most influential factor in determining the relationships shared by the subjects and objects in the system.

My initial plan was to write a piece of software that would take care of mediation on its own. In the context of the performance, I saw myself as being an ensemble member playing electronics. Letting the software handle mediation would have meant that 1) the dynamic mappings between the "interactive objects" and musical parameters would have been controlled by the software, and 2) the decision to move from one structural unit to another would have been made by the software. The data router program would have needed a feature that would make use of nonlinear algorithms to determine the biases of object parameters controlling musical parameters. This was the feature that I tried to implement first once the interactive objects were built. However, I realized that I was essentially trying to imitate dynamical processes that arose in nature when more than two interdependent variables were present. It occurred to me that there were enough interdependent variables present between the "interactive objects" and the ensemble to give rise to a dynamical system. If there was anything that was required, it was a conscious agent to manage the chaos that this system could result in. I decided to be that agent myself. It made sense not only from a practical standpoint but also because my deep knowledge of the system would allow me to focus on high-level musical ideas while deciding the mappings. The role was also attractive to me since it brought the audience participants closer to the creative process as they were interacting with the person who designed the system instead of a software black box.

Instead of taking on the task of monitoring and deciding every mapping, I created presets with sets of mappings in the data router program that I could switch between. Those presets were created during workshops and rehearsals based on sets of mappings that rendered significantly different sonic results. Switching between those presets allowed for a convenient way to create

structural units within each "movement." I also left open the option for me to make changes to the presets on the fly.

As a composer, I wanted to incorporate three distinct "movements" in *Space Within*. Each "movement" would be characterized by 1) the timbres or qualities of the sounds used, 2) the variables of those timbres that object parameters could be mapped onto, and 3) the specific mappings, their "biases"[67] and "smoothing weights,"[68] and the possible ways they might change during the movement. Needless to say, (2) and (3) depended greatly on (1).

For the first "movement," I chose to use long and continuous sounds that did not change very often. It started with only computer-generated electronic sounds. This soundscape was used during the installation phase. The aim was to make the mappings as evident as possible without abruptly interrupting the gradual transformations. I kept the "smoothing weights" high so that fast changes in object parameters were negated and slow changes were preferred. No object parameters were used to trigger new sounds but only to affect timbral qualities such as the harmonic content. Once the installation phase was over, the ensemble took the stage and started playing with the electronic sounds that already filled the space while following the instructions on their interfaces.

The second "movement" featured short and percussive sounds. The weights were lowered to allow for fast changes. Three object parameters (the cube's "energy," the floor pad's "delta" and transients from the microphone signal) were used to trigger new sounds while others were used to control spatial distribution and timbral qualities. Halfway through this "movement," the sounds were reversed in time. This was achieved easily with the electronic sounds. The performers with mechanical instruments imitated the effect in their playing and through digital effects.

[67] I have used 'bias' to refer to how much each object parameter affects a musical variable.
[68] 'Smoothing weights' refer to how input samples are weighted in an EMA smoothing algorithm. Higher weights result in slower changes in output. The weights can be thought of as inertial mass.

Generating a rave-like[69] atmosphere was the goal of the third "movement". This was the most challenging one of the three since it had a steady pulse. With the other "movements," I could treat temporal characteristics as continuous variables. However, the pulse necessitated temporal quantization. Using Euclidean rhythms to create patterns gave me variables that object parameters could be easily mapped onto. The effects of these variables on the sound were less straightforward compared to variables that affected rhythmic characteristics in a continuous fashion. Rhythmic density was perhaps the most noticeable among the characteristics that were being manipulated during this "movement". Other variables that were affected were mostly timbral. The weights were set to a medium value.

The process of workshopping the "movements" played a big part in deciding the sounds that were going to be used in the performance. During the first few workshops, the ensemble practiced improvising over a pulsating electronically generated drone. I was controlling the rate of pulsation and the pitch of this drone. My instructions to the others varied between creating a unified sound with the drone—mimicking or complementing its rhythm and harmonic content—and disrupting the constancy of the drone with tonally and rhythmically abrupt gestures. These variations formed the basis of the prompts that the featured performers received through their performer interface.

In later workshops, we experimented with various pitched and unpitched percussive soundscapes that could be generated electronically, electrically and mechanically. We practiced playing with these soundscapes incorporating the same prompts. I encouraged the ensemble to expand the parameters they varied to realize those prompts, i.e. not limiting themselves to varying

[69] The primary attribute associated with raves that I wanted to apply to this "movement" was the regular and repetitive rhythmic patterns of the music heard at those events. My expectation was that it would inspire the audience members to move as they would at a rave.

just the pitch or temporal qualities but exploring the multitude of timbral possibilities available to them. Siriwat incorporated a variety of guitar pedal effects including but not limited to granular delay, chorus, flanger, and distortion. Armstrong, along with varying the articulations she used to play a number of pitched and unpitched percussion instruments, experimented with chaotic digital synthesis. Nelson explored a variety of extended techniques on his saxophone including slap tongue and key clicks. He also incorporated a Max patch and a MIDI pedal controller that allowed him to vary the time and feedback of a delay effect.

We found that the sound palette we had created from these workshops gave us enough sonic material to populate the three "movements". I worked with the ensemble to determine sets of noticeable and compelling object-to-sound assignments. At the same time, we were thinking about how those assignments could be complemented by the instructions that the performers received through the performer interface. We looked for correspondences between timbral, tonal and rhythmic qualities. For example, a decrease in feedback delay time seemed to enhance the effect when the performers received an instruction to increase the temporal density of their sounds. Once these decisions were made, I provided the ensemble with a written document that outlined the function of the performer interface and contained general instructions about how each "movement" should be performed. The document is presented verbatim in the appendix.

