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Live Design as Living Process

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Live Design as Living Process

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Dedication

For Libby

my sister who left too soon and continues to inspire me.

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Thank you to everyone who has helped me realize this Thesis. From my elementary school teachers who patiently taught me to my graduate professors that continue to mentor me.

Abstract

Live Design as Living Process

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Live events and performance are fundamental aspects of our culture. They are the spaces where communities form and where productive dialogues occur between strangers. As the United States of America faces social isolation due to the novel coronavirus along with increasingly divisive politics, live performance is sorely needed to heal our communities. However, due to the pandemic, live performance defined as an event with performer and audience co-located in a shared time and space is no longer a safe avenue for creating art. The current pandemic is by no means the only force shaping our current reality; climate change, political unrest, digital technology, and global capitalism are all looming ecological forces we are facing. All of these forces need collective action to be effectively addressed. Live experiences are a critical component of manifesting the necessary social cohesion to redefine our relationships with the Earth.

The current state of the world leaves ecologically minded artists with a fundamental question, what are the vital ingredients of a live experience? This thesis is an exploration of live experience and how we can look to the properties of living systems as

lens for guiding successful design decisions. My goal is to reveal the elements that index a performance as live from an audience's perspective and re-imagine my design methodology as a living process. Through the design and implementation of an interactive installation titled, Elemental Media, I experiment with novel modes of audience interaction and involvement that respond to our current moment. Creating a hybrid event that takes place both virtually and physically offers a lens for considering how differing mediums and modes of spectatorship are involved in generating experiences of liveness. Assessing the success of this process and performance involves gathering audience responses, documenting and reflecting upon personal experiences, engaging with the writing of other researchers, and synthesizing these findings into principles for live design as a living process.

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INTRODUCTION

Setting the Stage

Stage design is the process of establishing the atmosphere of a performance through a design of scenic, lighting, costume, and media elements, creating a context in which the actions of the performers will be read and understood within. The act of setting the stage is crucial for the audience's understanding of any situation and this need for context extends beyond theatrical design. In anthropology, ethnographic writings employ thick descriptions to allow the reader to enter the world of another. In biology we must look to ecological relationships in order to understand the behavior of individuals, and within quantum physics the experimental apparatus is entangled with matter behaving as wave or particle. In all these sciences, determining the boundaries of a field site and reducing interference from outside variables is often the most challenging part of the work. In this introduction I will lay out the major conditions that have led to the creation of this investigation, while acknowledging that the true list of contributing factors can never be enumerated.

The clearest place to begin is my own personal history and what formative experiences guided my path. I was born in the Solomon Islands while my parents were in the process of translating the New Testament into the Arosi language. The Solomon Islands is a nation of hundreds of islands in the south Pacific. Due to the isolation thousands of separate language groups have evolved in a relatively small area making it a perfect environment for Bible translation work. This is because the diversity of languages makes it an area where many translations are needed in a relatively small area, creating lots of work for Bible translators. My family's time was split between, the capital city of Honiara

where there was a missionary center and out on the island of Makira with the Arosi people. Living in a small self-sufficient community that has their needs met through the natural environment is a rare experience in our modern world. I feel forever grateful for being able to experience this way of life. Many of my earliest memories are of exploring rainforests, creeks, caves, waterfalls, and encountering the elemental beauty of the Earth.

Beyond my early encounters with plants, animals, and the elemental, what continues to stay with me is the strong sense of community the Arosi people had and openly shared with us. In the village everyone knew one another and there were no cars, electronics, and fences to occupy and separate us. So, we spent most of our time outdoors and open to encounters with other people. Everyone was quick to share a meal with you by the fire or to teach you how to spear fish in the creek. This openness of connection is an aspect of life I have been continually searching for and working to foster through my engagements with others. The context of a small island village makes clear the importance of our relationships with other people and the natural world. When an action is taken there is a clear impact on the rest of the community and because of this there is a deep respect for living harmoniously. Conflicts need to be resolved and worked through as a village family to ensure that long term disagreements do not form and create strife. I find this manner of living in stark contrast with modern American living, where most everyone is a stranger and our individual actions towards the environment and one another are made less clear through the density of interference.

From Left to Right:

Figure 1: The Solomon Islands   *Source:* Google Earth

Figure 2: My Siblings and I   *Source:* Andy Bruner (Father)

Eventually, around the time I was beginning the seventh grade, my family returned to the United States permanently and moved to Duncanville, Texas. The cultural shift of moving from the South Pacific to the American South is one of the greatest transitions I've ever gone through. The scale of the city, the number of paved roads, highways, wearing shoes, the public school system, and the lack of interaction with neighbors were all shocking and foreign to me. What is worth noting, is that the built environment and the cultural practices in the U.S.A. dramatically shifted the way I engaged with the world daily. Finding a community was no longer as simple as walking out the front door and starting a conversation with someone. Community and connection in the United States is found in specific places and platforms which are designed for these encounters, at school, at church, at a concert, on Myspace, on Facebook, playing an online video game. These are the spaces where connections are created because they bring together people of common interests and create a structure for encounters to occur within. These platforms can be places of

meaningful connection, but they are often only open to certain individuals and can become bubbles of discrimination.

The current state of the world, expanding population size, climate change, capitalism, racism and white supremacist power structures center thinking individually, of profit over people, treating plants, animals, and the elemental as resources. A breakdown of community where we section off the world into a small portion of beings that we care about. When living in a city it is easy to forget that human civilization is an extension and entirely dependent upon the natural world. Our basic needs are met by global supply chains and packaged goods leaving us with little understanding of the ecosystems affected through their production. The natural world we do encounter is sectioned off to parks and gardens and kept neatly pruned. We forget the great wisdom that living systems possess and seek to solve the world's problems through techno-fixes rather than re-evaluating our relationships. Extending community beyond those people with whom we share common interests and learning to see that we are already in relationship with a vast network of more-than-human beings upon which our existence is inextricably dependent.

How do we begin to rethink our relations with the natural world and through this reshape our actions to serve the health and wellbeing of the entire Earth? Relationships between groups of humans clearly need healing but on a more fundamental level a reorientation of humanity's relation with the natural world is required. If we consider the life of a living being purely upon its ability to generate profit, without any consideration for the dynamic role it plays within the ecosystem, we will also place this same exploitative view upon our own species.

So, through what means do we create a community that extends beyond our human society? To be in relationship with one another and all of the elemental forces. There are

doubtless many approaches that all require exploration. My own set of experiences led me to create an interactive art installation that makes visible the contribution of humans and non-humans alike—a space in which the elemental and natural are made visible and given a voice. Installations, through intentional material configurations, can open us up to new relationships and encounters that can disrupt our typical assumptions of self and other. Opening possibilities for lasting connections and shifts in perception. Moreover, the process of realizing Elemental Media is a practice in learning how to design and collaborate with the circumstances of the world. Instead of creating a master plan and forcing it to work in a place, this work grows in context with the natural and cultural environment. We all too often think of the world in terms of objects rather than ongoing processes; *things* are meant to be a certain way; *patterns* are meant to change and respond. By sensitizing myself to living systems, I can learn how they grow, change, and respond to their environments and bring these into my creative and practical processes to create living and responsive systems.

Research into the Living

"The more we move toward that which is not (or not exclusively) organic, toward psychological life and social life, the more the boundaries are mobile, or in other words, living."

The Life of the Senses (Laplantine 55)

Research into the living must begin with us grasping the scope of what is alive and what elements bring this phenomenon into being. Our common sense points us to plants, animals, and all the creatures which preside on Earth as the defacto and perhaps the only example of living beings. Accounting for the processes that are shared between all of these we can pick out "the capacity to grow, metabolize, respond (to stimuli), adapt, and reproduce" ("Life Definition"). These five properties provide a roadmap for us to categorize the world into living and dead, biotic and abiotic. However, this definition is incomplete because it lacks a crucial component – context. No organism can live outside of its environmental habitat. Without an atmosphere, food, and other beings to engage with, the living processes occurring within the cells of the organism will cease to occur. Stan Rowe, in his book *Earth Alive* points out that, "Whatever life may be, it necessarily involves ecological relationships... An organ such as the heart continues its animated beating as long as it is intimately related to the living organism that envelopes it. Extending the logic, organisms are alive thanks to their embeddedness in larger encompassing "living" systems" (Rowe, 145). Considering life in terms of ecological relationships dramatically opens what we can consider living, from the Earth itself to human civilization,

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technology and art. This view affords experiencing human culture as a continuation of nature, yet another branch of life's great diversity, and perhaps through understanding life more deeply we can attune our practices to be in greater harmony with the whole.

