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PREPARE TO PIVOT: SHIFTING FROM THE PROJECTION SURFACE TO THE
ZOOM SCREEN NECESSITATED BY GLOBAL PANDEMIC

By

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BA Theatre, University of Montana, Missoula, Montana, 2017

Thesis

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for the degree of

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in Theatre

The University of Montana

Missoula, MT

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Prepare to Pivot: Shifting from the projection surface to the Zoom screen necessitated by global pandemic

Chairperson: Dr. Bernadette Sweeney

Abstract: Design for theatre is an endeavor in which the physical, the corporeal, the defined, is applied to an ephemeral artform, one meant to happen only in the moment and then fade away. As such, building the world of the theatrical space, whether physical or digital, is similar to shooting at a moving target. While one angle of approach may be perfect for a moment, being ready and flexible enough to pivot, whether to reimagine due to limitation or to adjust an entire project due to calamity, like the shift from in person to online streaming. This paper investigates the joy of research, the growing pains of development, and then the labor of reshaping and rebuilding a projection design when the Covid-19 pandemic forced a rethinking of live performance. Chapter 1 explores the excitement that comes from diving into the exploration of first concepts of design, with the beginner's mind engaged. Chapter 2 is a discussion of virtual filmmaking and how the game building software Unreal Engine is being utilized in the film world, as well as how these relate to theatre. Chapter 3 takes us on the ride of The Pivot as a pandemic forces changes in scripts and platforms. Chapter 4 deals with the balance of choices in design elements as they relate to projection in a live space versus the Zoom live stream, specifically, motion/stillness and geography building in a 2D platform. Finally, by maintaining a level of flexibility in design and approach, the pivot allows for new outcomes and unexpected discoveries.

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Prepare to Pivot:

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David Mills-Low

Forward:

Why theatre?

I toured with a theatre company from 2000-2006, the Vigilante Theatre Company based out of Bozeman, Montana. We toured the North West, performing for small town arts councils to international corporate events and everything in between. One of the shows that we had on the road was called, *The Ever Intrepid Traveling Clark And Lewis Show: An Epic Extravaganza on a Less than Lavish Scale*, a musical comedy written by Tom Morris and Greg Keilor. *The Clark and Lewis Show* was two hours of madcap comedy, exploring the Lewis and Clark Expedition from every angle imaginable. Our history was accurate. Our delivery was outrageous. The four actors in the company portrayed dozens of characters in quick succession. If one of us was backstage, we were generally doing a quick change, running a sound or light cue, doing a voiceover, or all of them at once, sometimes in 2 or three layers of character and costume. We often joked with audience members after the show that the premium tickets were for the show backstage.

But the audience was never privy to the madness backstage. The magic is the surprise. The cast of 4 that seem like a cast of thousands. The juggling of characters. The seeming impossibility of a perfectly executed quick change. The turn from riotous laughter to the catch in the throat as the lights dim to a spot of light on a lone performer and a guitar and a ballad that sings of a lost age or a lost love. For me as performer, the magic is to be up on that stage, letting the song or the lines or the moment slip through me like electrical currents, aware of the faces in the dark but not aware of the faces in the dark, caught up in the sacred dance that tiptoes across the profane. For me as a director, it is putting my actors into motion like cogs or gears or tops, helping them to find the energy lines of the story and then slipping away as it's time to share this whirring machine with the audience. For me as the playwright, it is agonizing late nights for months and months, alone with characters that burn with passion and pain and love and lust and longing. For me as sound designer, it is auditioning a thousand doorbells to find the exact perfect doorbell for the moment, the one that makes the audience startle every time it rings.

We watch theatre because the sublime nature of liveness, of human bodies orbiting one another in space in real time, with every chance that all may fall apart. It is a miracle when it all works. And it is never the same twice. It is the celebration of the unrepeatable.

I don't have a favorite play. When asked what my dream role is, to act, to direct, whatever, my answer is always "the next one."

As I compose this thesis, it is as a multi-form theatrical and media practitioner. This document is the result of learning through doing, practice as research. It is the culmination of a year working on a play and then analyzing the results. It is the culmination of 4 years of grad school, studying Theatre and Media Arts, focusing on digital media in live performance and 360 filmmaking. It is the culmination of 22 years working professionally in theatre, studying how meaning is made through proximity, how to move bodies through space to greatest effect, and how to say stories more gooder¹.

I use a number of terms and phrases that I want to take a moment to define or clarify, either the basic meaning of something that is a niche endeavor or to avoid confusion over my off kilter use of the term. They are as follows:

Virtual Filmmaking- This is a practice that perhaps stems from gaming and computer animation. It is, on one hand the use of virtual cameras inside of an animation program or gaming engine such as Unreal Engine, to shoot sequences within the virtual environment which are then exported and treated as standard media video files. This is how Pixar and other studios "shoot" their animated films. Virtual Filmmaking also applies to a practice of real-world filmmaking in which filmmakers utilize LED Walls to surround performers with a virtual environment on a set and then film the performance, replacing the need for location and green screen shooting. Much more on this in Chapter 2.

The Pivot- When I talk about pivoting, I am referring to the dramatic and often abrupt change in direction that projects sometimes have to undertake in order to continue to fruition. In the case of this document, I'm talking about the pivots that we had to make in the design and production elements of a show effected by the COVID-19 pandemic of 2020. Pivots come in all shapes and sizes. The idea of pivoting came to me from a Junior High basketball coach who taught us that by planting a foot and pivoting, we had a greater range of motion to work with than if we planted two feet. The pivot allows one to change direction and move around obstacles while still maintaining a certain amount of momentum.

¹ I am also a clown. I can't help it. I have a note from my doctor.

Gamification- When I talk about gamification, I'm referring to adding the tropes of video games into my projection design in order to underline the game aspects of the fantasy realms that our characters enter. This is not the way that a game developer would use this term, referring to the building of reward and feedback into a system in order to use the elements of game theory. This misuse stems from not having found a better term to refer to my process. It was a term that worked alright in production meetings but caused confusion as soon as I shared it with people familiar with programming.

Coding languages- I'm not going to go deep here as I don't have much depth of knowledge to work with, but I do talk about language-based versus node-based coding. Language based coding involves learning a language, this could be Java, Python, or C++ or many others. This language allows the programmer to input directly to the computer using a series of if/then statements. A node-based system takes some of the typing out of the system and tends to be more visual. Instead of typing in a code command, nodes or blocks of pre-written code are linked together to form a chain of commands that can then be affected by changing the variables of the nodes.

Theatre is a collaborative effort. Though I tend to talk about what I personally was doing, what my results were (it's my thesis after all), I want to talk about and thank some of the people on whose team I had the privilege of working. I'll talk here about the individuals that I worked most closely with. (I'm working my way through the group in the order that they appeared in the playbill.)

Jadd Davis lead the team as Director. At the time, Jadd was a third year, M.F.A. candidate in directing. He has an extensive resume as a performer and vocal coach and brings his experience and enthusiasm into the rehearsal space. While I don't doubt Jadd's ability to lead a show in a live setting, I think that the challenges of moving to an online platform for school, rehearsals, and the amount of vocal coaching he had on his plate at the time, posed a very real threat to his ability to continue to function in the show. The fact that we had a team in place that had as much experience as we did was a huge factor in how the show eventually found its footing. Jadd's graciousness under pressure, the trust that he placed in his team, and the ability to accept advice when he was out of his depth allowed us to set ego aside and get down to the business of mounting a show during "unprecedented times." We were able to come to the

consensus that we both had the best interests of the production in mind, which allowed him to trust that the questions that I doggedly asked and the suggestions I dropped into the ring were all part of working in support of the show. The process was stressful, especially as we rocketed into a tech week that was unlike anything any of us on the team had experienced before, but we were able to make our way through with grace and dignity because of the leadership and example that Jadd offered.

Jacquelyn Simonis acted as Scenic Designer on this production and proved to both be willing to play with the ideas of others while still bringing her own ideas to bear. She also showed a great adeptness at pivoting, which is an extremely valuable attribute in this field. In our first meetings, as the designers were offering up our initial inspirations Jacquelyn latched onto the idea of the Dungeon Master's screen, which I brought into our production meeting as one of the pieces of paraphernalia of D&D. She not only designed a lovely set based on this concept, which would have worked beautifully as a projection space for me, but she also made the screen a functional playing space in which the DM could rule over the game while maintaining a distance from the action. And when we switched to online presentation, she good naturedly dropped her design, and began working in the digital realm to design and collect images of bedrooms for the "real world" virtual backgrounds for all the characters. She did such a good job, that the virtual rooms looked better and more convincing than the actor's actual bedrooms. It was a pleasure to work with her.

Lara Berich, our faculty Costume Designer, is an absolute rock star who is a wealth of ideas. Their enthusiasm and expertise is infectious. Lara knows more about the intricacies of a Singer sewing machine than any other human being I know. I would work with them any chance I get.

Lighting Designer Hannah Gibbs is an M.F.A. candidate in Lighting Design. We started talking early in the process about how we were going to engage in the dance between lights and projections. We broke down the script and decided which area would shine in which scene, so as not to compete in scenes. By moving this conversation into the planning phase, we were set to save hours of conversation and adjustment when it came to teching the show (the process of getting all of the technical elements into place for a production, something that usually happens in the final week before opening). But after the pivot Hannah had probably one of the biggest

adjustments to make of any of us as she was now responsible for providing a lighting plan for the entire script, including having individual lighting plots for each performer's home "studio" space. She handled the shift with grace and aplomb, another rock star.