I was also concerned with creating forms within each movement. Defining structural units was key. Since the performance needed to be flexible enough to accommodate a variety of changes that audience interaction would give rise to, I was hesitant to use predefined harmonic or melodic units. As the core principle of the project was to treat the social dimension as a variable, I decided to use it to define the structural units as well. I was particularly inspired by Nicolas Bourriaud's elucidation of form: "A coherent unit, a structure (*independent entity of inner dependencies*) which

shows the typical features of a world. The artwork does not have an exclusive hold on it, it is merely a subset in the overall series of existing forms."[70] What matters is where we look to find form. The mappings themselves could be seen as "inner dependencies" that had the potential to give rise to forms in the audible component, as I discussed earlier. As such, the mapping presets in the data router program served as the building blocks of different forms.

- **Space and visuals**

The foremost consideration in this area was that the venue had to give the impression that the event was not a concert where the audience was expected to be quiet receivers. It needed to be apparent that the attendees could roam the area on their own terms and that they were encouraged to socialize if that was something they wanted to do. Tobar and I agreed that the strict separation between the audience and the musicians that we see in many concert halls was not appropriate for our event. In our discussions with Nguyen, we realized that the lighting would play an important part in making the venue seem like a space where social interactions could take place more naturally than in a concert hall.

The audience gallery was replaced with short rows of chairs scattered around the space. Most of the floor was left open for the audience to walk around and explore the space. This was to encourage the audience to be dynamic rather than stationary. The "interactive objects" were placed on elevated stations of different heights. To make them stand out, the blocks used to build the stations were first coated in black paint and then decorated using UV glow-in-the-dark paint (that was activated using blacklights). The stations were also lit with mediumly bright spotlights facing vertically downwards. Guidelines were drawn on the floor using fluorescent tapes to direct the audience's attention towards the objects. Mild spotlights lit the platform occupied by the ensemble.

[70] Bourriaud, *Relational Aesthetics*, 19.

These were the areas that we wanted to draw the audience's attention to. Multicolor LED strips were hung from the mesh roof making wave-like shapes. The main screen on the back wall featured the projection. The rest of the space was left as dark as possible. The goal with the dim and focused (as opposed to bright and diffused) lighting was to make the space look more like a club than a concert hall.

In designing the projection elements, my conversation with Lewis circled around how to visually represent the associations between the "interactive objects" and musical parameters. Since these associations were going to be in a flux, it would have been difficult to come up with a visual language for every association. Instead, we decided to generalize these associations as much as possible and leave the rest up to Lewis's judgement during the performance. In other words, the generation of visual elements was not entirely pre-programmed; there was an element of performance involved. An example of a generalization we made was that the "energy" parameter of the cube was almost always mapped onto variables that made the sounds more chaotic, such as distortion or the density of randomly triggered events. Lewis decided to represent this by mapping "energy" onto a variable that deformed the 3D cube in a glitchy fashion.

- **Outreach**

I was aware that most dissertation concerts organized by my colleagues in ICIT attracted an audience that was rather well versed in some form of music. Remembering that *Space Within* was a test to understand the political ramifications of a participatory system that I was designing, I assumed that if my audience consisted mostly of musicians, the results of the test would suffer from bias. There would be less diversity in the musical experiences the audience members would have had prior to entering the venue. The experiences they would have had handling objects similar to the "interactive objects" (something that would have determined how they participated) would

also have been limited. Many of the ICIT concert regulars were familiar with interactive technologies and their functions. It was also true that many of my colleagues had already learned a great deal about the project during preparation.

With these considerations, I decided to spread the net wide in my attempt to recruit audience members. More than a month before the shows, flyers were posted in public spaces in different parts of the UCI campus. A banner (see *Figure 6*) was broadcast on TV screens that advertised events happening under the umbrella of the Claire Trevor School of the Arts (CTSA). I hosted a webpage on my personal website where I briefly described what the event was about leaving enough room for the visitor to wonder. A Facebook event page and my personal Instagram account were used to post regular updates about our preparation and the "interactive objects". I also created an Eventbrite page to reach those who received updates about local events through the platform.

Figure 6

When potential attendees reserved their “seats” on Eventbrite, they were asked if they would like to take part in a post-concert survey or interview. Once the event was over, I reached out to those who responded positively to the question. The observations from the survey entries and the interviews form an important part of the assessment I provide in the next chapter.

CHAPTER 3: *Space Within* – The Event and an Assessment

My theoretical and practical exploration of "relational music" culminated in two concerts of interactive music. The reader may find *Figure 7* useful in forming a notion of what the concerts looked like. As described in the previous chapter, the objective of these concerts was to understand the politics of a certain kind of participation in a live-electronic-music context. A system that included "interactive objects" and mediating agents was designed to establish a two-way communication between the audience and the performers. The venue was customized to harbor this system. I also tried to elaborate in the previous chapter the goals the production team had and what measures we took to increase the chances of achieving them. In this chapter, I shed light on how well the event addressed the goals we had set. I also present an account of the political implications of the "situation" surrounding and within the event. Nature of participation, activation of the audience, distribution of authorship, and engagement with a community are the four broad criteria through which I analyze the politics. The post-concert surveys and interviews provide indispensable information for this chapter's discussion.