Understanding what elements in a phenomenon give rise to and index our experience of a live happening are important across domains because these patterns often indicate the presence of systems which require our attention and study. Five indexes of Living are covered here: Communication, Embodiment, Consequentiality, Contextuality, and Temporality. Each of these terms and their relevance will be revealed through connections with other writings from a diversity of fields along with personal experiences involving encounters across real and virtual environments. This investigation into the living takes a wide view, from cellular life to our modern human civilization, and is working to find common connections across these expanses. Through looking at life in all of its forms we can discover shared threads and use these threads to weave a new framework for the creative process.

COMMUNICATION (GROW)

Communication and feedback are defining features of all living systems. They are what allow systems to grow and evolve in relationship with their environment. From the smallest microorganisms to the international public, all of them are involved in communicative processes which are imperative for their continued existence. Fundamentally, communication involves the giving and receiving of meaningful patterns of energy and matter in ongoing flows; therefore, when an entity encounters new material and responds we index it as living. There are many systems in communication which we do not directly experience as such because the temporality of feedback is not on a human

time-scale. To perceive these, we need to specifically attend and research them for sustained periods of time. A beautiful example is given in Donna Haraway's book *Staying with the Trouble.* The example centers around the evolution of orchids and how their shape, coloring, and scent combine to look, "like the genitals of the female insects of the particular species needed to pollinate them" (Haraway 68). These adaptations can be read through the lens of "selfish genes", but the narrative is much more compelling when it, "amplifies accounts of the creative, improvisational, and fleeting practices through which plants and insects involve themselves in one another's lives" (Haraway 69). In this telling, both beings are active participants within a relationship that changes based on their involvement with each other.

Looking to studies of culture and social encounters we can see how differing interactional scales give rise to unique types of events and phenomena. On a personal level we all experience the liveness of social encounters when we work to maintain our social standing with others. Erving Goffman with his 1967 book, *Interaction Ritual*, illustrates how social encounters are largely defined by people seeking to maintain "face" which is "defined as the positive social value a person effectively claims for himself by the line others assume, he has taken during a particular contact." (Goffman 5). This model of face-work makes it very clear that the way we are presenting ourselves is always in relation with those we are engaging with, and that our own conceptions of self are defined by how we perceive ourselves being situated with-in social situations. Through becoming "aware of the interpretations that others have placed upon [our] acts" (Goffman 13) and inversely our own interpretations of their face-work, we are actively creating the context within which words gain meaning and relevance. These contexts and spaces which are created through

communicative interactions exist outside of individuals and are themselves lively entities worth our study and attention.

The study of live performance that occurs within physical spaces versus virtual environments offers a lens for considering how differing modes of spectatorship and communication are involved in generating experiences of liveness. Within real spaces, as members of the audience, we can feel the energy of a crowd, the chatter and movement, and experience the same shifts in lighting and sound. As we respond to these sensory forces a resonance occurs creating a collective conscious experience. Both actors and audience can respond to these stimuli creating a dynamic experience where the communication between all involved is clearly felt to have an impact on the live occurrence. However, even though shared physical space allows for liveness to be transferred this resonant "intra-action" is by no means a given of live performance. The emergence of a strong live phenomena is highly dependent on the context of a given happening. The state of mind of participants is of critical importance. For example, if an actor repeats lines without feeling their relevance or responding to the reactions of the audience the performance will fall flat and lack its energetic potential.

When we consider computer mediated environments (virtual environments) and the live events that occur within these mediums, our pathways for communication are defined by the design of the software platform. These design decisions can either afford unique interaction possibilities or limit the communication flow between participants. For example, live streaming offers new affordances by making content widely available with minimal barriers to entry for audience members however the experience of crowd energy and feedback for performers is currently mostly limited to chat functionality or external platforms. As T.L. Taylor states in her book, Watch Me Play, the chat feature is central to

the Twitch platform and in some ways allows for a "live streamed crowd experience" (Taylor 42). The fast-scrolling chat box is not readable but conveys crowd emotion. Designing better ways for crowd experiences is a rich space for development because it dramatically impacts both the performer and spectator experience. For example, "crowdspeak" on chat works when there are thousands of simultaneous viewers, but an intimate performance of a few dozen audience members would benefit from the potential to make their voices and faces directly seen to the performers. Additionally, crosstalk and side conversations between audience members is an important aspect of social gatherings with many digital platforms currently lacking this functionality. There is a myriad of challenges associated with implementing these suggestions, from the perspective of the host of an event their needs to be methods for controlling the flow of conversation while also allowing for general participation. Developing methods which allow for increased communication, both on personal scales and on audience scales will allow for experiences which can organically evolve through feedback between participants.

EMBODIMENT (METABOLIZE)

The process of communication and feedback give rise to the embodiment of phenomena which are distinguishable and recognizable agentive forms distinct from their environments. By taking in raw materials from the outside environment and transforming these through metabolization living systems create their own internal environments where unique micro-biomes can thrive. Through the perception of bodies, we come to understand the inter-relationships between entities and the boundaries between self and other. Our perceptions of liveness are inherently situated within our bodies, but this does not mean that our embodiment stops at our skin, on the contrary we embody "personal, social, and

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political aspects" (Strathen 67). Performances, festivals, communities, and publics can all become embodied and move through time and space, generating powerful movements and social change. We begin to experience these phenomena as more than the sum of their parts, with power and agency all on their own. These phenomena are sustained and brought into being through shared symbols, discourse, interactions, as well as encounters with the boundaries of other bodies. When you are embodied in a performance for example, you understand this space as distinct from your normal outside world, there is a unique set of rules and understanding shared between performers and audiences, a shared trust which allows for actions to take on new meanings. To be embodied means understanding a happening within its context, conversely if you are outside of the body that the occurrence happens within, your understanding will be in relation to your own body, which may be a vastly different context.

Karen Barad in her essay, Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter, argues that "What is needed is a robust account for the materialization of all bodies--- "human" and "nonhuman" --- and the material-discursive practices by which their differential constitutions are marked" (p. 810). Barad's Agential Realism theory rejects the notion of separate entities and things and instead presents a "relational ontology" that places phenomena as "ontologically primitive relations--- relations without preexisting relata" (p. 815). Importantly, what defines and makes the boundaries of bodies distinguishable are the apparatuses we use, in this context apparatuses are "specific agential practices/ intra-actions/ performances through which specific exclusionary boundaries are enacted" (p. 816). With this theory we can see that bodies are made determinate by the relationship between discourse and material practices. By attending to discourses as well as to the design of performances and virtual platforms we

can come to shift and iterate upon these practices which define our bodies and, in the process, unlock new possibilities and affordances.

In mediated environments our ability to embody is largely defined by the platform we are situated within; this can take many forms from a humanoid avatar in an online game to a profile page on social media. These avatars are afforded specific modes of engagement that define the limits of the embodied experience. For us (Humans/ organic life) our corporeal bodies are the medium through which we experience the rest of the "cosmos" (Strathen 69), and therefore all perception is in relation to our bodies. When working with virtual environments it is important to consider how we can engage the body beyond visual and auditory senses, the more we can activate all senses and create shared experiences between individual bodies the more live and visceral an occurrence will feel.

CONSEQUENTIAL (RESPOND)

With all life there is a consequentiality, what occurs matters, because it can be the difference between continued life or death - mortality. When moments of consequence occur, they call us to respond and act. In the face of danger, we must either fight or run. In our human world, many encounters do not appear to be life and death events. However, often when we experience feelings of liveness it is accompanied by feelings of uncertainty and fear about the possibility of failure or the potential for success. We experience this throughout our lives when we encounter new circumstances and must choose how we respond. This is the experience of a performer or producer who is putting their work out into the world, but the audience on the other side can also experience these consequential feelings. When a message is consequential it draws our attention and makes us consider it carefully because it speaks to our embodied experience. Moreover, from an audience's

perspective it is not important that the message is received in real-time or broadcast live because to have a feeling of "liveness" the message simply needs to be relevant to the individual in the moment of reception.

A few factors play into an event being consequential for a spectator, and the three that stand out are compelling storytelling, addressivity, and the participation framework in which we are engaged in. Storytelling is an artform all to itself and I will forgo getting into the intricacies of it here. What is important to pull from storytelling is its ability to generate empathy for characters. The generation of this empathy involves the processes of communication and embodiment we have already covered. By being able to relate the experience of others to our own we can deeply empathize and care about what happens even to fictional characters in far-out scenarios. When we are on the edge of our seats in a movie or performance it is because we see ourselves in the action, and the outcomes become relevant because we are seeing our own lives with those that are performing. What's important is that even after engaging with an effective story we carry these moments into the rest of our lives and use them to make sense and meaning of our own lived experiences.