Dr. Bernadette Sweeney was Jadd's mentor as a director, but has also acted as my academic advisor, a mentor, and as my Thesis Chair. I don't think that the show would have been as strong without her steady guidance. And I don't know that I would have made it through the last few years without her wisdom, wit, and expertise helping to keep me on the straight and narrow. Thank you Ber.

Lastly, I want to thank/mention Mike Post, my faculty mentor on the show, as well as the mentor for Hannah Gibbs and Liam Mayer, our Sound Designer. Mike stepped into his position in The School of Theatre and Dance just in time for all hell to break loose. And while all of the faculty and staff in the School sprang into action to keep our educational ship afloat, Mike was also tasked with taking the lead on transitioning our shows to an online format and acting as a multi-form tech guru. His calm advice and sense of humor in the face of adversity let me keep moving forward while trusting that I was in good hands. And having Lighting, Sound, and Projections all building to a shared spreadsheet in Google Sheets was an inspired move that had us working from the beginning of our build processes, making decisions informed by what the others were doing, which in the end saves tons of time in a paper tech. It's not appropriate for every show, but is a tool that I'm going to carry with me moving forward. Thank you Mike.

Intro:

I didn't mean to be a designer. I came to it as a result of being a theatre artist in a state that has precious few theatre artists. I began as an actor, added playwright to the mix, then director. Before I knew it, I was doing everything from Sound Design to Light and Scenic Design and finally, Video Projections. Each new hat came from a necessity in a production that I was working on. If I feel that I can do the job, I'll jump into the ring.

I produced my first sound designs while touring with the Vigilante Theatre Company. The Vigilantes performed an all-original repertory of plays, written for us by regional playwrights. I had taken over the roles of the actor who preceded me. But just as I stepped into his shoes onstage, my predilection for music and sound made it a natural fit that I also took over his role as the resident Sound Designer. 20 years later and I've lost count of the number of shows that I've designed. When video was added to my list of endeavors, it was not as great a stretch. I'd spent some time in film school in my youth and the camera has never been far from me. My first time integrating digital projections into a show came as a necessity, as the plot of the script that I was directing (and acting in as well as sound designing--the hats we wear in summer theatre...) depended on the information contained in them. Lighting and Scenery, on the other hand, are an area that I am much less comfortable designing, something that I have taken on only when there was no one else available to take on the job. My point is that all of my design influences and choices come first from the script and are in service to the story. That is not to say that I never deviate from the media called for or described in the script. Sometimes playwrights and directors make banal or cliché choices, I should know, I've been both. But I don't start designing until after I've walked the pages of the story I'm approaching.

My first step is to read the script. This seems obvious. But the intentionality of approach is the key. I read, not wondering what I am going to say or how I am going to move my actors, or

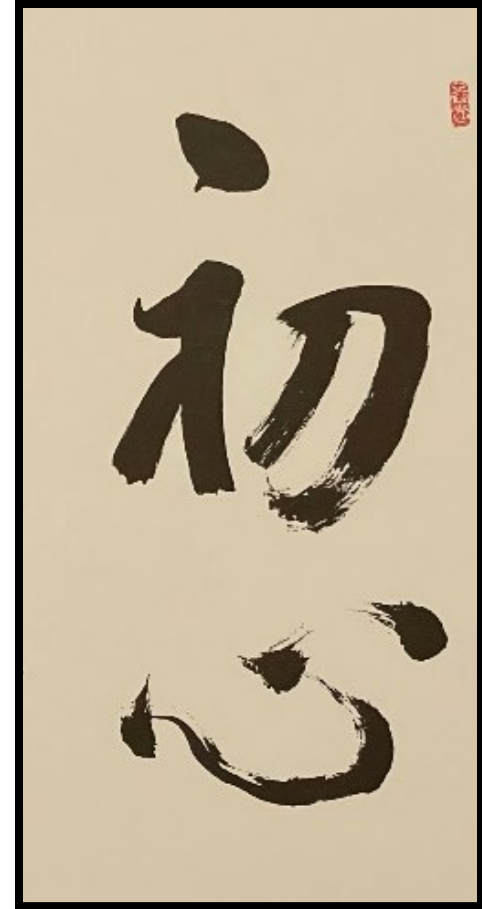


Figure 1: Calligraphy of "The Beginner's Mind" as it hangs on the author's wall. Photo: David Mills-Low.

more germane to this discussion, what images I'm going to throw into space. I try to read with the openness of the beginner. In the practice of Zen Buddhism, the idea of the beginner's mind is a central tenant. The beginner's mind is "the innocence of the first inquiry...The mind of the beginner is empty, free of the habits of the expert, ready to accept, to doubt, and open to all the possibilities." (Shunryu, xiv) To read with the beginner's mind is to keep your mind open and ready for the visions that come screaming from the text. The beginner's mind is the actor's mind, open and ready to respond. When inspiration appears, I'm ready to follow where it might lead.

If I may be excused another metaphor, the beginner's mind is the mind at rest, waiting for the shove of the idea. Newton's first law of theatrical design.

While my mind runs a constant gamut of tangents, for the sake of clarity, this document will focus primarily on a design that I took on as my Final Creative Project, the capstone to my M.A. in Theatre, the UM School of Theatre and Dance Autumn 2020 production of *She Kills Monsters: Virtual Realms*. I've broken this discussion up into four chapters, each dealing with an element of design, my areas of research and expertise, or both.

Chapter 1 dives into the idea that design enhances storytelling. While this may seem obvious, I have been involved in countless productions over the years where the answer to a question is, "That doesn't fit in with my design/directorial vision." By putting "The Vision" before the story, we weaken the cohesion of the story we present to the audience. My first job, as designer or collaborator, is to bring ideas. My second job is to let go of those ideas if they do not make the production stronger or more coherent. In this chapter I celebrate the idea and how it arrives.

Chapter 2 is an exploration of new tech and what they mean for the future of Film, Television, and Theatrical productions. I deal mainly with the advent of virtual filmmaking as it is being developed through productions like Disney +'s *The Mandalorian* and how these advancements not only mean a sea change for the way that mass entertainment is made, but that these developments also mean a democratization of tech for independent filmmakers and theatre companies. Using Unreal Engine, the virtual filmmaker's equivalent of God creating the universe by using digital Legos, to build photoreal, dynamic landscapes is a practice that isn't just the purview of major studios. With the right equipment, I can create worlds for use as digital artifacts in theatre that expand the tool set of the art form.

In Chapter 3 I discuss “The Pivot,” what that meant for the production, what that meant for me personally, and what that has meant for the theatre and film industries as a whole. I delve into what happens when a pandemic hits, forcing a move from live performance in a theatrical space to recorded live stream on the Zoom platform. This involves investigating the changes that had to be implemented because of the limitations of a new format and variations between versions of scripts. I also explore the differences between the photo-realism of a projected image contrasted with the hyper-realism of saturated colors on a computer monitor as they occurred in this particular project.

Chapter 4 looks at the demands of motion versus stillness that grow out of story telling modes and a quest for the cleanest way to tell our story to our audience, moving step by step through the theoretical and actual process of building geography for an audience watching on Zoom. This includes 3D world building, 2D capture of points in 3D space, and the implementation of virtual background as a marker for geographical location. It illustrates the process of moving from a mediatized space, the theatrical production with media inserted, to the intermediated performance, in which the media is the theatre and the theatre is media.

Chapter 1: Design in Service to Story Telling

1.1 Context

On February 20th of 2020, I received an email, (Sweeney, 20) from the interim Head of Practice and Performance in Theatre and Performance Studies at the University of Montana, my graduate mentor, Dr. Bernadette Sweeney. I scanned the contents, a notice that two of the shows in our upcoming season had shifted positions. *Mother Courage* by Bertolt Brecht was to move to the Spring 2021 semester and *She Kills Monsters* by Qui Nguyen² to take its place in Fall 2020. At the time I was 2 ½ years into an MFA in Media Arts and 1 ½ years into an MA in Theatre, part of a plan to cram five years worth of school into four. Because of the concurrent nature of my two degrees, and the research based as opposed to performance based nature of my MA, I



Figure 2: From the tech rehearsal of *Assassins* at the University of Montana, 2019. Directed by Randy Bolton. Photo: David Mills-Low

² We'll be talking about this one a lot, as well as the alternate script, *She Kills Monsters: Virtual Realms*. Qui Nguyen, *She Kills Monsters* (New York, NY: Samuel French, 2016).

was trying hard to keep myself off stage and out of the rehearsal process for my last couple of thesis writing semester. During the preceding semesters, I designed sound for The Montana Repertory Theatre's Education Outreach tour *Morgan and Merlin* (Laramie Dean, Fall 2018) acted in *Summer and Smoke* (by Tennessee Williams, Fall 2018), co-designed and operated projections (as well as designed sound) for *Assassins* (Sondheim and Weidman, Spring 2019), designed sound and projections for the Rep again with *Love that Dog* (Fall 2019), performed



Figure 3: Hudson Therriault in *Love That Dog*, the Montana Repertory Theatre's 2019 Education Outreach tour. The bulletin board is a projection that shifts and morph's throughout the show. Directed by Hillary Bard. Photo: Justin Philalack

Cascando (Samuel Beckett, Fall 2019) as the multi-media thesis of a fellow grad student and, when the email arrived, was working as dramaturg on *Twelfth Night* (Shakespeare, Fall 2019).