3.1 Overview of the "situation"

Space Within was conceived as a project that would alter some well-established customs regarding the relationships between audience, performer and composer. In doing so, it would draw attention to the status of these agents and their interrelations in the context of a musical performance. However, I was not concerned with just any musical performance. As someone engaging in SEA,[71] I was keen to understand the particular social context I was dealing with.

Specifically, I was operating within the confines of the ICIT program under the Music department of CTSA at the UCI. Each of those entities influenced the nature of the events

[71] I view socially engaged art (SEA) as a superset of participatory art.

Figure 7

happening with their support and under their supervision, and, therefore, the sort of audience those events attracted. Needless to say, the audience was a determining factor in the proceedings of *Space Within*. I describe in the previous chapter what considerations I had with regard to recruiting audience members. The section highlights how the ICIT program generally attracted an audience that was music-literate. Not only did they possess an understanding of the musical arts, but many of them were also familiar with the technologies I used in the production of the event. The outreach campaign was designed to recruit audience members from walks of life extending beyond the

Music department to help me better understand the viability of the system that was developed for the event.

Fortunately, the outreach campaign was able to attract a wide variety of audience members, only some of whom were familiar with the ICIT program or what the people in the program did. This became evident in the conversations the ushers and I had with the audience members during the installation phase. This is not to say that there was no bias involved. Most of the attendees were associated with UCI in one way or another. There were also more attendees who identified as male than those who identified as any other gender. These facts were evidenced in the Eventbrite registration entries.

The Eventbrite registration link also asked the visitors to optionally state what their expectations were of the event. Since they had very limited information about the event to begin with, their responses were expectedly imprecise. “Fun” was the word that appeared most often in responses to the prompt. “N/A,” “interesting,” “different,” “innovative” and “not sure” were among other frequently used expressions. Perhaps the most outstanding response was “Consciousness-expanding alien music”.[72]

During the installation phase of both shows, the audience members gradually populated the black box. As they entered, ushers greeted them and introduced them to the “interactive objects” and the concept behind the event. The production team made a spur-of-the-moment decision before the first show to all socialize with the attendees whenever we were available. We repeated this in the second show. The ensemble members also decided to mingle with the attendees without explicitly mentioning that they were going to be performing on the stage. Each of us tried to make the attendees feel welcome and give them some context about the event. They were encouraged to

[72] My guess is that the response was inspired by the artwork used in the publicity material.

explore the space and socialize. We also tried to make it clear to the attendees that they could talk to each other during the shows and make noise.

A drone-like soundscape outlining a E7 chord filled the space at the beginning of the installation. Audience interaction affected timbral qualities, spatial distribution, and the notes in the chord that were emphasized. The interactions gradually changed the soundscape during this phase leaving it in a state that was noticeably different from its initial state.

The installation phase came to an end approximately twenty-five minutes after the doors were opened when the ensemble took their place on the stage. We used the soundscape as a reference and began complementing it with our performance. Audience interaction decreased momentarily as they reoriented their attention towards the ensemble. The interaction resumed soon after. We began incorporating the instructions that were generated by the interaction into our performance. However, the way we followed the instructions was not necessarily linear, and this was by design. For example, when the X-axis of the XY window in the performer interface represented "register" and the ball moved north, rather than playing higher pitches sequentially, we often played melodic phrases with a general upward motion while inserting turns, trills and short downward movements. This was one of the areas where the musical training and experience of the musicians became important. This nonlinear treatment of otherwise linear instructions marked the difference between the performance phase and the installation phase that featured only linear relationships between the "interactive objects" and musical parameters.

We progressed through the three "movements" that featured different sonic palettes. The ensemble highlighted the unique qualities of each palette by varying articulations, changing effect parameters, and treating rhythm differently. Distinct sections were created within each "movement" by changing the prompt, representing different sets of parameters in the XY window,

and by moving between distinct harmonic areas. The relationships between the audience and the ensemble also shifted between individual sections and "movements". This was most apparent in how quickly the sounds and the ensemble reacted to audience input. For example, the changes were slower in the first "movement" compared to the changes in the second one.

In general, the audience members were curious about the "interactive objects" from the beginning of the shows. Sometimes, a group of attendees would gather around an object and discuss its effects on the sounds. This sort of interaction continued into the performance phase but to a lower extent than in the installation phase. When the ensemble took the stage, the audience did become quieter. However, as the performance proceeded, conversations became more frequent. Some attendees chose to sit quietly and observe what was happening in the space. They did not seem interested in interacting with the objects as much as some of the other attendees. During the pulse-based third "movement," a good number of attendees began swaying and dancing to the beats that were being played. Some of them were interacting with the objects at the same time. A few people began dancing on the floor pad.

The performance lasted approximately fifty minutes. Once the performance had ended and I had acknowledged and thanked the contributors, the space was left open for everyone to socialize. Attendees were encouraged to ask the production team any questions they might have had. From the end of the performance, it took around thirty minutes for the space to become empty.

The attendees who expressed interest in taking a post-concert survey or in being interviewed in their Eventbrite registrations were contacted through their preferred mode of communication. Unfortunately, many of them did not respond to the communication. Those who did were either sent the survey or interviewed over the next two months. A total of five attendees

were interviewed. Two attendees responded to the survey. The performers (other than myself) responded to a survey that was tailored for them.

3.2 Successes and failures

Although the project was experimental in nature—meaning its sonic and social outcome could not be predicted with any certainty—the production team did set out to achieve some goals. The event met these goals to varying degrees. This section is dedicated to discussing some of the areas in which we succeeded and others where we could have done better. I rely on the survey entries and the interviews in certain cases.