Addressivity includes providing relevant information but it goes beyond this by speaking to individuals in particular ways. Mikhail Bakhtin in his essay, "Speech Genres", points out that "the composition and, particularly, the style of the utterance depend on those to whom the utterance is addressed" (Bakhtin 95), and that the addressee is determined by what place, time, and activity we are engaged in when an utterance is made. Every utterance has a particular addressee in mind and is actively trying to determine the addressee's potential response. When we encounter an utterance or media form which addresses us specifically, through relevant information and its stylistic composition our attention is

grabbed, and we feel an importance and consequentiality related to the message. Social media platforms, such as Facebook and Twitter, spend significant resources and research on trying to make content relevant to individual users. This is because they know if the information is specific and engaging people will spend more time on their platform and they can do targeted advertising. Content is relevant when it addresses a need or want, or connects directly with experiences we are having in our daily lives. When the right information is presented to us at the right time it makes us feel specifically addressed and spoken to.

There are many situations we are involved with where our modes of participation can shift and thereby dramatically changing the significance interactions take on. Erving Goffman's notion of 'participation framework' which he explores in his book, *Forms of Talk*, is helpful here in revealing that there are not simply "recipients and nonrecipients, but rather [...] an array of structurally differentiated possibilities" (Goffman 137). For example, within a group of two or more people the current speaker may address an individual specifically (the main addressee), the other participants are still involved in the conversation but are non-addressed. Furthermore, a nearby group may overhear the information but simply ignore it because they find it irrelevant (Bystanders).

Relating this to mediated experiences like using Zoom and other video conferencing platforms, participation framework is a notion which goes far beyond face-to-face encounters. Depending on the role you are taking in the call, how consequential and live the experience feels can vary widely. As the moderator or main speaker for a call you must be quite active and engaged throughout the video conference making sure to keep conversation flowing and ensure that when conversation is happening and that proper turn taking is taking place. As a general member of a call, you can take on many roles, but the

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two which are most clearly evident are that of the active interlocutor and the passive listener. The active interlocutor is often marked by having a camera feed turned on and actively engaging in conversation either through chat or speaking up directly. The passive listener may have their camera off and will not often speak up during a meeting. We all take on this role from time to time, and it feels much like being a bystander in physical space. One can hear the conversation going on, but one's attention may be wandering towards other things, like the social media page pulled up on your second monitor. When engaging with online video conferencing especially in long lecture-based formats it can be difficult to remain focused and realize how the content is significant to you, especially if you feel you are not being addressed or called upon to participate.

In live event design we can make experiences more consequential by incorporating all these factors. By designing an experience with the target audience in mind, the story and addressivity can speak directly to the current context the audience is experiencing. With virtual events the main obstacle is devising a participation framework that can transform passive viewership into active participation. One clear way of addressing the issue of passive participation is by including interaction as part of the design of the event, so that the audience is no longer a viewer but can make their voice heard and through this create communication feedback loops. As mentioned previously, "crowdspeak" on streaming platforms is already prevalent and does allow audience members to have a method of communication. However, to truly make this encounter consequential the performance must respond and react to the audience's feedback. For our decisions to have consequences they must make a mark on the trajectory of the performance.

CONTEXTUAL (ADAPT)

When a portion of a population is isolated and lives in a unique environment they begin to adapt and evolve to the specific ecosystem they inhabit. Charles Darwin in his famous trip to the Galapagos Islands was one of the first to notice this evolutionary effect, in his own words, "by far the most remarkable feature in the natural history of this archipelago…is that the different islands to a considerable extent are inhabited by a different set of beings" (Darwin 418). Even though the Galapagos Islands are only separated from each other by 50 or so miles, the lifeforms inhabiting each island have perfectly adapted to the unique challenges and opportunities present in their environments. These changes in the morphology of the organisms living on the Galapagos occurred gradually over many generations, knowledge slowly being embodied through the process of living and dying. In human culture our ability to adapt happens on much faster timelines, with many drastic shifts occurring in a single generation. However, our adaptations often take the form of environmental manipulation. Using our hands, minds and tools we've discovered that it is much quicker to modify our external environment to suit our needs rather than to wait on evolution. What is worth our consideration though, is how our constantly shifting human environments are impacting our physiological and social lives.

When new technologies make possible mediums of communication and interaction that have never existed before these spaces begin to shape the way we perceive, understand and engage with the world. In our current time of social distance and physical isolation our need for connection is in great demand and the only consistent space we can find this is the internet. "We can see the internet as a means of existence, in some ways close to water, air, earth, fire, and ether in its basic shaping of environments" (Peters, 49), the internet has become the common ground we have for gathering and forming community. With

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everyone being isolated to the internet as the main mode of social connection we are both given new opportunities and are limited in our abilities in this new environment. One of the main limitations of virtual events in my experience is the lack of chance encounters with people. You can, of course use dating apps, join virtual events, and find other modes of meeting people; however, these lack the atmosphere and impromptu connections that we experience when attending events in person. If we take an in-person concert for example, a critical affordance that makes this conducive for social encounters is the ability to have aside conversations with a specific individual while also watching the main performance. When people meet each other in this manner, there is a common footing and understanding of shared interests which allow for a more natural meeting within a context. In most virtual performances, we lack the ability to see and communicate with other attendees, and if there is time for individuals to participate through video chat it is often in a highly structured manner which doesn't allow for crosstalk. Virtual platforms that allow for chance encounters on personal and collective scales are crucial for community building. As we continue to live in a socially distant world our desire for communal encounters will remain and, "the idea of what counts culturally as live experience (will evolve) over time in relation to technological change" (Auslander 3). Even when the world emerges from the shadow of the current pandemic the modes and techniques for producing events will forever be changed along with our understanding of live experience.

Even in our era of global internet connection every individual inhabits a niche community defined by their culture, social standing, interests and community. This confluence of forces shapes and guides the perspective from which we see the world, as Stuart Mclean puts it, "Fabulation is always a collective undertaking, involving the relational becoming of an artist" (Mclean 40). Artists are shaped by the collective while

also being influential forces of shaping collective cultural understanding, this autopoietic process is crucial for communities to survive and thrive. Every ecosystem is supported by its members, each being receiving, transforming and passing along energy in cycles that support the whole. As humans we are embedded in cultural and natural processes and in order to thrive, we need to be sensitive to how we are using and passing along resources. In the same way wasteful consumption can destroy natural ecosystems. So too, can political ideologies be contaminating to the cultural environment we inhabit. Racism, white supremacy, capitalistic exploitation, and all other forms of spreading hate and creating hierarchies of division are pollution in our culture. These afflictions are autopoietic as well, living viruses which thrive in the populations they infect, and eradicating them requires becoming aware of how they spread so that we can minimize our risk of exposing ourselves and others. Biological viruses have an intelligent immune system to contend with that can learn from vaccines and past experiences. Cultural viruses, however, are much more difficult to stop by immunization because they evolve rapidly, and because humans are surprisingly prone to ignoring evidence when it contradicts long held beliefs and power structures. Furthermore, the domains of biological and cultural viral spread are very tangibly linked as we have seen throughout the U.S.A.'s response to the coronavirus. Our culture of individualism, profit before people, and lack of unity have been the leading cause of the death and pain that the biological virus has brought into being. Even when a vaccine arrives for Covid-19 we will still be left with the culture that manifested the pandemic. There is no simple cure for culture, however investing in education, empathy, and community can go a long way in reducing ignorance and bigotry.

TEMPORAL (REPRODUCE)

Life is a temporal process happening on many different timescales, from evolutionary eons to the steady beat of a heart, in all these timescales we see rhythms, patterns, and seasons which continually flow. Motion and life are intimately linked as we can see with the words, animate and inanimate, that which can move and that which cannot. The process of animation is the manipulation of the inanimate such that it appears to come to life. When we consider the world though, nothing is truly inanimate, all forms which appear solid are but a momentary wave upon the Earth in geologic timescales. Human perception is attuned to seeing the world at about 60 Hz (60 F.P.S.) making it difficult for us to perceive slow moving creatures as animate beings moving intelligently through space and time. For example, "so quietly and so slowly do plants live and move that we in our hasty motion often forget that they equally with ourselves belong to the living and evolving organisms" (Huskar and Myers, 80). Plants offer a glimpse into the wider avenues of animacy, because over seasons we see them grow and move but in momentary encounters they are as still as any stone. We can begin to see that many of the things we label inanimate are only moving on differing temporal timescales, which we need to consciously attune ourselves to in order to perceive.