On a whim, I decided to read *She Kills Monsters* to see if it spoke to me as a final creative project, a projection design. Plans had already been made for my thesis. But, you know,



Figure 4: Aimee Paxton and David Mills-Low in *Summer and Smoke*, directed by Dr. Bernadette Sweeney, Fall 2018. Photo: Terry Cyr

just in case... As I read, my brain exploded. I contacted the director to see if he wanted projections and mailed my mentor, Dr. Sweeney:

“Jadd CCd you on his last email to me and I believe talked to you this morning. I wanted to chat with him, just to see if he's interested in projections for *She Kills Monsters*, before I officially threw my hat in the ring. Getting your email about the schedule change in the season was exactly the catalyst that I needed to make my final decision on how I want to approach my final project and thesis. I will come in Wednesday morning to discuss all of this face to face, but I'm very interested in doing the projection design for *She Kills Monsters* as my final creative project for my degree. It is the show in the season that really screams at me as being an opportunity to put into place many of the techniques that I'm researching and will allow me to speak to a vast variety of projection approaches during my time here. And if we do it right, it will add a wow factor to the show that will boost the fantastical nature of the role playing scenes, while complimenting and stepping out of the way of the "real world" scenes.

Jadd says that we need to talk to P&P first. Let me know what I need to do in order to make my proposal. Thank you for the inspiration.” (Mills-Low, email correspondence 2/24/2020)

1.2 Overviews

1.2.1 A note on dual texts used in this production.

The day after I wrote the email above the Centers for Disease Control said that COVID-19 was headed toward pandemic status (AJMC Staff, 2021), but we didn't have our first confirmed cases of the virus here in Montana until March 13th. In fact, even when we went into lockdown here in Montana, the cases were still in the double digits and it felt like Montana might be largely unscathed. Numbers in the state didn't start to skyrocket until the summer of 2020. As such, I spent the first 2/3 of my design and build process, planning for social distancing and mitigation measures as we mounted *She Kills Monsters* (hereafter *SKM*) as a live and in-person format. We didn't move to script number two, *She Kills Monsters: Virtual Realms* (hereafter *SKM:VR*) until mid-July of 2020, as we shifted to an online format.

A document such as this one would normally deal with only the produced script as that is the version that the audience saw. I made the decision to cover the two scripts in this case, as this endeavor was almost like working on two different productions, rather than being a single, unified process. The research and discoveries from the first period of work inform and expand those of the second period, but the aims were quite different.

1.2.2 The plays

She Kills Monsters takes place in 1995 and follows the very average Agnes Evans whose parents and 16 year old sister Tilly perish in a car crash on the night of her graduation from college. A year passes. Agnes starts shifting through the ruins of her past. She discovers a homemade Dungeons and Dragons module³ in her sister's room. She takes this module to her local game store to find someone to help her decipher it. The store's resident DM (Dungeon Master) Chuck Biggs, takes on the task of guiding Agnes into the fantasy realm that her sister had created. Over the course of the play, fantasy and reality begin to blend as Agnes jumps in

³ A module is a pre-made outline for a campaign that a Dungeon Master uses to run the game for their players. This differs from normal game play where a the Dungeon Master creates their own story lines. A module is designed to be run by someone other than the creator, sort of a blueprint for the story line, inhabited with pre-determined characters.

and out of the game. Through role play she begins to get to know her sister in ways that she never had a chance to in life, all while gaining an appreciation for the “uncool” fringe that is “nerd-dom,” the value of fantasy, and the lifeline that the imagination offers to those who live on the outside of “normal.” The adventure includes a great deal of epic fighting of magical creatures, investigations of sexuality, reckoning with life and relationships in the wake of tragedy, all couched in mid-nineties nostalgia. Music, period references, and the trappings of nerd culture set our story in a very specific time and place. As the story wraps, Agnes defeats the dragon, wins the campaign, and learns that perhaps story is the final resting place of the soul, the place we go to celebrate those loved ones who have gone before us. In the words of the play, “This story came from my soul and by breathing life into it, who knows? Maybe a bit of my soul gets the chance to breathe for a moment once again.” (Nguyen, 82)

She Kills Monsters (SKM) received its world premiere in 2011, at the Flea Theatre, an Off-Off-Broadway Theatre in New York City. *She Kills Monsters: Virtual Realms (SKM:VR)* received its world premiere performance in May of 2020, about 2 months after the Covid-19 pandemic shut down live performances across the United States. This script was a hasty adaptation of the story for performance in an online, socially distanced, streaming platform, incorporating some touchstones of the *She Kills Monsters: Young Adventurers Edition* in which, for instance, Agnes is a high school cheerleader instead of a 25 year old, high school English teacher. While *SKM* took place in 1995 and is steeped in ‘90s nostalgia and nerd culture, *SKM:VR* takes place in the present day. (Nguyen, 2020) *SKM* has 16 scenes, *SKM:VR* has 21 (There are two scene 3s in the script)

The story: Agnes is a cheerleader, who has an annoying younger sister. In her Junior year, Agnes says, “I wish I didn’t have such a geeky sister” (Nguyen, 2020)⁴ and as the script says, the gods answer her wish and her sister dies in a car accident. A year later Agnes discovers a homespun module, as per *SKM*, but in this version Chuck, the DM, is a high schooler who runs an online D&D game. Agnes’s best friend Vera is a “goth” cheerleader who sucks at Calculus, and Agnes’s boyfriend Miles is a football player. Most of the plot follows the same basic trajectory, but is written to take place online, as if the characters are interacting on Zoom or in

⁴ In the original Agnes says, “I wish I didn’t have such a boring life.” (Nguyen, 2011) Agnes is kind of an asshole in *SKM:VR*.

online chat platforms. A lot of the epic monster battles from the original are simplified, or cut, just leaving us with the main bosses of Farrah the Fairy, Evil Gabbi and Evil Tina the Succubi, Miles the Gelatinous Cube, Vera the Beholder, and Tiamat the five headed dragon. (We lose Bugbear and Kobold fights where Agnes learns to fight or die in the game as well as to respect her younger sister's powers.) In *SKM* the Narrator bookends the show with an opening and closing monologue as well as introing or closing a couple of scenes,⁵ but she is used to deliver exposition throughout *SKM:VR* and even at times trades off lines with Chuck the DM, which shifts the dynamic from that of the omniscient narrator of the fairy tale to a pseudo-active participant.

Full disclosure: I find *SKM:VR* to be a weaker script, with many plot holes and mistakes. (For instance scene 19 aka 20 begins as if the characters are in the same physical space but ends in an online environment.) For me it lacks the richness of the pop culture nostalgia of the original and the game play loses much of the detail that drew me to wanting to build the worlds of *SKM*. The handling of sexuality and gender are dealt with through a more modern lens, which is at times a little clunky, but also a little less cringy than perhaps happens in the original. But *SKM:VR* also loses the context of a time in which this nation was slowly learning how to acknowledge “the other,” and minimizes the fight for the right to be accepted, to be one’s self, the pre-“Woke” 1990s. *SKM* made me cry. *SKM:VR* made me work more because of what seems like miniscule changes. (The Underworld shifts from “...a dark cave lit with only torches, Orcus... sits reclined on a throne of skulls and bones” (Nguyen, 2011) to “Narrator – Agnes follows Tillius into Orcus’s dark and dank cave. Chuck – It’s moist AF in there.” (Nguyen, 2020) As I had already built and shot Cave 1, this edit meant scrapping Cave 1 and building Cave 2 with a complete shift in lighting and materials.

My opinions on the script are in almost direct opposition to those of the director of our production, Jadd Davis. Shortly after our move to online was decreed, Jadd and I ran into one another at a park near our respective houses. We had a short, but enlightening discussion (properly, socially distanced of course...) on this very subject. While I don’t remember all of the exact details of our chat, what I came away with was not a feeling of despair, that I hadn’t been

⁵ The director and I decided to use this character as a pre-recorded framing device for the show, with none of her monologues happening live. We had to change gears on this for *SKM:VR* as she is in much more of the show.

able to persuade him of my position, but rather a sense of optimism, that he was entering the process with a strong passion for the story, something that is vital for a director, as it is their passion that in turn feeds and guides the actors. And my sense of hesitation and scrutiny would be serving me, in that I was going to be entering the process with my eyes open for troubles and my passion focused on problem solving. I believe that this dichotomy is actually a very strong position for a production team to be in. It illustrates how the collaborative nature of theatre is more like the crew of a ship, with the director steering the ship, but also the lookout pointing up ice bergs and the engineer reporting in on the status and capacities of the engine. If everyone thinks the script is brilliant there is no room for improvement.