- **Audience diversity**

Christopher Dobrian, an attendee and an ICIT faculty member, noted in his interview that he had attended similar interactive events as someone associated with ICIT. It partly confirmed my assumption that if the event was advertised only within my program or department, chances were that many of the attendees would have had prior experience with interactive music. As stated in the previous section, the shows were attended by an audience that had varying degrees of exposure to activities related to ICIT.

Although specific data about all of the attendees' profession was not collected, it was apparent from the email addresses used to RSVP that a majority was associated with UCI. But most of those attendees were not directly associated with the Music department. This was indeed a desirable result of the outreach campaign since it was geared towards attracting not just those invested in the creation or study of music in a professional capacity but also those who were not.

Goran Matijasevic, executive director of the UCI Chief Executive Roundtable, mentioned in his interview that he attended events within a variety of artistic practices and came across some in the field of theater that involved audience participation but none in a musical context. In my

interview with Jeevika Bhat, an MFA student in the Dance department of UCI, she stated that the physical-participatory aspect of the event was something she had not come across in a musical performance before. The event reminded her and someone she was with of "new age museum exhibits" that had interactive elements. On how different the event felt compared to other musical events they had attended, the two audience survey participants gave scores of 5 and 4 on a scale of 5.

How a non-musician would navigate the space and the system was of particular interest to me. As mentioned in the previous chapter, the sonic outcome of the event depended greatly on how attentively a participant listened to the influence they had on the performance. As a musician, I understood that the nature of this attentiveness depended greatly on one's experience with music-making. Having a mix of musicians and non-musicians in the audience allowed me to better assess how obvious the connections between the "interactive objects" and musical parameters were.

From my conversations with the attendees during the installation phase, I learned that some of them were not directly associated with UCI and found out about the event through social media and Eventbrite. Since I did not expect to reach such people (as the campaign was conducted mostly in UCI), it was a surprising yet welcome occurrence.

The campaign was not concerned with the gender identities of the people it was designed to attract. But I was a little disappointed that there was not more diversity in this sector. I certainly do not have the expertise to determine why this was the case. However, I want to think about this aspect more seriously when organizing future events.

- **Audience activity and perception**

One of the primary goals of the event was to encourage audience participation. It was evident that many of the attendees were interested in participating. The "interactive objects" were being used

throughout the shows with varying degrees of activity. It became clear, however, that some of the associations between the objects and musical parameters were not obvious to some. This was evidenced by the vigorous actions they were employing to effect noticeable changes in the sounds. Kei Akagi, a highly experienced jazz musician and a Music department faculty member, stated in his interview that he had to listen very closely to realize how the floor pad was affecting the sounds. Dobrian echoed this view in his interview when he said that the associations were not obvious to him. However, he felt that the cube had a more one-to-one relationship with musical parameters than the microphone did. We also discussed how some of the information that the ushers provided could be interpreted subjectively[73] and, thus, might have led to a wide range of behaviors not all of which produced perceivable effects. Bhat mentioned in her interview that she did not realize throughout the performance phase that the ensemble was reacting to audience input. She also suggested that covered placards with descriptions of the objects and their functions that one could choose to uncover and read might have helped the attendees.

In spite of the less-than-obvious object-to-sound associations, some attendees expressed that the overall environment that the event created made them feel engaged with the music-making process. Lilac Friel, a visual artist, stated in her interview that the installation phase helped her "feel comfortable in the environment and [become] a part of it". When the ensemble started playing, her experience during the installation made her feel that there was a conversation between the ensemble and the audience although she was not fully aware of the specific object-to-sound relations. The third "movement" was particularly engaging to her due to the strong rhythmic pulse. Watching others dance to the beats encouraged her to move as well. Although Bhat did not realize that the audience was interacting with the ensemble, she thought that the installation phase was

[73] For instance, the information that slow movements would create more perceivable effects was not precise about how slow the movements needed to be.

interactive and engaging. The ushers and the design of the space encouraged her to participate. She also suggested that the evenness of the lighting across the space likely obfuscated the boundary between the audience and the ensemble and, therefore, made the audience feel more involved in the performance that resulted in continuous interaction with the objects.

Although one of my goals was to make the connections between the "interactive objects" and the sounds obvious to the participants to enable them to make informed creative decisions, the audience feedback led me to reconsider my goals in this respect. While it is true that I would have preferred the audience to feel more in-the-know about the object-to-sound mappings, the social sphere that *Space Within* was able to establish was enough to make some of the audience feel like they were influential in the process, and that their physical presence in the space was recognized and appreciated. They also felt free to engage with the environment in ways other than listening quietly and interacting with the objects. This showed me that the audience did not feel compelled to participate in merely the delineated and obvious ways. They took control of their own experience in the social environment. I now think that these are the primary effects that "relational music" needs to have on audience members.

An expectation I had was that the participants would share knowledge about the "interactive objects" with other participants. Friel mentioned that she observed many instances of such sharing. She had herself introduced the objects to several participants some of whom were strangers to her. According to her, some participants were learning about the objects by watching others interact with them.

I also expected some unexpected behaviors from the participants. During the second "movement" in the second show, an ICIT student approached the microphone and began tapping on it vigorously. It resulted in a sudden increase in the dynamic level of the sounds and a triggering

of dense percussive events that completely shifted the course of the performance. On the other hand, Akagi said that after he interacted with some of the objects during the installation phase, he took a seat and fell asleep. He cited the soothing effect of the sounds at the beginning of the show as the reason for this response.