Every living thing is brought into being by another living being, which continues living as long as it can, and hopefully along the way manages to reproduce another generation. Reproduction and propagation are essential to living because they enable evolution and allow a species to continue living far past the life of any individual. In biological life, reproduction is the site of evolution and continuity, of carrying forward the gifts of generations past and of becoming new in the present. We all in our D.N.A. carry billions of years of embodied knowledge which allows us to thrive, live and appreciate the

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wonders of being. Through time we are connected to every living thing from microorganism to plants and mushrooms, sharing common ancestors and continually diverging upon new paths. Equally human culture is defined through the gathering and propagation of knowledge over generations. The story of human civilization is defined by our ability to record and remember events of the past and make use of these in the present. Stories and language are the basis through which society is formed, allowing us to form communities that can cooperate over long periods of time. We continually build upon what we inherit from our ancestors and are responsible to those who come after us. We have a duty to pass on values and narratives that promote the thriving of the entire Earth and not propagate harmful ideologies.

Is a book a living being? In some sense it is a rather inanimate being with a fixed set of words and stories that it contains. The narrative of a particular time period often crystallizes the political and cultural beliefs of that period, much like how the rings of a tree carry a record of their environment into the future. So, even though a story is already written it will be referenced, translated and interpreted if it is continuing to be read and discussed. Like the rings of a tree, it is the foundation for future generations to build upon and through this continues to live and be relevant. David Eagleman in his book *Sum* writes, "There are three deaths. The first is when the body ceases to function. The second is when the body is consigned to the grave. The third is that moment, sometime in the future, when your name is spoken for the last time*."* (Eagleman 30). In our example, the first death is when the book is completed with all words set in stone, the second is when the last copy of the book is lost or destroyed, and the third is the last time the book is referenced or discussed. Works of art and literature can stay with us long past when their authors have ceased to be with us, and if a work has a large enough influence it will continue to exist

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through future generations of art and literature. We may not even remember the original text or author but if the ideologies and narratives it contained continue to be propagated the work hasn't truly died. This is much like how our genetics carry information from species long extinct and therefore some part of them continues to live through us.

Art and creative works are living beings that can live far past individuals and we cannot fully grasp the scope of their impact on present and future realities. Especially in our world of internet connectivity artistic works can travel the globe and be seen by a host of strangers that will recontextualize and interpret the work in a unique way. Desjarlais in his book *The Blind Man: A Phantasmography* writes much about how photographs and images are animate beings, "Images are not static, timeless icons of abstract meaning to be received cognitively by a rational brain. They work, shift and alter, and disturb, within material and imaginary life" (Desjarlais 174). Every time we revisit an image our perspective will be different and therefore what we perceive can drastically shift. An encounter with a piece will always occur in the present in a live context, and be a relationship between the work, the viewer, and the larger environmental context.

DESIGN PROCESS

"Artworks begin to assume a living reality - an evolving continuity in the space and time of their articulation outside the formative grounds of their inception. Here I evoke a particular actualization for artworks, one in which the works themselves seem to take on the decision of self-expression."

-Poiesis and Art-Making: A Way of Letting-Be (Derek H. Whitehead, Ph.D.)

From the beginning of this thesis project, my goal has been to bring together virtual and natural worlds with which people can interact and experience the interconnection between themselves and the rest of the environment, in the hopes of fostering a more-than-human community. Actualizing this has been an ongoing process for the entirety of my three years in graduate school and has been shaped and formed through the many productions, people and plants I've interacted with throughout my journey. While developing this work I have been continually researching and exploring living systems and striving to keep these principles at the center of the design process and use this creative project as a point of practical research for putting these principles into practice.

Elemental Media is an ongoing temporal happening that inhabits virtual, cultural, natural, and material spaces. A continuous week-long live stream of a backyard garden in full spring bloom. In the evening, and far into the night, live music and visuals materialize, both as projected light and as pixels streaming into the world wide web for all to see. For those attending fully virtually, the website hosts a series of opportunities to explore and commune with environments, people, and beings. This work exists equally in physical and virtual spaces and it is exploring new ways of creating dialogue and

community across these modes of experience. On the custom website, we can see and affect a live-stream of the backyard garden through our bodies, voices and user interfaces. Additionally, participants can join an open video chat room and engage with experimental web-based 3D worlds. The actions and explorations of those engaging in all simultaneous spaces co-author the experience and influence the sensory environment.

Here I will trace the design and development of the piece by bringing together experiences and circumstances which informed decisions.

THE MEDIUM AND MESSAGE

A medium is a substance which enables the transmission of meaning and is the space in which organisms are embodied within. In art and design the choice of medium is of critical importance because it defines what is materially possible and how the audience can engage with the work. The medium is the foundation of all artwork and artists are constantly exploring how mediums can be manipulated and worked with in order to express the range of human experience. As our tools and technologies grow, we gain access to more media which expand the possibilities of expression and communication. Every medium has unique affordances and limitations, it is the role of design to choose when and where to employ a particular medium to best convey the desired message. In this project multiple mediums are put into play to engage audience members across the various environments they inhabit.

The most fundamental medium is the Earth which is the basis for our living existence and is the provider of all elemental media. Anyone who has spent time away from cities and spent time exploring natural landscapes understands the fundamental impact these environments can have on our bodies and minds. Shinrin-yoku the Japanese

word meaning "Forest Bathing" is the practice of walking in nature and opening your senses to the world and letting this experience transform your perspective. This practice perfectly describes how simply taking in natural spaces with all our senses can be deeply healing both mentally and physically. Setting the performance in an outdoor garden is a deliberate choice in order to immerse people with all their senses and to acknowledge the inherent healing potential of natural environments. Working with landscapes and plants as collaborators is a way of learning more about myself and the local Texas ecosystem. Cultivating wildflowers requires working in plant temporalities and thinking in months and seasons rather than hours and minutes. Slowing down and appreciating the changes in weather, the coming of rain and the warmth of the sun. These are all fundamental aspects of our existence that we can easily ignore when spending most of our days in doors behind a computer screen. Connecting with soil and sun grounds us in our bodies and reminds us of our roots within the Earth, experiencing this connection is central because it transforms Earth into a material reality rather than abstract concept. One of the central goals of this design is to manifest feelings of community for the audience both with other humans and the larger ecosystems we are embedded within. Being outdoors in a space filled with other living beings inherently opens us up to experiencing our interconnection with the rest of the Earth.

Our choice of media is linked with the circumstances we inhabit in our current moment. The novel Coronavirus has been instrumental in shaping how performances are produced and presented, and this project is no exception. With much of the audience only being able to experience the work through the internet it is imperative that we create a space (medium) that allows these viewers to have a compelling experience through a computer interface. A defining difference between an in-person experience and a live-

stream is the perspective the audience views the work from. With a physical installation the audience is free to explore the work from multiple angles and is given agency through this. With a live-stream our view is typically limited to a single perspective and the viewing angle is defined by the production team, everyone viewing the experience has a similar visual experience. In order to give audience members greater agency in this installation, we made use of four cameras placed throughout the space and each is given its own webpage where that stream can be viewed. This breaks the experience into multiple "rooms" that the audience is free to roam and explore throughout their visit. Furthermore, each webpage has a user interface which allows the audience to control the viewing angle of the camera through the manipulation of a Pan Tilt mechanism. This allows the audience to collectively choose the viewing angle and control what is in frame based on what is interesting to them. Each of the rooms also allows participants to join a video chat so that they can communicate with people in the physical and digital space. By having multiple rooms, attendees have the possibility of having smaller more intimate conversations that reflect the encounters we have at physical gatherings. By giving participants options, agency, and the opportunity to engage with strangers in an online platform we are increasing the liveness of the event.

The experience of being present in a space and connecting to an online event will inherently have discontinuities. Those in person will have sensory experiences that those online simply cannot engage with, the inverse is also true. Having elements that can extend and bridge these realities together is an important element within the experience to create connection. The soundscape for Elemental Media is a critical component in forming this shared space. By allowing online participants to manipulate the soundscape of the physical installation both by giving them the option to use their microphone, and through interacting

with web site user interface. Participants in the physical space can hear these online interactions and respond using a microphone placed in the space. With these pieces in play, bi-directional communication is possible and the lines between physical and virtual space are blurred.

COLLABORATORS AND CONTEXT

From where does an artwork emerge? From an ecosystem of collaborations, projects and relationships which continually build on one another to create something new. Creating and sharing work often reveals shared interests and is a natural way of growing community. Artists are drawn to cities and spaces that have active art scenes because this energy is contagious and generates more creativity. As more thoughts, emotions, and art are shared the work of all individuals is improved through the process of exposure and critique.