1.2.3 Personal notes on how to make the shift

Any time I work on a show, I ask a lot of questions and make a lot of notes. Some are for me, to make sure I've gotten the mental wheels spinning, some are for directors, other designers, and occasionally whoever will listen, my partner, my dog... Nothing is quite so satisfying as

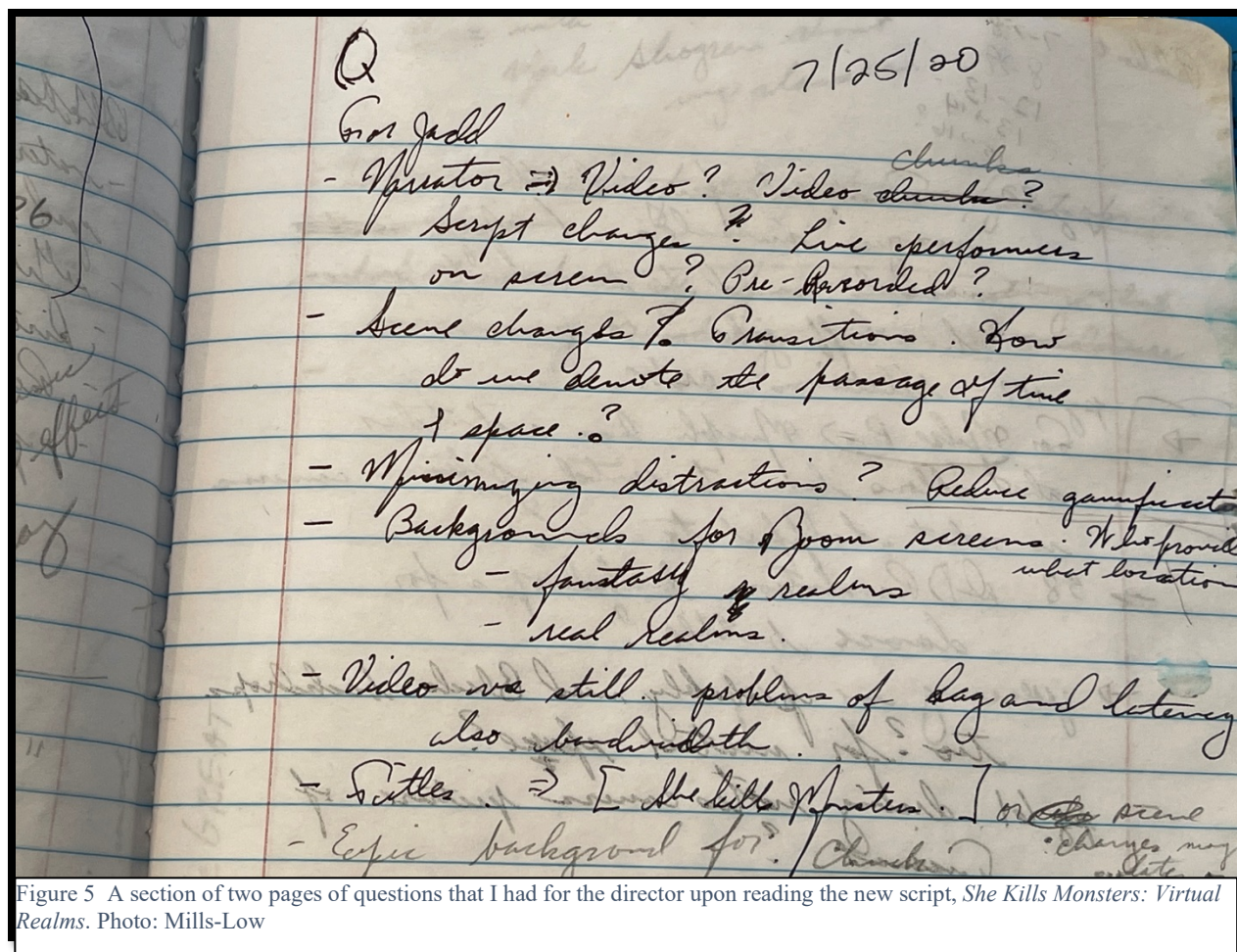


Figure 5 A section of two pages of questions that I had for the director upon reading the new script, *She Kills Monsters: Virtual Realms*. Photo: Mills-Low

going back through old notes and seeing what's been done, check-marked, or crossed out because it was answered or completed. The *SKM:VR* transition happened so fast that many of my notes are untouched or repeats, as I sometimes only got answers much later or not at all.

The shift from performing in a theater, in front of a live audience, to performing online, on the Zoom platform, with the addition of the shift to a new version of our script required a number of changes in approach and re-design of elements. The most dramatic change came in the manner of presentation.

When matching up my ideas of projection and projectable surface, with the designs put forward by the set designer, I began sketching how we might start working with light on shapes. While I tend to explore my design process through writing and exploration of materials, I do

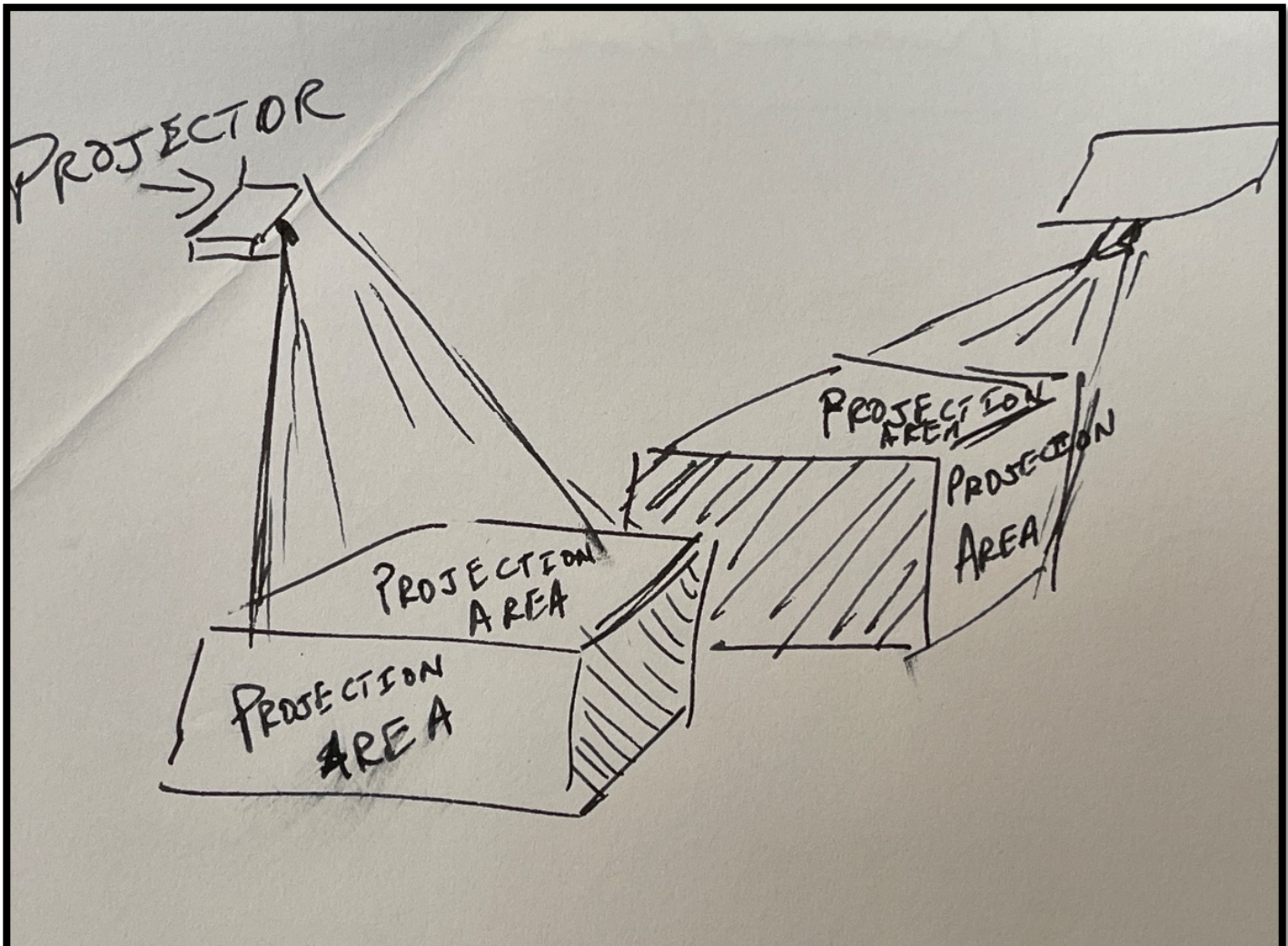


Figure 6 A basic sketch showing projection surfaces and how multiple projectors are necessary to create 3D for an audience that surrounds the stage. Multiple projectors are required because of the multiple POV of audience, something that can be simplified in a Proscenium staging.
Photo: Mills-Low

sometimes work out ideas through sketches. Figures 6-8 are a series of sketches that illuminate a technique of transforming the stage into a landscape. My intention was to take elements of this blocky set, that somewhat resembled a game of Tetris, and transform it into landscape through projections. For instance, a block that is a table in the “real world” becomes a rocky outcropping on the edge of a stream in the fantasy world. (Figure 6)