- **Performer experience**

On how different performing in this event felt to the performers compared to performing in events that they usually perform in, Nelson, Siriwat and Armstrong gave scores of 3, 3 and 5 respectively on a scale of 5. In describing how the workings of the project influenced her role as an improviser, Armstrong referenced the resemblance she perceived with African American musical tradition that prominently features call and response. Siriwat mentioned that the effects of audience interaction were not as immediate which forced him to rely on estimations more than usual. Nelson found himself more focused on contributing to the soundscape rather than thinking as a soloist. He reported that it was his first experience interacting directly with the audience in a musical way. The interaction expanded the realm of sounds that he had to respond to.

The ensemble articulated in the survey that the long preparation phase was crucial in getting accustomed to the concept and the technology at the core of the project. Nelson expressed that the preparation helped him get comfortable playing with the others in the ensemble. According to Siriwat, it helped him understand what he needed to contribute to create a cohesive sound.

Although the performer interface provided information that the performers found helpful, they relied more on listening during the performances. The interface was most helpful during the preparation phase as it helped the performers understand the relations between audience interaction and the effects that were applied to their sounds. It also helped them prepare in terms of how to respond to changes in the effect parameters. Siriwat thought that the effects were a more immediate

way of incorporating audience interaction than having to interpret such interaction solely through his own performance.

In terms of improvements that could be made, Siriwat suggested that more time could be spent "purely improvising to become more cohesive as an ensemble." He also mentioned that a headphone system could have made monitoring the sounds easier. Nelson stated that visualizations of the sounds produced by the audience could be incorporated in the performer interface. It could have made the connections between the objects and the sounds more evident to the performers.

3.3 The politics of *Space Within*'s participation

Participation was a critical concern for me and the rest of the production team in *Space Within*. We may remind ourselves of the line I drew in the first chapter between art that featured participation as a facet of a practice or tradition and art that deliberately challenged the status of the audience as spectators. *Space Within* certainly fell under the second category; the impetus behind the creation of the work was to draw attention to the relationship the audience had with common instances of musical performance and to try to alter it. There was a consciousness of the fact that in many established musical practices, the audience did not have any say in the production of sounds. In the context of concert music, the composer and the performer held privileged positions in relation to the music-making process. The audience, on the other hand, were considered receivers who were expected to engage with the sounds critically. I likened this to the Brechtian model of participation. *Space Within* also attempted to engage the audience critically but through physical participation. The kind of close listening expected of the audience in many works of Western "art" music was also expected—even necessary for participation, as we saw earlier—in this work. The added element of physical participation let the audience affect the performance in a rather direct way. This made the approach more akin to Artaud's.

I observed a common factor between *Space Within* and Paik's *Participation TV* that is worth mentioning here. Paik reimagined the relationship a viewer had with the television, a device that featured programs designed for the viewer to consume without giving them an opportunity to affect the programs themselves. The relationship changed when an audience member interacted with a microphone to affect the image displayed on a television screen. Apart from the obvious reference to this dynamic in *Space Within*, the work also reimagined the audience's relationship to a "situation" that often does not call for their input in the elaboration of a work's meaning.

- **Forms of participation**

Physical participation in *Space Within* was voluntary. The presence of objects that the audience could interact with to affect the sounds was itself an invitation to participate. However, participating consciously not only required the audience's interaction with the objects but also close listening, since the links between the objects and musical parameters were not always obvious. To understand what effect a participant was having on the sounds, they needed to pay close attention to how the sounds were changing. This aspect of the work privileged those who had musical training and were accustomed to "situations" where they were required to listen and respond to changing soundscapes.

The scarcity of information regarding what kind of behavior would lead to noticeable effects on the soundscape led to a wide variety of interactions with the objects. It might be fair to say that the physical participation that the event inspired was more exploratory than goal-oriented in nature.

Although collaboration among participants operating different objects was an expectation of mine, it was dependent on how obvious they found the object-to-sound associations. The lack

of clear one-to-one relations prohibited the sort of intuitive handling of the objects that was needed for coordination to take place.

The event also lent itself to other forms of engagement, such as moving and experiencing the sounds from different vantage points, observing the interactive behavior of other attendees and their relations to the soundscape, critical listening, listening for entertainment, and sleeping. Although some of those forms of participation were unexpected, they were welcome.

- **Activation**

The event provided ways for the audience become active physically. My assessment is that the "interactive objects" looked different enough from conventional musical instruments for those without much experience making music to feel comfortable interacting with them. The assumption that music-making was the territory of professionals in the field could be left behind. At the same time, the not-so-obvious relations between the objects and the sounds likely played a part in the continuance of audience participation.

The design of the space also played a big role in keeping the audience members active during the event. The absence of an audience gallery removed one of the factors that could have resulted in an obvious separation between the audience and the ensemble making the former hesitant to become activated. The scarcity of seats also meant that the audience was more likely to be standing or walking that sitting. This made it possible for various forms of engagement to emerge that were not limited to interacting with the objects.

- **Authorship**

At a technical level, it could be argued that the event managed to extend creative agency to the audience. There were four distinct ways of affecting the sounds that were available to them. Their interactions with the "interactive objects" affected not only computer-generated electronic sounds

but also the performance of the ensemble. However, the question needs to be asked how this agency was experienced by the audience members. From the surveys and interviews, it became apparent that there was a lack of clarity in what effects their actions had. There was confusion even among those who had significant experience making music. If an agent was not conscious about the consequences of their actions, it could be hard to argue that they were 'authoring' those consequences. This same problem appears, as mentioned in Chapter 1, in the works of Baird, Freeman and Watson. My rationale was that reducing the number of data points would make it possible for individuals to relate their actions to observable effects. However, the nonlinear interpretation of interaction data on part of the ensemble likely contributed to the obfuscation. The combined effect of the "interactive objects" on the sounds was also likely too complex to discern what part of it was being contributed by a particular object.