Communities are embedded within each other, beginning in our homes and moving out to include larger organizations like universities and cities. Since moving to Austin for graduate school, approximately three years ago, my home has been one of the defining communities in my life. I've been fortunate to live with the same group of friends for this entire period and to share a wide range of overlapping interests with all of them. Additionally, the home we have been renting is blessed with a large backyard (approximately 3600 square feet) which has enabled us to experiment with gardening and outdoor sculpture. Having physical space to explore and create is a critical resource that is difficult to come by in an urban environment where the land is often policed by landlords and city regulations. In a typical performing arts context, the theatres are tightly scheduled with many performances occurring back-to-back. This gives each individual production a

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limited amount of time in the space to explore and iterate. In response to this design teams must be extremely well-prepared before entering the performance space. Therefore, the entire production team often must work long hours during the limited technical rehearsal process to realize the collective vision. In contrast by having the performance space be our backyard, artistic and design decisions can emerge more gradually in relationship with the natural environment and collaborators. A master design plan isn't placed upon the space, rather incremental decisions over years of time build upon one another. Critically this allows for all interested parties to express their visions and opens the time and space to explore multiple alternatives. Many decisions which impact the Earth negatively are created because they are done quickly and without input from the community. Slowing down and making iterative design decisions is a process which more closely resembles natural growth and minimizes unforeseen consequences.

However desirable making work over an extended period might be, it is often not feasible given the institutional structure. This structure demands that we become proficient at creating work quickly when in a space and have clear plans when entering the technical rehearsal process. While at the University of Texas at Austin I had many opportunities to work as a Media and Projection Designer on academic productions and learned many lessons through these experiences. When entering the technical rehearsal process, it is the first time that design elements and performers are in the same space interacting with one another. This is an exciting moment, and regardless of the amount of planning that occurred beforehand new opportunities and challenges will become apparent in the moment. What this means is that our minds and designs need to be open and flexible enough to adapt and change to meet the vision which emerges out of collective collaboration. In my own practice of media design, a technique which has enabled flexibility is real-time rendering

because it allows for visuals to be iterated upon live and in context. When we create video content on a computer screen which is intended to be projected on a scenic element, it is difficult to judge how this will look until it is in that context. The process of offline rendering can slow down the iteration process significantly and hinder our ability to stay focused on the design and communicating with the rest of the team. Ultimately when I am in the performance space, I want to be able to play and experiment with multiple possibilities, and anything that enables and makes this process faster will benefit the production. As techniques and processes are discovered in one production these can be carried forward into future works and continue to have a life beyond a single production.

This last year as we have explored how to make work during the pandemic, a desire has emerged to have performances that are more interactive and engaging for the audience. If watching a live stream of a performance is the same as watching a pre-recorded film from the audience's perspective, what is the point of doing live work? One of the main opportunities we gain from a synchronized event is the ability to interact with the audience and have their feedback impact the direction of the performance. Incorporating interaction into a performance requires that the production is designed from the beginning with audience interaction in mind, because the technical infrastructure and narrative design must be tightly coupled to successfully create an interactive story. All the details regarding how the audience will interact and what impact this will have on the performance need to be considered and worked through. Fortunately, I have had the opportunity to collaborate with other artists who are passionate about pushing the boundaries of live entertainment and experimenting with new forms of performance. In December 2020, the Frank Wo/Men Collective, an Austin-based performance group, put on a new work titled "K ! :D D: Ö", in which I collaborated as a media engineer and web developer. My graduate cohort

member and friend, Chris Conard, brought me onto the team, and we worked closely together to bring about the final performance. Our collaboration has continued past K ! :D D: Ö and Chris has been an invaluable colleague in helping me realize Elemental Media.

The format of K ! :D D: Ö was a simultaneous multi-live stream, where each of the five performers had their own "room" that audience members could tune into. On each of these webpages, several buttons were present to allow both for channel changing and to allow for messages to be sent to the performers. When a participant clicked a button, this would send a message to our media server and then be rendered to the live stream and sent as projected imagery into the performer's physical room. This allowed for each performer to use the buttons as a simple mode of feedback and interaction with the audience. Several performers used the buttons as a form of call and response; for example, push the green button if you want me to explore the closet. By including this simple set of communication tools into the performance, all participants became involved in a live relationship where the outcome of the performance is co-authored. We ran the performance eight times, and the level of engagement from the audience had a significant impact on the energy in the performance. When lots of audience members participated in communication and voting, this naturally excited the performers and amplified the energy. Much like with in-person events, a dead silent crowd will sap the energy from the performance, so too a live stream of an event needs the audience to be manifest in some form to bring life to the performance. The process of making K ! :D D: Ö was a major source of discovery both technically and from a design perspective. Many of the techniques and technologies we discovered through this process are being brought forward and expounded upon in this thesis project.

Another production that significantly informed the design of Elemental Media is the UT Creek Monster Habitat project. This project came into being when Karen Maness,

a Live Design Faculty member, was approached by the Waterloo Greenway about being part of their annual Creek Show in 2019. The Creek Show is a free site-specific light show which seeks to bring attention to the natural beauty of Waller Creek while also giving local artists a platform for sharing their work with a large audience. As part of the original design team, my role was to assist in pre-visualizing the final performance and to design interactive lighting systems for the installation. This was my first opportunity to bring performance design to an outdoor location, and we learned a host of lessons from the process. A major takeaway was that any custom systems we create need to be simple to install and tear down. Having to do complex wiring in the field is a recipe for non-functional systems. When possible, running a single cable for data and power helps to ensure that unintended wiring doesn't occur and that fewer cables need to be run over long distances. Weatherproof enclosures are a critical aspect of doing an installation in an outdoor setting. Beyond preventing water from destroying sensitive electronics, these enclosures need to be easy to open so that the devices inside can be maintained without compromising the weather seal. Many of the products and techniques we used for the Creek Monster Habitat are finding a new life in this thesis performance. We are making use of waterproof addressable L.E.D.s, weatherproof speakers, and weather-sealed enclosures that were purchased for that production. Being able to reuse past materials reduces the financial and environmental impact of putting on future performances and enables more creative work to blossom.

MATERIALS AND TECHNOLOGIES

Realizing this production, required a host of materials and technologies to come together and work harmoniously with one another. Growing wildflowers, building multi-

story structures, running electrical systems, and programming virtual environments were all part of this process. Many of the materials employed in Elemental Media are found objects, D.I.Y. (Do It Yourself) builds, or equipment that has been generously loaned to the cause. Each element has its own unique story and origin as to how it came to live in the yard. Through the process of engaging with these diverse materials my understanding of the interconnection of relationships that underpin life has been deepened.

Physical Installation

Creating the physical installation began nearly three years ago when I first moved to Austin from College Station. One of the professors, Fred Park, from my undergraduate program (Texas A&M Visualization) happened to be retiring that year and was getting rid of old research materials. Within this pile of forgotten treasures, were a series of trapezoidal wooden pieces that I learned could be assembled into a dome for immersive projection. As I was about to embark on my M.F.A. with a focus in projection design the opportunity was too synchronistic to ignore. When I completed the move to my new residence in Austin the first project we did as a household was to figure out how to construct the dome. After some research, we discovered the specific shape is a half Deltoidal Icositetrahedron, a Catalan solid. Once this shape began inhabiting the yard it became a focal point for experimentation and fueled our desire to see more geometric forms fill the space.

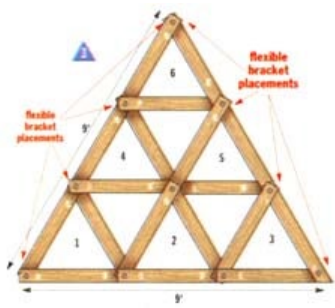From Left to Right:

Figure 3: One Facet of the Dome   *Source:* Michael Bruner

Figure 4: Dome after initial construction   *Source:* Michael Bruner

The next shape to take residence in our yard was the Pyramid. As we know life begets life, and the pyramid was born out of our desire to continue building more structures. Our initial experience putting the dome together had us eager to continue exploring what other geometry was possible to create out of simple materials. My roommate Chris came upon an article in Mother Earth News that described the process of building a modular pyramid modeled after the pyramids at Giza. The structure can be used as a 100 square foot greenhouse if you add a covering or simply as a space of meditation and contemplation. What made this build interesting is that all the wooden pieces are the same length and each of the four sides are also identical. Binding this shape together is a series of long bolts that go through all the wooden pieces when they meet at triangular points. A series of repeated triangles that come together to create a beautiful three-dimensional structure. To me this speaks of how life continually builds upon itself, of simple forms continually coming together to create higher orders of complexity and beauty.