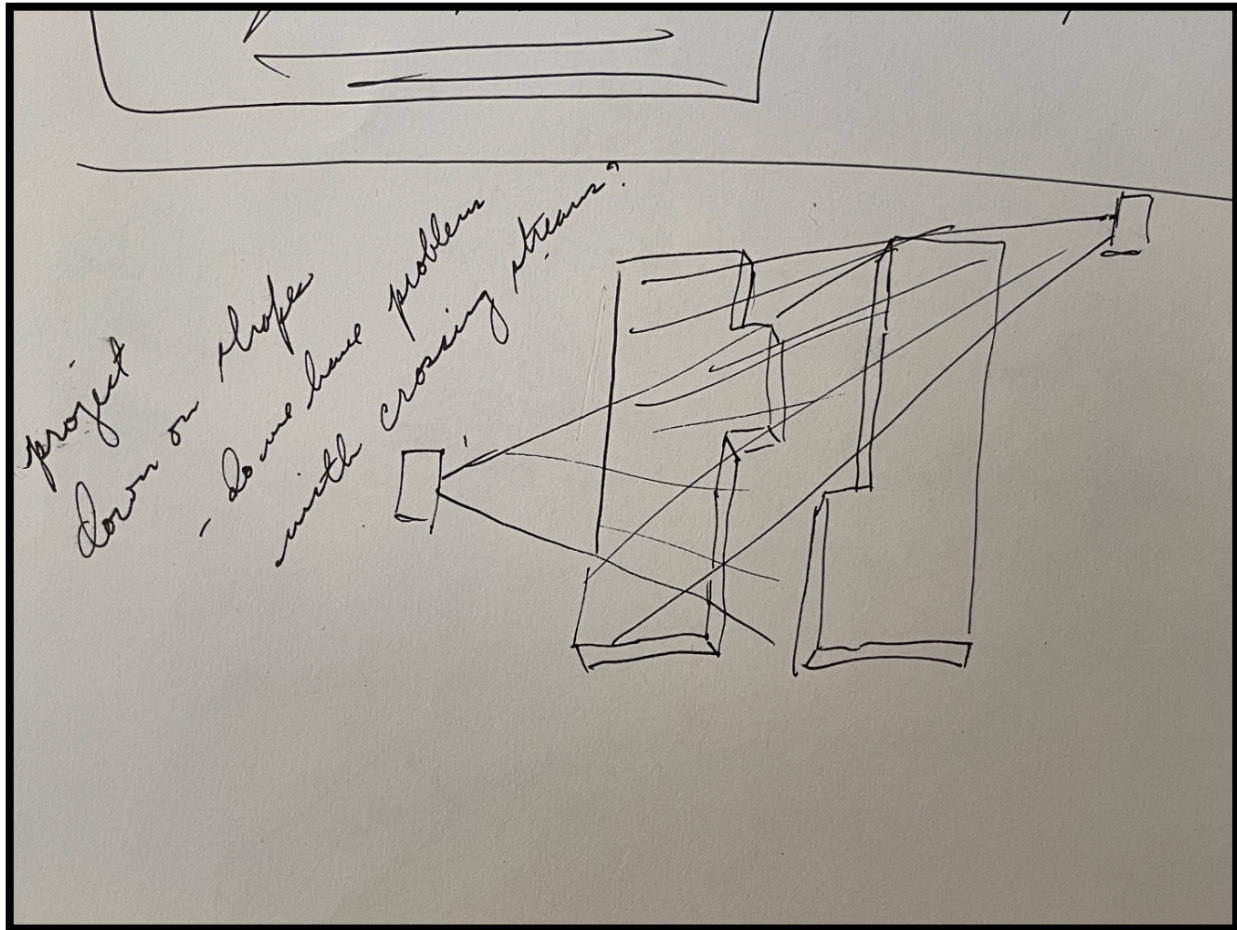


Figure 7 This is a quick sketch that I made for the director, showing how the stage could be lit with projectors, changing the landscape that the actors were walking on. My note mentions the research cue to see if there was a problem with crossing streams of projectors and whether that would negatively affect the light. In order to achieve this spill, the projectors shoot to the platform opposite, meeting in the middle of the recessed area. The raised platforms were proposed at 8” high, or the raise of a standard stair. Photo: Mills-Low

This next image is slightly more refined (Figure 7) in that early sketches of the stage were being explored. At this point I was starting to figure out how to create a specific forest landscape to fit into the raised platform idea of the set. My plan was to place elements, the banks of a stream on the raised areas and a flowing stream in the recessed area for Scene 6 of the show (Nguyen, 34) In order to achieve the 3D nature of this landscape as well as light at least a

majority of the playing surfaces for audience that would be on 3 sides of the playing area, I needed at least 2 projectors hitting the space.

The final image (Figure 8) is a quick render of the proposed set coming from the scenic designer. The set piece at the back is a reference to the Dungeon Master's screen in Dungeons and Dragons gameplay. We were first hoping to do backlighting on the screen as it can cut down on certain glares, as well as hide the projectors behind scenic elements. But the design shifted to having a playing area above and behind the middle screen, which forced us to move to front projection in order to minimize shadows and fighting with structural elements, while maximizing projection space. We were, at this point in the process, looking at a total of 5 projectors for the show. It's possible that we could have dropped to 1 set projector and two floor projectors,

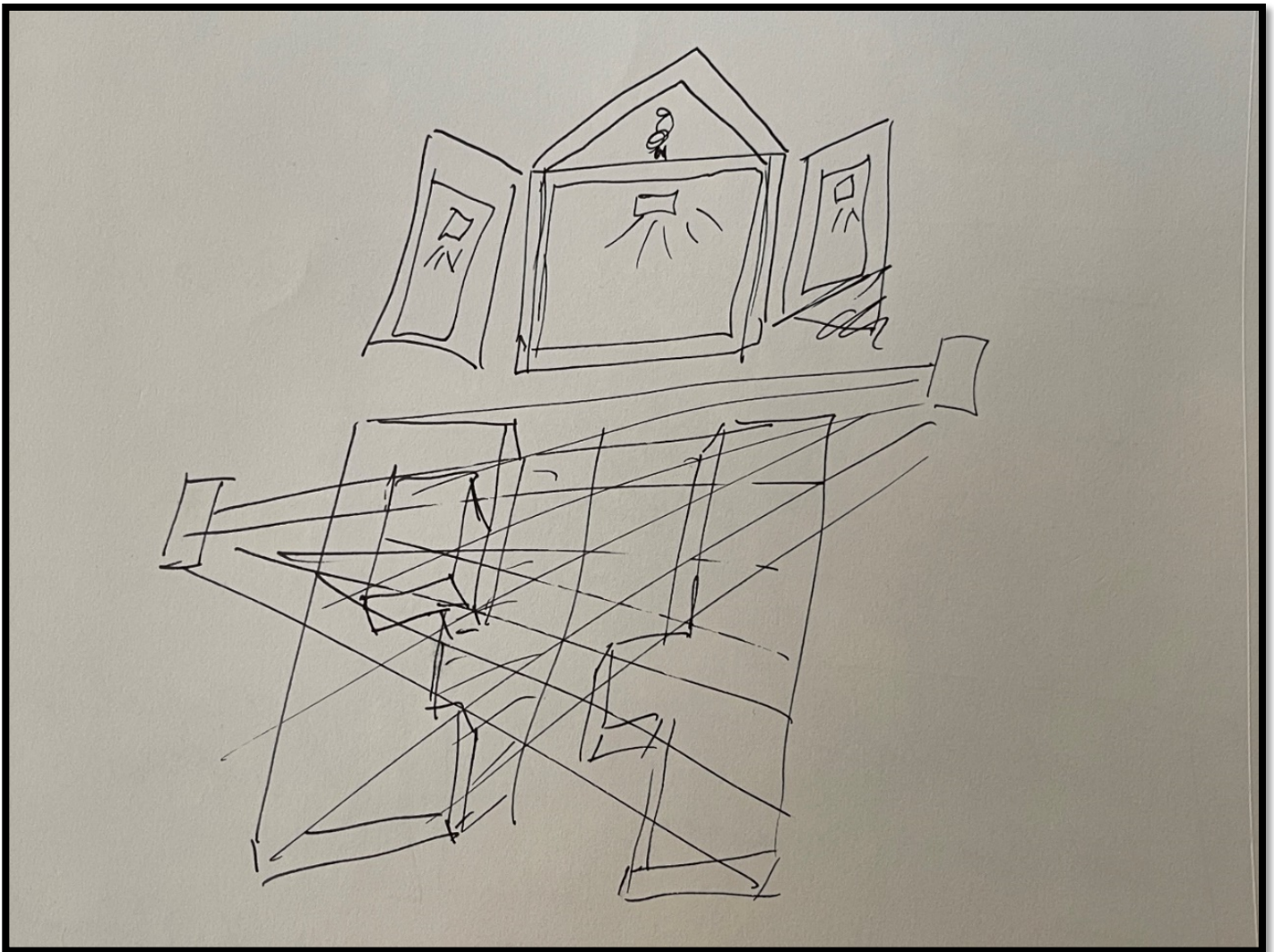


Figure 8 While my drafting skills are pretty rudimentary, I think they get the idea across. Mostly they serve as mental bookmarks that I can refer back to. Photo: Mills-Low

depending on the units we used. The Pivot happened before we were able to start testing our limits and fine tuning our approach.