As the person who designed the system and the member of the ensemble in charge of data routing, I had a high degree of control over the relationships that were being established between the participants and the ensemble. But what was more important than the ability to control the relationships was my awareness of the minute aspects of the system that allowed me to make informed decisions. For instance, noticing more activity in the data from an object often prompted me to assign that data to electronic sounds that were most noticeable at that moment. The same extent of awareness was not extended to the audience (or the other performers of the ensemble for that matter). I would argue that with respect to authorial control, the audience did not experience it to the extent that I had intended, especially during the performance phase.

On the other hand, the preparation phase of the project involved many collaborations. The performers were highly involved in shaping the sound palettes that were used for the different "movements." They also had a lot of inputs in the design of the interfaces they used. On the scenic

and lighting design fronts, the designers reached almost every decision through detailed conversations amongst themselves. They shared their progress with me throughout the process to which I only provided minimal feedback. I was a little more involved in my interaction with the projection designer; we spent a few meetings thoroughly discussing the technical and aesthetic requirements of the projection. I argue that the collaboration within the production team was robust enough so that the event could be considered largely co-authored.

- **Community**

The event drew attention to the roles played by the different groups of people generally involved in a musical performance. The discussions I had with the interviewees were interesting in the sense that not many of them were focused on the sonic outcome. The attendees expressed most interest in the experiential realm which included their function in the space, their relationship to the sounds and the ensemble, and their interaction with other attendees. Even though their understanding of the agency they had was not always clear, they thought that their presence in the space was consequential. In this way, the event was able to make the attendees reconsider their roles as audience members.

Social interaction happened rather openly throughout the shows with the exception of a few moments following the ensemble's entrance. The exception was likely caused by a change in the social dynamics; the installation phase gave the audience full control over the soundscape and the space while the performance phase brought with it agents that were generally treated with reverence in the context of a musical event. It took some adjustment before the audience could resume their previous activities.

The fact that audience members were sharing knowledge of the "interactive objects" among themselves was an indication that they felt responsible, to some extent, for what was

happening in the concert space. Their unprompted initiative to begin dancing during the third "movement" of both shows also suggested that they felt a sort of ownership of the space and the "situation".

From the survey entries of the performers, I surmised that their *Umwelt* was expanded due to the incorporation of audience participation. They attempted to develop an awareness of how the audience was reacting to the sounds. However, because they were reacting to changing soundscapes and instructions on their computer screens, their interaction with the audience was heavily mediated. The scenario was not too different from performing with a dynamic score that did not necessitate audience participation. Therefore, a distance remained between these two groups. Nelson's suggestion to incorporate visualizations of the sounds produced by the audience in the performer interface was perhaps a result of this distance, although it is unclear to me whether the incorporation of such visualizations would result in a vastly different relationship between the groups.

The experience of the audience and their feedback also made me, the composer, reconsider some of the assumptions and aspirations I had with regard to the project and the production of music in general. During the development of *Space Within*, I was concerned with the extent of the creative agency the audience would experience and attempted to address this concern through the obviousness of the object-to-sound relations. I realized that my assumptions about the connection between these two factors were not all correct. Reflecting back on the system that I designed, I certainly assumed certain connections to be obvious based on my experience as an electronic musician. The subtleties of timbral variations that I have been exposed to many times and have been trained to recognize were not all that obvious of others. The bias I suffered from by means of being a musician led to inconsistencies between my expectations and results.

At the same time, I realized that those timbral subtleties that I cared about a lot as a musician were not all that important to the social beings that inhabited the system. The lack of clarity in the object-to-sound relations did not stop the audience from becoming integrated into the social fabric of the event. They explored a variety of ways to engage with each other and the sounds on their own. The audience did experience a sense of agency, but not the same one that I had intended for them to experience. In my opinion, this phenomenon exhibits a profound shift in the audience's perception of how they are to take part in a concert, a perception that is not limited to the production and reception of sounds but extends to social relationships and roles. Maybe without realizing, they had affected the social outcome of the event in ways I could not have predicted.

Considering these analyses, I feel confident stating that the broad goals of engaging the community of concertgoers in an interactive musical environment and persuading them to reconsider their roles were met by the event.

3.4 Conclusion

What made me interested in relational art and SEA was their consideration of and engagement with the social factors that affect the production and reception of art. Through my research, I became more aware of the kinds of political matter that such art seeks to address. Although, at the start of the project, a strong motivation of mine was to explore the effects of audience participation on the performative and compositional paradigm of music, I eventually became more interested in the shifts in roles and relationships that audience participation could bring to the process of making music. The sonic outcome became an object that carried marks of the agencies the audience and the featured performers had. I often set aside my preferences about the sonic outcome in favor of the preferences that the ensemble had and the perceptibility of changes in certain features of the sounds.

However, I did not view this as a compromise on my part. I came to accept the fact that I was interested in the emergent social outcome more than I was in the sonic outcome. In spite of this impersonality that I attempted to engender, my voice did become an important determinant of both the sonic and the social outcome. For instance, the choice of sonic features that were affected by audience interaction was not entirely impersonal. Those were features that I liked to play around with in my non-participatory compositions. Another example of my personal preference was the use of repetitive electronic beats in the third "movement." It not only had a sonic goal but also an unstated social goal: to motivate the audience to dance.