From Left to Right:

Figure 5: The original Diagram   *Source:* Mother Earth News

Figure 6: Our finished pyramid   *Source:* Michael Bruner

Figure 7: Close-up of Binding   *Source:* Michael Bruner

As we began dreaming and devising the installation it became necessary for us to ground our decisions in a central theme that could guide our aesthetic design choices. We landed on the four elements, Earth, Fire, Water and Air as these connected with both the biotic and abiotic forces of living systems and are the fundamental media of our planet. With the emergence of these elements, we wanted to make each of the geometric structures a focal point for one of the elements, so out of this decision two new forms came into being. While speaking to Chris Conard about possibilities for an air-inspired structure we became excited about creating an elevated deck that would afford visitors an aerial view of the installation. Thus, we began creating what would eventually be known as the Sky Box, a 12x8 foot platform standing at 12 feet at its highest point. As the first shape that needed to be able to support people, we spent a good deal of time creating a solid structure and reinforcing the foundation. The sturdiness and covered lower level of

the sky box makes it an ideal location for routing power to the rest of the installation. On the lower level, we installed a weather-resistant power socket and switch. From this single switch, we are able to turn the power on and off for the entire installation, making it easy to manage the power distribution throughout the yard.

From Left to Right:

Figure 8: The skybox under construction   *Source:* Michael Bruner

Figure 9: The skybox completed.   *Source:* Michael Bruner

The final sculpture to make it into the yard is the Earth Geo. This geodesic dome was initially created for a previous thesis performance, Polluted Playground by Kaiwen Fa, and used as an immersive projection surface. I had the pleasure of assisting Kaiwen on his thesis during my first year of graduate school and learned a great deal from working on that piece. So, when considering what form could serve as the Earth element, I immediately thought of the geodesic dome that had gone unused for two years. By bringing this feature forward from Kaiwen's thesis project, his work continues to be alive

and inspire present art. Each of the sculptures that inhabit the installation are physical manifestations of relationships and stand as a testament to the central role communities play in bringing artwork to life.

From Left to Right:

Figure 10: Constructing Dome for Kaiwen's Thesis   *Source:* Michael Bruner

Figure 11: Dome with Projection   *Source:* Michael Bruner

Figure 12: Dome installed in yard   *Source:* Michael Bruner

Each of the elements is an aspect of life, and all of them are tied together through the flowers, trees, and grasses that are throughout the space. Cultivating plants is a temporal process that connects us with the seasons and keeps us grounded in the natural world. Plants have their own timescales that don't necessarily meet our timelines; the flowers will bloom when they are ready. We can prepare the soil, provide water and choose optimal locations, but ultimately, we have a limited amount of control. Each plant and every animal have their own season, and the contribution of all of these living elements continues to evolve the space. Noticing the minor changes and blooms of new

flowers adds continual discovery to every day. In preparing for Elemental Media, we planted two pounds of wildflower seeds throughout the yard in November to give them time to germinate before the spring. When the winter storm happened in February, it put many of the plants in Texas in jeopardy, and personally, I was unsure of what flowers would survive as they had already started to sprout. The storm did set back the spring blooms, but many of the plants resiliently survived the freeze and continued growing. Surviving freezing temperatures speaks to the adaptability and embodied knowledge all plants possess. Caring for these plants through rain, heat, and wind has been an opportunity to see how the elemental aspects of the Earth are continually shaping and forming the living world. The practice of caring and working with plants is an ongoing process of sensitizing ourselves to the natural world.

Audio Visual Installation

In the audio-visual installation, we made use of a variety of tools to bring the project to life. We utilized 1500 individually addressable 5-volt L.E.D's, 15 Philips Hue Bulbs, and 10 DMX fixtures for lighting. The projection system included 5 projectors to light various structures and surfaces throughout the space. The audio system was made up of 7 speakers and a 12-inch subwoofer that surrounded the yard to create an encompassing soundscape. All these technologies require their own communication protocols and having them all work together as one system was one of the main programming challenges. Tying all these pieces together is a software called Touchdesigner, which enables the input and output of a variety of data formats in a single environment. In this installation, Touchdesigner serves as the bridge between the virtual and physical mediums. By receiving and parsing data sent from the website, Touchdesigner is able to coordinate all

of the pieces into a cohesive whole. In many ways, this piece of software is the fundamental medium that enables the experience to occur.
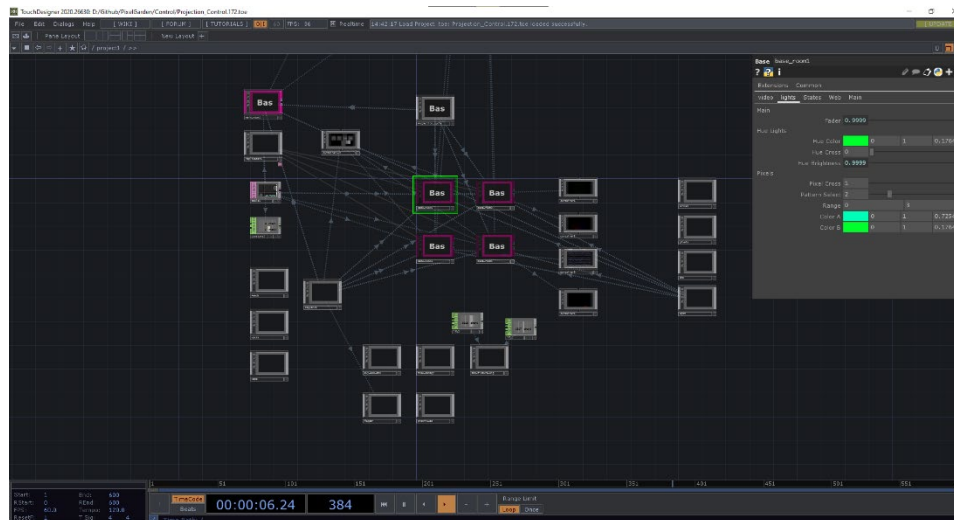

Figure 13: Touchdesigner Patch for Projection and Lighting System
Source: Michael Bruner

A central design challenge when creating Elemental Media was figuring out how to balance the input from the users on the website with the creative vision of the design team. If too much control is handed over to users, then the experience within the space can become chaotic and lose some of its effective power. While collaborating with Bill Rios on the design of the lighting, we struck upon a balance where we as a design team created looks for each of the elements, and then users could modify these within certain ranges. This system allowed us to choose color relationships and create a cohesive environment while also adding in a level of randomness from user input. This balance helped generate interest throughout the week because the states and their relationship with other elements were always different, but the core looks stayed consistent. Touchdesigner was

instrumental in making this happen as it allowed us to fine-tune parameters and keep the lighting and projection in sync.

The audio system was a major bridge between the virtual and physical installation and allowed for bi-directional communication to occur. Participants on the website were able to join with their camera and microphone and have their audio amplified into the space. Conversely, participants in the space had the opportunity to speak into a microphone to be heard both on the website and the virtual space. The experience of hearing voices from the website spatialized into the installation was a powerful means of creating a shared space across the internet. The audio system also applied echo and distortion to the signal making the act of talking a playful experience that encouraged participants to explore what sounds they could create with the system. So even when there wasn't a back-in-forth between participants engaging with each other, the microphone was still an important feature for giving audience members a chance to have a consequential impact on the installation.

Virtual Installation

Creating the virtual installation involved coding a website, creating a backend messaging system, installing four custom-built cameras, routing audio, streaming five simultaneous video feeds, and creating user-controlled audiovisual effects.