Gone were the 5 projection areas. My landscapes would now be an ever-diminishing area on the viewers screen of choice, shrinking exponentially depending on the number of actors on the screen, and hidden behind the performers as Virtual Backgrounds. I had also built my cue sheets for *SKM*, integrating them into the master cue sheet for Sound, Lights, and Projections. (These three areas were all building with an eye to what each was doing either alongside or independently of the others, and with the intention of building all of the sound and projection cues into the same QLab project so as to streamline the running of the show.) This entire list had to be re-imagined as well as constructed anew. Because we moved from the theater to Zoom, the actors were now going to be doing their own scene changes in the form of shifting their Virtual Backgrounds every time we shifted location, sometimes multiple times within a scene.⁶

I made a number of decisions on shifts and cuts to the scope of elements that I would be attempting in the show. As soon as we shifted to Zoom, I knew we were going to have to start minimizing distractions. This especially referred to the gamification that I had been planning. In media theory, there are a number of findings that relate to learning and media. The Redundancy Principle is one of these, a curious effect that seems to offer sometimes contradictory results. “Research findings show that using all three, words, graphics and narration... to deliver information, leads to overload and in most cases, is detrimental to learning.” (Martin and Betrus, 2019) Later in the discussion, the authors offer another study in which text and narration together yielded better results than narration alone. My proposal of gamification sits on a See Saw of this principle. With this thought in mind, the gamification of adding text to an already truncated and busy screen only acts as distraction, being a third element and thereby muddying the waters of understanding. Were I to have provided closed captioning however, something that reinforced the audio element of the performance, this example of the Redundancy Principle would actually serve as a tool for the audience to have a better grasp of the information being broadcast to them.

⁶ My spreadsheet for this looks more like the tracking sheet a costumer uses to tell performers when to change their costumes. It had a scene by scene cue sheet for each performer as well as guides for when Stage Management needed to turn off cameras for performers. In fact, I described changing Virtual Backgrounds as being like going off stage, changing your hat, and coming back on again. (Each actor was assigned a crew member who used co-host privileges in Zoom to turn off actor’s cameras in an attempt to sync this function up as well as to give a more traditional blackout feel.)

Likewise, were we back in the original format of large scale projections, adding gamification to the landscape acts as additional information that reinforces the nature of the story being told. In the projection version of this scenario, gamification is background information that can either be taken in or ignored by the audience in the same way that hit points being displayed in a video game tends to be a background action. When moved to the zoom screen, any gamification I might do, moves to a foreground action, pulling focus from the performers and acting as a distraction from the story being told.

Another change that I put forward was to switch from full motion video for the projections to still images for the Virtual Backgrounds. If the pandemic has taught us anything, it's that internet connections are unstable and Zoom is completely unforgiving in the face of any bandwidth issues. In order to minimize strain on computers and networks, I suggested that we streamline our needs by switching to stills. (More on this in chapter 4.) I did hang onto the idea of having one Zoom screen that was dedicated to video backgrounds and other information, proposing that I run this screen from my computer in the Media Arts Grad Lab, where my beefier machine and T1 connection should prove to be more reliable than what most of the actors were calling in from. But by September 5th, about 3 ½ weeks before the filming, I decided that even this would be too much of a distraction and cut it.

Key to a successful pivot? Simplify.

1.3 The Triggering Towns

In his book Triggering Town, Richard Hugo says, “A poem can be said to have two subjects, the initiating or triggering subject, which starts the poem or “causes” the poem to be written, and the real or generated subject, which the poem comes to say or mean, which is generated or discovered in the poem during the writing.” (Hugo, 24) He goes on to say that the triggering town is only the idea that sparks, it is not the story. The true subject owes no allegiance to the trigger. In fact the less you cling to the trigger, the more interesting places your poem will go. This idea was first introduced to me in my first semesters as a poetry student and nascent actor, at the University of Montana, in the early 90's. Over the past 20 some years I've taken this idea and applied it to my creative life, finding that it speaks in other formats as well, plays I've

written, sound designs I've built, and my work as a media artist. The triggering town is the explosion, the impetus, the first inspiration. In this section, I'm going to share a series of "triggering towns," the ideas that jumped out at me from my readings of *She Kills Monsters*. Later I will show how these triggers jumped from sparks and random images to flesh out my designs.

But first, to push metaphor, the script is a road. In the first reading, there is a certain care and pace that allows the story to unfold within a landscape of the imagination. On further readings, this landscape may start to be taken for granted. Or perhaps an aspect of it becomes the sole focus. But on the first time down the path, all the reader's senses are on high alert. Upon turning a corner, a sudden and unexpected vista acts as that outside force, dragging the ride to a halt. You pull the car to the side of the road. The eyes leave the page and turn interior. These are the visions brought on by the triggering town.

1.3.1 An exploration of the towns themselves

The following is a series of quotes from the script that acted as mental triggers for me, inciting a series of visions and a giddy anticipation of playing in the sandbox of technology to create an atmosphere of immersive fantasy for our show. Here we go...

1.3.1.1 Place

"Chuck - Imagine if you will this setting. You are standing on the sands of a mystical beachside." (Nguyen, 14)

This line signals our first major, in-scene change and our first move into a specific magical realm. The opening narration of the play offered a chance to deliver information through sound and video projection, to digitize elements of the world.⁷ This line extends the invitation to build landscapes, and more than landscapes. By that I mean more than just the assets of a set, here's a tree, here's water, here's a hill... Instead we can investigate a geography of place, where landscape has context with a greater world. I'm talking map making. World building.

When I first read the line above, I was struck by two visions, the first being an image of the kitchen in which our characters are standing, magically melting away, the words of Chuck the DM coming to life visually as he speaks. This shift serves multiple purposes, one as a story

⁷ See <https://youtu.be/rwwsFglTnlw> for a demo of a possible opening that I created for the director.

telling tool, coming to the aid of an immersive experience for the audience. But also serving as an entry point into the imaginary world-building of the Dungeons and Dragons game itself, in which the role of the DM is to use verbal imagery in order to paint fantastical, immersive realms for the players. The audience is not only watching the actors embody the role playing game, they are also sucked into the realms of fantasy as well. Transitions from the real to fantasy and back is an element of this place building, but is a topic I will be covering more in depth a little later on. Two questions spring to mind as I contemplate this: Why and How.

First to why. In the prologue to William Shakespeare's *Henry V*, The Chorus intones the wish for an epic landscape upon which to play, "a kingdom for a stage, princes to act/ and monarchs to behold the swelling scene." Then should we have the roaring fire of Henry to share with you, oh audience. They then beseech the crowd, through an explosion of verbal fireworks, to imagine the bare stage of the Globe to be great swaths of land, all bundled within the walls of the theatre, upon which these mighty deeds may play out. In a pre-media world, a world where the spoken word was tied to image rather than to the shape of letters on a page, this entreaty dragged the viewer on the journey, a society more closely allied to the oral tradition than to the written word.

Now skip ahead some 400 years, into a media saturated culture. Words are now tied to letters, vocabulary is gleaned from reading rather than listening. I myself am from a reading generation and learned the majority of my vocabulary from the written word rather than from an oral tradition. (<https://www.dictionary.com/e/words-we-mispronounce-because-we-read-them/>) The image has to fight free of the words. Plays require more effort to read because they are tied to the written word, with the reader having to fill in much of the imagery for themselves. Film, on the other hand, is a more visual medium, images being easier to digest for a visual soaked society. The best screenplays are written as a series of vivid images, with short snippets of dialogue. They are written to be read as a blueprint for what one might see, with an eye forward toward production. A stage play tends to come to the audience (I'm speaking of published scripts, not original productions at this point) from the vantage point of having been produced previously, and any imagery in the action of the script tends to be the transcription of stage manager's blocking notes. It is the blueprint of what once was, with the shape of current form

being found through the rehearsal process. A play is meant to be performed, to be seen from the outside, not to be read. It's as if the audience has one hand tied behind their back. What to do?

One option is to show them. To transport them to the very world that our characters inhabit. This is not necessary for every show. For instance, *Leaving Iowa* (Clue and Manton, 2011) which I directed for the Opera House in Philipsburg, takes place in the present and past of a character re-living and re-tracing the route of the family road trips from his childhood. Our set consisted of a series of representational props that moved on and off the set, all framed by dark velvet curtains. This neutral background let us slip in and out of time and space with fluidity. Our characters floated out from the void, only to disappear like the flash of a fleeting memory.



Figure 9 Suzanne Gutierrez, Kristen Beckman, David Mills-Low, and Jim Sontag in *Leaving Iowa* at the Opera House in Philipsburg, Summer 2011. Directed by David Mills-Low. Photo: Tim Dringle

She Kills Monsters also jumps in time and place, but the fantastical realms that our main

character plunges in and out of mean that splashes of immersive landscapes serve to draw our audience into the world of play and the worlds of the play.

When this is done well, it's magical, like windows opening in a dark room, letting the vista pour in. And the added advantage of building these projected images in something like Unreal Engine is that the elements used, from trees to water, have a built in, variable animation. Trees slowly sway in the breeze. Grass bends and swishes. Water flows or simply ripples as the digital wind trips across its surface. Sculpting of land masses or concretization of caves from stones, is one thing. But building a forest for your characters to stand in that ripples and breathes, is the height of creating an immersive environment.

In the days before reading *SKM*, I watched a behind the scenes video with Jon Favreau, laying out the innovations in virtual filmmaking that was happening on the set of *The Mandalorian*. I found these to be intriguing and exciting to be sure. But when I read Chuck's line above, I instantly had visions of the landscape rolling out over the top of a representational set, *SKM*'s Newlandia crawling out of the belly of Ohio. This carrot was the lure that I needed to dive into Unreal Engine as a complete novice.