Once I began reflecting on the experience of the audience and the featured performers, I began noticing the differences between the expectations I had and what the subjects experienced. Many of the differences could be attributed to 1) the audience's lack of understanding in how they were contributing to the soundscape, and 2) the bias the featured musicians and I had about perception of sonic features. These two factors point to how differently audience and performers operate in a musical performance. Perhaps an improvement I will try to implement in the future is to make clearer those differences in our operation and create devices that could minimize the differences in how the two groups of people conceptualize and hear sounds. One concrete way of achieving this could be letting the two groups interact with similar or the same interfaces.

At the same time, it is important to acknowledge that a separation between the performers and the audience is inevitable given how much closer the performers generally are to the creative process than are the audience. This separation, in my opinion, is not something that needs to be eradicated but utilized creatively in developing an understanding of the social dimension of musical performances. The assumptions we currently have about the roles of different agents in the creation of music have been shaped by traditions and practices that go back centuries, as well

as by more recent market forces that have transformed our relationships to people, objects and spaces. As I have mentioned earlier, bringing attention to these roles and relationships is one of my primary motivations behind creating "relational music." In a way, *Space Within* succeeded in this regard. Not only did it make the audience question how they were affecting the production of sounds and how their actions related to those of the featured performers, they organically created an open and fluid social environment that supported a wide range of activities and also exhibited signs of collaboration and collective responsibility. And it happened *in spite* of the prevailing differences between the audience and the featured performers. What I would be curious to explore further is whether similar environments can come into existence *because* of those differences and if so, how. In other words, can an emphasis on the differences give rise to interdependent relationships where the two groups utilize their clearly delineated roles to shape the soundscape?

Because of the complexity of the system that needed to be developed for this project, most of my energy was focused on the designing and developing the technological tools that the system depended on. However, "relational music" is not just about the novelty of the system used to produce sounds. It is concerned with the pervasive forces that affect how we relate to the world we inhabit. In *Space Within*, the specific political stances I had about the social sphere of concert music and beyond were not openly stated. I did not employ any creative tools with the express purpose of making the participants aware of the politics of spectatorship or participation. The political paradigm was left open for them to interpret in their own ways. In future events of "relational music," I want to pay more attention to how my political beliefs may inform the conceptual landscape of the performance. I would like to employ creative tools that not only deals with participation in a self-reflective manner—i.e. restructures roles and relationships within the sphere of a musical performance—but also extends beyond the politics within the concert space

and brings into conversation the outside forces that govern our lives, relationships and ability to create. My strong belief that music is not just a means of personal expression but a way of bringing people together and fostering collaboration is only a small part of the things that motivate me to create art. One of the topics that interest me that I have not been able to address in this project is the difference between participation that perpetuates oppressive forces and that which questions and disrupts those forces. I believe that making this distinction in my work will be the defining factor of "relational music." I want to move forward with this recognition.

BIBLIOGRAPHY

Aljazeera. "Bangladesh Elections 2018: What You Need to Know." December 29, 2018. https://www.aljazeera.com/news/2018/12/29/bangladesh-elections-2018-what-you-need-to-know.

Baird, Kevin Craig. "No Clergy: A Piece for Flexible Small Ensemble Generated in Real Time Based on Audience Feedback." The State University of New York at Buffalo, 2005.

Barthes, Roland. "The Death of the Author." *Aspen* 5+6 (1967).

Becker, Howard S. *Art Worlds: 25th Anniversary Edition, Updated and Expanded*. University of California Press, 2008.

Bishop, Claire. *Artificial Hells: Participatory Art and the Politics of Spectatorship*. Verso Books, 2012.

———. "Introduction." In *Participation*, edited by Claire Bishop, 10–17. Documents of Contemporary Art. Cambridge, MA: Whitechapel Gallery and the MIT Press, 2006.

Born, Georgina. "On Musical Mediation: Ontology, Technology and Creativity." *Twentieth-Century Music* 2, no. 1 (March 2005): 7–36. https://doi.org/10.1017/S147857220500023X.

Bourriaud, Nicolas. *Relational Aesthetics*. Les Presses du réel, 2002.

Breel, Astrid. "Audience Agency in Participatory Performance: A Methodology for Examining Aesthetic Experience." *Participations: Journal of Audience & Reception Studies* 12, no. 1 (2015): 368–87.

Clarke, Eric F. *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*. Oxford University Press, 2005.

Debord, Guy. *The Society of the Spectacle*. Detroit: Black & Red, 2010.

Freeman, Jason Alexander. “Glimmer: Creating New Connections.” In *Transdisciplinary Digital Art: Sound, Vision and the New Screen*, edited by Randy Adams, Steve Gibson, and Stefan Müller Arisona, 7:270–83. Communications in Computer and Information Science. Berlin, Heidelberg and New York: Springer, 2008.

———. “Glimmer for Chamber Orchestra and Audience.” Columbia University, 2005.

Gell, Alfred. *Art and Agency: An Anthropological Theory*. Clarendon Press, 1998.

Godfried Toussaint. “The Euclidean Algorithm Generates Traditional Musical Rhythms,” 47–56. Banff, Alberta, Canada, 2005.

Goehr, Lydia. *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music*. Clarendon Press, 1992.

Helguera, Pablo. *Education for Socially Engaged Art: A Materials and Techniques Handbook*. Jorge Pinto Books, 2011.