The most fundamental piece of technology that had to be in place to facilitate user interaction over the internet was a robust low latency messaging system. For this installation, we made use of the MQTT (Message Queuing Telemetry Transport) messaging protocol. This protocol has many advantages: it is lightweight, uses limited bandwidth, and is able to run on low-power devices. The protocol has two entity types, a central broker and clients; the broker is responsible for routing messages between clients

while clients are able to either publish or subscribe to message topics. For this installation, the broker was an Amazon Web Services (AWS) server that I set up for the K ! :D D: Ö performance with the Frank Wo/Men Collective. The clients are made up of all the web users who are publishing messages to topics and then locally a computer running Touchdesigner is subscribed to those topics and handling the local communication. Each element on the website has its own topic so that control commands can be specifically addressed and routed correctly. Setting up and configuring the broker on AWS was the most challenging aspect of getting the system up and running but once that piece was in place the communication between the website and the local system was robust and consistent.
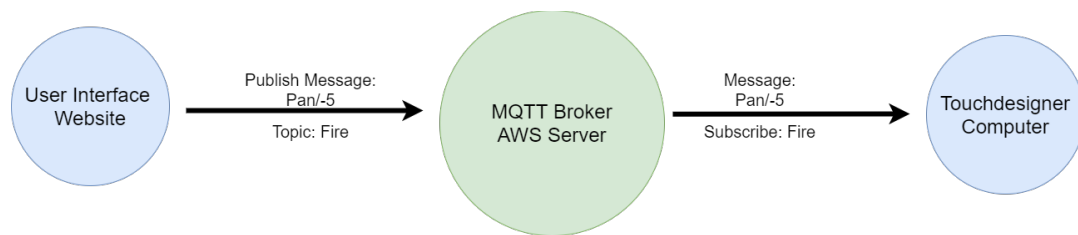

Figure 14: Web Communication Diagram

Source: Michael Bruner

The front-end website was created using HTML, CSS, and JavaScript and was hosted for free using GitHub pages. The backbone of the website is OBS.Ninja, which is a peer-to-peer video forwarding application, it allows for ultra-low latency video streaming and conferencing. Each of the elements had their own OBS.Ninja stream and web page that allowed the participants to view and interact. The reason for making use of OBS.Ninja over other streaming services like Twitch is that the latency of OBS.Ninja is much lower, and

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this allows web interaction to feel much more responsive. Quick response time and visual feedback are critical for actions to feel consequential and for users to understand that their actions are indeed having an impact. The main limitation of using OBS.Ninja is that because the service is peer-to-peer without any central cloud server, the more viewers you have connected at any one time increases the CPU load on your local computer. This limitation can eventually reduce the frame rate to such a degree that the stream stops entirely and the streaming computer crashes. Thankfully, because this installation was designed to not have high-density visitation times at any one point, the stream quality remained high throughout the performance.
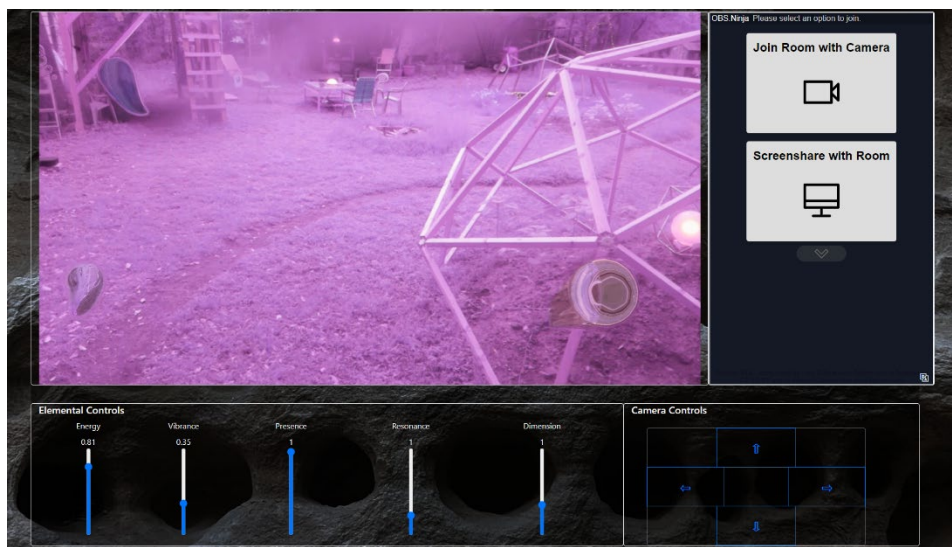

Figure 15: Custom Web Interface   *Source:* Michael Bruner

Transmitting the video feeds onto the web was one challenge but maintaining four reliable video feeds that are living outdoors for multiple weeks was an entirely different challenge. To accomplish this, we made use of the Raspberry Pi 4 Model B. These are single-board computers that are relatively inexpensive ($100) that can be customized

with various peripherals. We experimented with multiple camera modules and local area network streaming protocols to push the video from the Pi's to the streaming computer. For streaming the video from the Raspberry Pis to the local media server, we made use of the NDI protocol using a program called Dicaffeine. Dicaffeine provided a simple user interface for setting up video streaming parameters and monitoring the status of Pis.

In the end, we made use of three different types of camera modules to achieve different effects. The first was the Pi Camera Module V2, which provides a decent video quality at 5-Megapixels and gives a wide field of view. However, we found that the performance of this camera at night left much to be desired; to compensate for this, we made use of Pi NoIR Camera V2. The NoIR is essentially the same camera module as the V2, except it has no infrared filter making it more sensitive to light and allowing us to make use of IR lights around the space. This provided the viewers on the website additional lighting and visibility without detracting from the visibility of projection and lighting in the space. Without an infrared filter, the cameras gain a reddish-purple tint during the day. We found this gave the imagery an other-worldly dimension that suited the installation well. The last camera module we made use of was the Pi high-quality camera module which allows for the use of interchangeable lenses and improved visual quality. This camera worked great for getting close-ups of the beehive in the installation because we could use a telephoto lens and specifically focus the lens on our desired subject.

All four of the cameras in the space were mounted into custom-built waterproof boxes that allowed for power and ethernet to be run without letting water in. Three out of the four cameras had Pan Tilt mechanisms installed on them that allowed for web participants to shift their viewing angle. These custom pieces necessitated that the

housing is large enough for the mechanism to move around and be transparent for the camera to view through. In creating these, we made use of junction boxes combined with clear plastic domes. Chris Conard was instrumental in the development and construction of these housing. After experimentation, we found that the Pi's are prone to overheat, which can cause frame-rate loss and digital glitches. To cool them down on hot days, we made sure to place them in shady areas and to keep the boxes open so the air can cool them. As all of these components were self-assembled, many minor fixes and adjustments had to occur throughout the installation to ensure that all the cameras continued to function. Working with custom electronics is like gardening in this way, to keep them alive and happy you must care and tend to them.

PERFORMANCE AND REFLECTIONS

The performance took place April 12th -16th and was streamed online between 10 am-10 pm every day. The physical space was open for in-person visitation from 6 pm to 10 pm each night for small groups to explore. As the creative team spent more time in the space throughout the week and as visitors gave feedback on their experience, we continued to iterate upon the installation. In this process, I got feedback through questionnaires both for the online and in-person aspects. However, I found that direct conversations with participants was the best method for getting feedback and suggestions from attendees. Getting direct input was easier to accomplish in person because the conversations naturally occur as audience members left the space. Receiving this feedback online was more challenging because there are no set visitation times and the stream could be viewed anomalously.
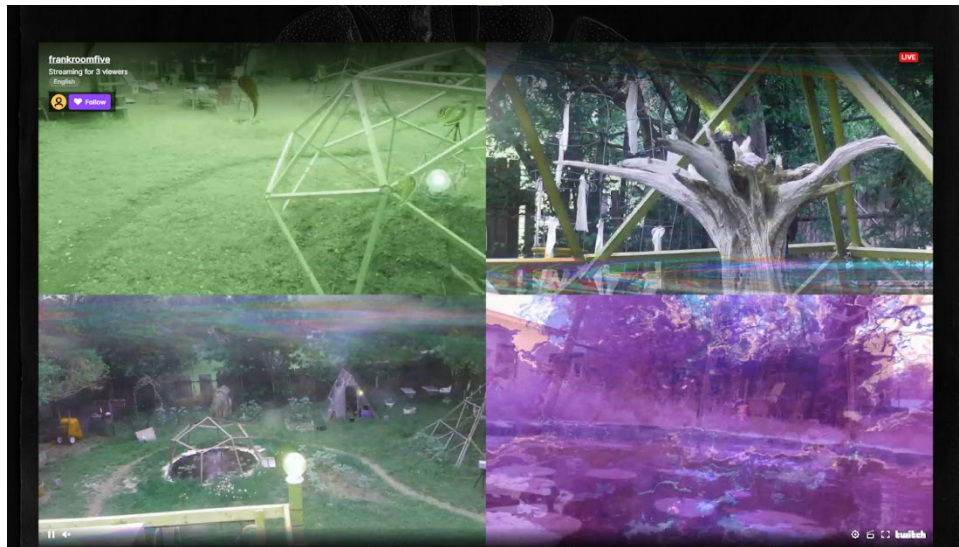

Figure 16: Twitch Stream Showing all four camera feeds.