1.3.1.2 Gamification/Additional Info

“TILLY – But first you're going to have to meet the rest of our party... First up is Lilith Morningstar. Class: Demon Queen.” (Nguyen, 16)

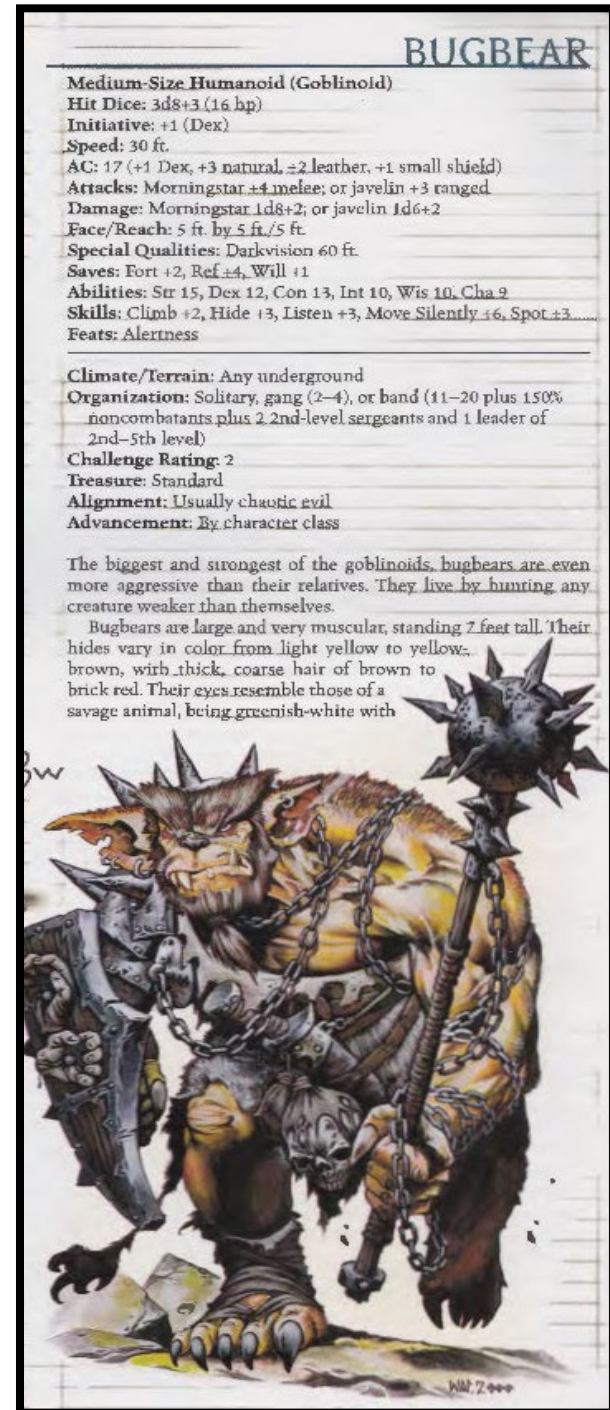


Figure 10 Excerpt the stats of the Bugbear, on page 76 of the Second Edition of the *Advanced Dungeons and Dragons Dungeon Master's Guide*. Photo: Mills-Low.

This is our first instance of an element of gameplay/fantasy role playing, that may not be completely familiar to those uninitiated in the world of D&D, which can reasonably be considered to be a fair percentage of our audience. It is one that is instantly recognizable to the initiated however. This gives us an opportunity to play with a couple of elements. For those who don't know the game, putting text onto the screen in a familiar format, gives them a reference point from which to start. Dungeons & Dragons is a game of stats and descriptors, as well as jokes hidden amongst the numbers. But the stats in D&D are seen in other formats, the backs of baseball cards, the pages of 90's boy band magazines (Joey's favorite color is ripe banana...), or any other form of popular nerdery. I was, and still am, one of these nerds. When I read the above, I pictured the stats of Lilith Morningstar, whose last name is the weapon of choice of the Bugbear in Figure 10, flashing in yellow, as a visual aid, with the addition of such stats as, Favorite color: Midnight. Favorite Food: Baby. (This comes up in the script a little later and makes a fun easter egg for those paying attention.)

Scattering the scenery with the material of gamification had a greater purpose than just rewarding the observant. Especially when juxtaposed with the unfamiliar, having a second form of information delivery aids in retention and understanding. Familiar trappings speed the relation of the observer to the material at hand. The text, alongside spoken word, acts to amplify meaning. From Marshall McLuhan and *The Medium is the Massage*, "Most People find it difficult to understand purely verbal concepts. They suspect the ear; they don't trust it. In general we feel more secure when things are visible, when we can "see for ourselves." ... All kinds of shorthand systems have been developed to help us see what we hear." (McLuhan and Fiore, 117) Thus stats on the wall act as a sort of Closed Captioning, aiding in the understanding of new concepts and underlining elements that may be lost in the verbal rush. We are giving our audience the decoder ring that allows them to decipher the way of the world that we're creating.

1.3.1.3 Instant Transition of Location

"AGNES – Pause! CHUCK! (Reality suddenly shifts back to the kitchen table)" (Nguyen, 17)

This is the visual language of film, the jump cut that smashes us from one location to the next, and one that is very familiar to the media savvy viewer. This shift can be performed with lights and sound, but how much more effective to turn off the landscape like a light switch. We

go from grand fantasy realms to the mundane reality of an Ohio kitchen in an instant. Slam the window closed. The greater distance we travel from epic to plain in this snap of the fingers, the funnier it is.

1.3.1.4 Video Game Cinematics for Transitions and Geography Building

“Scene Transition from Forest to Underworld” (Nguyen, 20-21)

In creating audio transitions for episodic plays, my goal is to find the perfect piece of music that not only carries on the theme of the scene that we’ve just left, but also preps us for the world that we’re about to enter. In the visual world of cinema, this transition can take several forms. The traveling airplane on the map of Indiana Jones, the frame wipe of George Lucas and Star Wars, or the fade down on the interior of the Kane cabin, with young Charles Foster Kane playing in the snow out the window and then back up on the grown Charles Foster Kane in his newsroom. Boy to man, with a blackout in between. This feels perhaps closest to theatre, a convention that goes back to the invention of the light. The darkness in between is the chance to change the set, to shift the world a little before the lights come up again. But if your world is a 3 dimensional digital landscape, the transition can take on the movement of a body in motion through space. When I first started building Newlandia, I started carving an island, a location on which all of the points on our story’s map could have a place in space, so that we could move virtually but physically from one to the next. This proved to be impractical as a world of that size takes a huge toll on the computer rendering all of those digital assets. But the movement through logical space made sense not only from a strict storytelling point, where the audience could go on the journey with the characters, but also from a reflective point. Movement in space is the realm of the cutscene in video games. (A Cutscene is a cinematic point in a game, where storytelling takes over and gameplay takes a passenger’s role.) The world of Final Fantasy, which was a touchstone for myself and Jadd Davis, the director of our production, is full of such cinematic cutscenes, higher resolution pieces of film which are the payoff for the work of playing.

The *Final Fantasy* video game series was a huge influence on my design thoughts for this play as it is very much a video game version, albeit with a Japanese origin, of the role playing game developed in D&D. It is such a close cousin, that including it in my idea bank only made sense. Character stats, characters being subtitled as they speak, hit points being taken or

restored, and grand camera moves are all elements of the style that this franchise created.⁸ This aesthetic was growing into its own during the time that *She Kills Monsters* is set. It's very possible that Chuck Biggs, the DM, or one of the other friends of Tilly that appear in the play, played one of the early editions of Final Fantasy on the Super Nintendo or Sony Playstation.

There are several transitions in the play that move us from fantasy realm to fantasy realm. For those transitions I planned cinematic transitions that would visually take us from space to space. For the transition above I built the following video. We move from the forest to the Underworld: <https://youtu.be/f4LduYNjq94>. The video starts with camera facing the ground, a common video game cinematic trope, that harkens back to classic Samurai cinema. It then tilts up as we dive into the cave, before traveling through smoke and fire, finally resting in the Underworld, described as, "Inside a dark cave lit with only torches, ORCUS, and oversized red demon with large black devil horns sits reclined on a throne of skulls and bones..." (Nguyen, 21) This description changed for *SKM:VR*, which I discussed earlier.