Lasserre, Grégory, and Anaïs met den Ancxt. “Urban Lights Contacts.” Scenocosme. Accessed March 27, 2023. https://www.scenocosme.com/urban_lights_contacts_e.htm.

Mason, Christian. *In the Midst of the Sonorous Islands*. Breitkopf & Härtel, 2016.

Moorefield, Virgil. *The Producer as Composer: Shaping the Sounds of Popular Music*. 1st MIT Press pbk. ed. Cambridge, Mass: MIT Press, 2010.

Rancière, Jacques. *The Emancipated Spectator*. Translated by Gregory Elliott. New York & London: Verso Books, 2009.

Rosenthal, Rob. “Pete Seeger and the Politics of Participation.” In *Songs of Social Protest: International Perspectives*, edited by Aileen Dillane, Martin J. Power, Eoin Devereux, and Amanda Haynes, 75–86. London: Rowman and Littlefield International, 2018.

Rosenthal, Rob, and Richard Flacks. *Playing for Change: Music and Musicians in the Service of Social Movements*. London: Routledge, 2016.

Rzewski, Frederic. *Les Moutons de Panurge*. 1969.

Small, Christopher. *Musicking: The Meanings of Performing and Listening*. Wesleyan University Press, 2012.

Toelle, Jutta, and John A Sloboda. "The Audience as Artist? The Audience's Experience of Participatory Music." *Musicae Scientiae*, April 26, 2019, 1029864919844804. https://doi.org/10.1177/1029864919844804.

Watson, Jordan. *All These Worlds Are Yours*. 2016.

Zbikowski, Lawrence M. *Cross-Domain Mapping*. *Conceptualizing Music*. Oxford University Press. Accessed April 30, 2021. https://oxford.universitypressscholarship.com/view/10.1093/acprof:oso/9780195140231.001.0001/acprof-9780195140231-chapter-3.

APPENDIX: Performance Notes

Following are the instructions that the featured performers received before *Space Within* took place. They have been presented here verbatim.

SPACE WITHIN

Performance Notes

General

- XY: The position of the dot in this square may be interpreted in several ways depending on the parameters indicated on the X and Y axes. You are free to vary other parameters of your performance; The *XY* only asks you to pay special attention to the parameters indicated. All the parameters have a degree of vagueness associated with them. Let the trajectory of the dot guide your tendency in a qualitative manner rather than in a quantitative way. Some of the parameters are directly related to effects applied to your sound, e.g. *register* is linked to the centre frequency of a bandpass filter. Keep an ear out for those changes and adapt to them.
- PROMPT: This gives you an indication of your relationship to the other ensemble members. The first part of the prompt indicates what aspect of your performance the second part refers to. Say the prompt reads:

  `melody/harmony`

  `complementary`

  You could interpret it as asking for a contrapuntal or homophonic texture rather than a monophonic one. On the other hand, if the first part reads "gesture" instead, you could try playing question-and-answer phrases. Again, these terms are vague and may take different meanings in different scenarios. Listen and adapt.
- PITCH INTERVAL: When this reads something other than "0," it tells you that the grain delay affecting your sounds is performing a pitch shift of the indicated number of semitones. In each feedback iteration, it shifts the pitch by the stated amount. If you wish, you may adapt your pitches to complement this effect.
- METRO: This part of the interface only becomes relevant in the third movement. It shows you three things: the number of beats in the current cycle, the beat we are currently on (indicated by a green background), and the beats that you should try to emphasize (indicated by a red background). More details in the notes for the third movement.

- BACKGROUND COLOR: A change in the color indicates that you are entering a new section that should sound somewhat different from the previous. It is often accompanied by a change in the XY parameters or the prompt.

Most of the information on your screen will be reflected in the sound in some way. The most important thing is to listen. The audience interaction will naturally guide us in different directions.

1. Slowly but Surely

This movement is all about creating a unified sound. The *Prompt* may not change at all. Whatever changes you make, make them slow; I.e. no dramatic shifts. The closest analogy would be moving a very heavy object that has wheels; it does not move or stop very easily. Some things to try: long phrases, recursive rhythmic and melodic patterns, unison, slow onset and release. A sense of constancy should run throughout so that the changes suggested by the *XY* become noticeable.

2. Bells and Whistles

In this movement, you should try to stand out a little more. Changes should happen rather swiftly. The prompt will mostly ask for dissociated, complementary or disruptive sounds. Feel free to jump in with a solo, but be prepared to be interrupted. Use ‘sharp’ (might mean high-pitched, fast onset) and short sounds whenever feasible. It should sound as if the performers are all individual entities with little to no intention of being together at any point. However, this does not imply that you cannot interact with each other in any way.

3. Join the Party

This movement adds another layer to the ones explored in the previous ones: Euclidean rhythms. In short, these rhythms are formulated by equally distributing a certain number of attacks over a certain number of beats. For example, a Euclidean rhythm with 8 beats and 3 attacks could have divisions that look like 3+3+2, 3+2+3 or 2+3+3. Adding rotation to this can give more variations that go over the bar. The *Metro* section of your interface comes into play in this piece. The beats highlighted in red are the ones that you should try to accentuate. You will likely also hear the pattern in one or more of the electronic sounds that will be playing.

At moments, the rhythm might sound like it is disintegrating. Follow that tendency; Try to sound as if you are deviating from the pulse but constantly being pulled towards it by a force. You can think of it as a weird sort of swing if you like.

You can use the electronic bass (when it is present) as the basis for a harmonic space.