Source: Michael Bruner

Figure 17: The Earth Geo   *Source:* Michael Bruner

Figure 18: The Fire Pyramid   *Source:* Michael Bruner

Figure 19: The Water Dome   *Source:* Michael Bruner

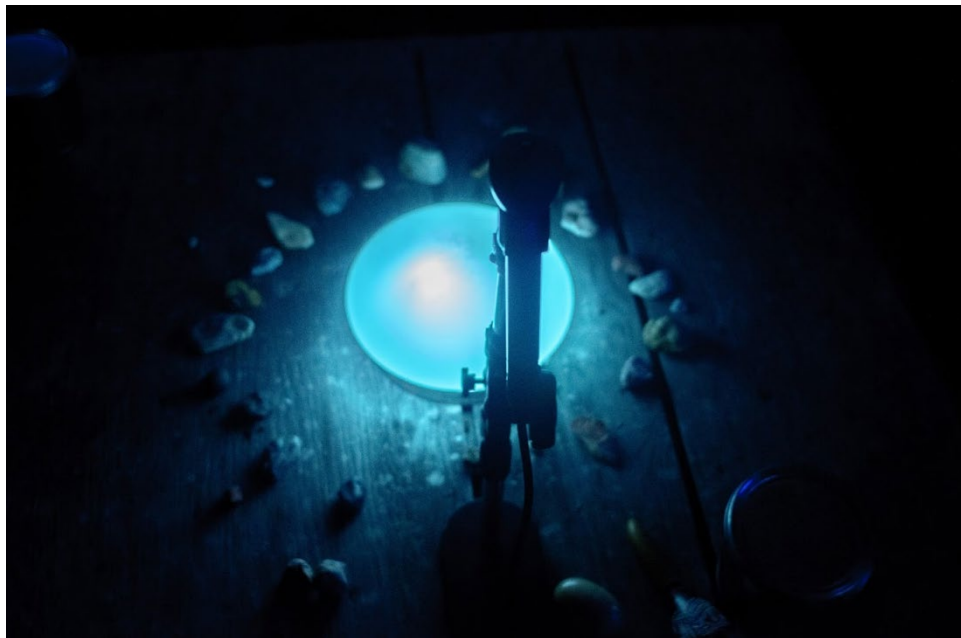Figure 20: The Skybox   *Source:* Michael Bruner

Figure 21: Microphone in Space   *Source:* Michael Bruner

So, what are the vital ingredients of a live experience? Through reflecting on the process of creating Elemental Media and by studying living systems, what has struck me is that relationships are at the core of all that is living. Relationships between and within entities are what sustain all living processes. When I consider what makes a work live, it is not a binary possibility but rather a spectrum that measures a relational matrix. We can begin to understand the liveness of a system by asking ourselves, what relationships are being manifested and maintained through the process? Through a diversity of entangled relations, ecosystems continue to live and thrive, and so too with artistic works. Conversely, looking to what relationships are being ignored and minimized can bring to light areas of further growth. Communication, embodiment, consequentiality, contextuality, and temporality are all aspects of relationships, and by looking at these, we can find specific methods for fostering connections.

A living process is in continual iteration: taking in feedback and being in communication with collaborators and audience members. Elemental Media evolved during the week of the performance based on all of the conversations and interactions that occurred throughout. The best part of live productions is that they are performed multiple times, and this allows the creative team to refine design elements until they are in harmony. With Elemental Media, I did this by speaking with audience members every evening and then working to put these new discoveries into practice before the next night. In this way, the experiences of all participants build upon one another, and overtime the design is co-produced by all who choose to contribute. As a live designer, my interest is not in locking a work down, but rather opening it up to evolving. When we say a work is done, that is the

first death of the work. A key part of keeping a work live is the dedication of the creative team to keep iterating.

Embodiment means we have the possibility of influencing and being influenced by our environment. Our bodies are manifested through our relationships with people, technologies, and environments. The affordances provided on the website, like adjusting audio-visual parameters, moving cameras, and joining the video chat room, gave those online an extended cyborg body. The relationship between our human body and the technical apparatus creates a new hybrid body that is able to sense and interact across geographic distances. One participant mentioned that the digital experience actually felt more tactile than the in-person aspect because they had more control over the state of the space through the web. This points to the fact that embodiment is made visceral by the level of influence we are able to exert on an environment. Within the physical space, the main modes of embodiment were through physically exploring the space and through the use of voice to interact with the soundscape. These modes are less direct than the controls on the website but still gave participants the chance to influence and be influenced by the installation.

Our embodied actions have consequences and meaning when they are perceivable and able to be noticed by ourselves and others. With Elemental Media, one of the core goals was to create a shared and connected space where the actions taken by individuals shaped the state of the environment. Examples of how this was accomplished include changing the look of the visuals on the website, influencing the lighting and projection states, and audio interactions. These modes of communication between the participants on the website and those in the space were able to be seen and experienced across mediums. Thus, allowing participants to experience their actions having greater consequences than

their immediate environment. By minimizing the delay (latency) between taking action and having the live-stream respond, we can create consequential feedback loops. These feedback loops are critical for actions to be understood as consequential. Without immediate feedback, we have no opportunity to understand what our actions did or did not do. One discovery of this project was that the lack of defined performance times limited simultaneous viewership in physical and digital spaces, decreasing interaction across these mediums. In the current iteration of the installation encounters between participants were left to chance, which reduced the number of consequential interactions between individuals across the digital and physical mediums.

Elemental Media occurred in two distinct contexts, one online and the other outdoors. These spaces, in many ways, are antithetical contexts that dramatically shape our perception of the work. With the online context, we are most likely in our home, interacting through a computer screen, and this is probably a mode of being we are quite accustomed to. According to audience responses, the web-based experience was often viewed as a calming backdrop and as a way of "peeking into a very private and sacred space from afar." The website provided a means for audience members to safely observe and watch events unfold. In the web experience, you can remain anonymous, only looking in, and in this way create a barrier against being truly immersed within the world. In my experience, online events often have this aspect of only partial engagement – we are "there" but can keep a safe distance and allow our presence to be unseen and unnoticed. There is a certain pleasure in these small acts of voyeurism, but my belief is that being seen and acknowledged in a space is a much more gratifying and consequential experience.

When going to the physical installation, our default environment is left behind, allowing for a more dramatic shift in context that can open us up to being present. Audience

responses indicate that the "in-person was much more engaging. The sensory experience of just being outside and being able to move and interact with the installations without having to navigate the web page has no real equal". This response points out that the act of getting into an outdoor context, where our bodies can fully sense the environment and where we no longer need to interact with digital interfaces, is a more effective experience. Furthermore, within the physical installation, our bodies become part of the environment, and we cannot anonymously view as we do on the website, but rather we are put into a spatial relationship with all that is around us. Through being put into this new set of relations with the world around us, our curiosity and sensory experience opens up. A live experience makes tangible the web of relations we are within and makes it new and apparent through shifts in context.

After the installation is taken down and this paper is written, the work itself continues to live. No single project is able to realize every idea and dream that we have for an experience. Which is why the temporal continuation of our work is so critical. Throughout the development of Elemental Media, the design team had a myriad of ideas to improve the experience and to push the work in new directions. Still, it wasn't feasible to implement all of them. One big desire, once COVID-19 has run its deadly course, is to have a larger gathering where music and visuals can bring together a crowd of friends to create a whole new web of relationships. In the physical installation, I also have a desire to create more dynamic interactivity, and to achieve this I intend to experiment with a range of different sensors and input devices. Some possibilities include having touch sensitize plants that respond with light and sound or creating a mobile friendly application that allows participants to control the space, or having environmental sensors that gather data

on the sun, air, water, and earth and have this also affect the installation. The possibilities are many, and I will continue to create work exploring what has started in this process.

When beginning my graduate degree, my goal was to find a practice and a process that I could take with me for the rest of my life. I wanted to discover how and why to make work that matters in this wild world. Through creating Elemental Media, researching, and being in a community of thoughtful humans, I have discovered that relationships are at the heart of living systems. As a live designer my role is to create contexts that allow for relationships to form between beings and, through this practice create more integrated and diverse ecosystems.

From Left to Right:

Figure 22: Backyard Before   *Source:* Zillow

Figure 23: Backyard After   *Source:* Michael Bruner

APPENDIX

AUDIENCE QUESTIONAIRE

Thank you for attending the Elemental Media Installation! Your feedback is a valuable part of this research study.

This survey is completely anonymous, and your contact information will not be collected when you submit this form. Any response you provide will be used in the research study and may be quoted. You may respond with as much or as little information as you like, and you can skip any question you do not feel comfortable answering.

1. Please select an option below:

     a. I consent to anonymously providing my feedback for this research study

     b. I DO NOT consent to anonymously providing my feedback for this research study

2. Did you experience a sense of community / have an encounter with someone new?

3. Did you feel connected with the environment and other people in the space

4. Favorite aspect of the experience?

5. Any difficulties? How easy was the space to navigate and interact with?

6. Did anything not go well during your visit?

7. How long did you stay in the installation?

8. Any other feedback you'd like to add?

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