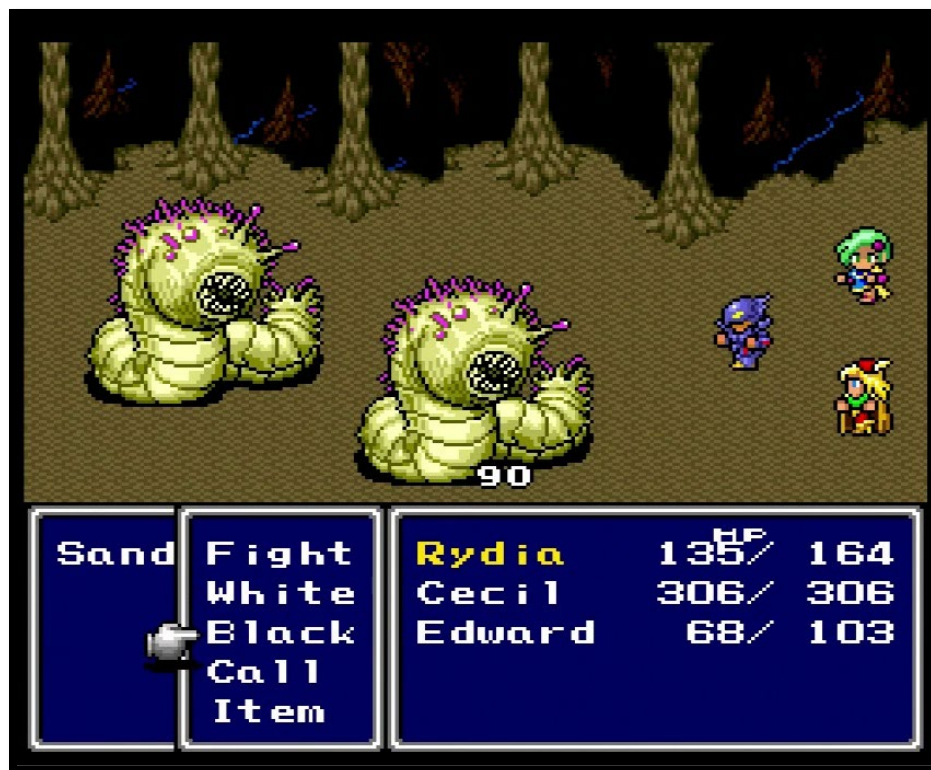


Figure 11 *Final Fantasy IV* gameplay. Note that the Sandworm is taking 90 points of damage. The character's stats are displayed below them. Photo: Web

⁸ <https://youtu.be/2qH6gPZS1zl> Link for the Final Fantasy 8 Trailer.

1.3.1.5 Gamification

“CHUCK - CRITICAL ROLL!! Tillius slays one Bugbear.” (Nguyen, 27)

“CHUCK - Agnes levels up. Gains plus one in being less of a dumbass!” (Nguyen, 28)

I’ve already mentioned Final Fantasy and D&D and the gamification that they demand in a play so heavily steeped in their lore. As I read through the play, scenes like this screamed out for the on screen stats and hits of the video games of the day. (See Figure 11) Another piece of pop culture that screamed into my mind while reading these sections is the Scott Pilgrim graphic novel series by Bryan Lee O’Malley and the subsequent film, *Scott Pilgrim vs the World*, directed by Edgar Wright. Both of these titles are marinated in video game culture and the gamification of story that *She Kills Monsters* was steeped in. But the level of richness in storytelling could be increased, as well as offering a slight distraction during fight scenes, to aid in the confusion of battle. It also lends to the fantasy nature of the story, hopefully adding some level of humor to the violence, a distancing mechanism, to play with titles like the ones in Figure 12.



Figure 12 Screen grab from *Scott Pilgrim vs. The World*. In this shot we have a character engaged in fantasy combat, with bonuses to their stats appearing on the screen beside them. Photo: Web.

1.3.1.6 Augmented Reality

“KALIOPE - This is Tiamat. (Using magic [aka a video projection], Kalliope shows Agnes the dragon of Legend]” (Nguyen, 28)

“ORCUS - Go go Orcus Map! (A comically large map suddenly appears out of nowhere.)” (Nguyen, 30-31)

By this point in the script, we’ve established the heads up display of video games. The map overlay that you can pop up when you’re lost. Every fantasy book has a map at the beginning. And every D&D campaign has a map. A good Dungeon Master will also bring along the figurines that help the players come to terms with the creatures that they are engaged with. That these things should all be projected, made perfect sense economically. Light is cheap. A map on a 12 foot tall wall is easier to read than a physical map held by an actor. The “magic” of projection mapping can place a creature somewhere that we don’t expect to see a creature.



Figure 13 One of the maps I created for *She Kills Monsters*, detailing the place names that were in the script and using some of the tropes of fantasy maps. Photo: Mills-Low

Chapter 2: Technology as a means to an end, aka virtual filmmaking to the rescue

“Nobody can be trained as a theatre professional, without at least being aware of the image languages of cinema, television and the digital media. In theatre and performance practice, video equipment, digital tools, and high-tech sound-systems are increasingly significant.” (Bleeker, 2010)

2.1 Reveling in Democratization

Democratization of technology is the trend by which technology becomes cheap enough and ubiquitous enough that theoretically anyone could afford to use it. I have in my pocket a machine that can access more music than the average radio station, contains the ever changing data of a rolodex, a calendar, cookbooks, libraries, answering machine, telephone, GPS and maps, a million games and distractions, and a camera with the resolution of major motion picture cameras. I can use it to play Angry Birds, or I can do as Sean Baker did and shoot a feature film on it.⁹ Or Steven Soderbergh.¹⁰ The phone that I just purchased, shoots in 4k resolution (Super High Definition) at frame rates of up to 60 frames per second (fps) or at 1080p (High Definition) at frame rates of up to 240fps. That’s better than the Black Magic Pocket Cinema 4k that the school of Media Arts just purchased. Plus I have onboard Lidar (light detecting and ranging) which allows me to capture cloud point data that are pinpoint accurate measurements of a space, which can then be pulled into 3D modeling tools like Blender, for 3D animation, CAD, for spatial modeling, or Unreal Engine, for world building. And it fits in my pocket. Did I mention that? I think I did. I’m still pretty stunned by the democratization of technology that has happened over the last quarter century.

When I went to film school at Montana State University, Bozeman, in 1997, we were still shooting and cutting on film. Our sound was recorded and synced on tape. I cut together projects on 8, 16 and 35mm film stocks. When the film *Titanic* hit the Oscars that year, boasting a computer rendered ship and seamless transitions from digital to real actors, my professors told us

⁹ Sean Baker’s film *Tangerine* premiered at the Sundance Film Festival in 2015 and was shot on 3 iPhone 5S smartphones outfitted with special anabolic lens attachments to allow for an extra wide aspect ratio, coupled with a hand held gimbal to give a Steadicam feel but in the compact, single hand held form factor.

¹⁰ The Oscar winning director of *Oceans Eleven*, *Magic Mike*, *Erin Brockovich*, and *Traffic*, shot and released *Unsane* in 2018 and *High Flying Bird*, which premiered on Netflix in February of 2021 on the iPhones 7S and 8 respectively.

it was a fad. They said that digital filmmaking would go the way of 3D. They were absolutely wrong.

Before this democratization, the idea of being a filmmaker was a rarified endeavor, one only to be attempted by the rich, the connected, or the doggedly determined. Film stock was bulky, relied on expensive cameras, cost heaps to buy, heaps more to process, and heaps more again to re-process your edited project.¹¹ Digital filmmaking, on the other hand, relies on SD cards which are reusable, and hard drives for storage, that are also reusable. An equivalent amount of footage can be shot for pennies on the dollar.

Computing technology works in a similar way. Moore's law states that processing power will double every 2 years. The computer that I'm writing this paper on is more powerful than the Supercomputers of my childhood. Digital Animation programs and Game Engines (the programs that define the physics and allow the world building of the video game industry) have also democratized, from specialist endeavors that required training in coding languages to the high level¹², node based systems¹³ of engines like Unreal Engine. In the last few years, we have seen the rarified technologies of the film and gaming industries not only become accessible to the average user in terms of availability and price point, but ease of use puts these tools into the hands of users who are no longer required to know low level, coding languages. When software

¹¹ When I was in college, they told us that 16mm film cost \$100 for a 10 minute roll. Another \$100 to process that roll, and so on. 35mm film cost 3 times as much. A very efficient ratio of shooting to used footage is 3 feet shot for every one foot used. To shoot a 90 minute film at that ratio, on 35mm stock, would cost over \$16,000, just to shoot and process. *Apocalypse Now* shot at a ratio of 95:1. If you're interested in digging into today's prices, check out Matthew Wagenknecht's page on today's prices. <http://www.matthewwagenknecht.com/the-actual-costs-of-film/> or play around with this fun film calculator from Kodak, which will help you prep for your own film. <https://www.kodak.com/en/motion/page/film-calculator>

¹² Here we move out of my area of expertise and into the world of programming languages. A high level programming language is one that is easier for the average person to understand, but is more resource heavy for the machine processing the language. Low level programming is more specialized, but is much more efficient for the computer running it. Unreal Engine is a high level, node based system and is therefore easier to jump into but is expensive as far as processing. Unity (another gaming engine) is more of a low level, code based system. Unity takes more specific training to jump into, but allows for a more efficient build. In the same way that philosophy confuses me with intentional obfuscation of meaning, programming languages seem counter intuitive for me. I have much to learn.

¹³ A node based system allows a user to patch together Actors (Isadora), Operators (Touch Designer), or "the events, function calls, flow controls, variables, etc." (Unreal Engine) in order to build, animate, or automate elements in these various programs. Instead of writing code for each of these actions, the builder need only select the node that they want and connect it through virtual wire to the node they want to effect. Additionally, drag and resize tools allow for a more plastic malleability of level elements. A rock for instance can be resized, rolled over, and hung in space through mouse movements or more intuitively, in VR.

moves from low level to high level, it is the equivalent of an artisan having to carve individual blocks in order to build with on the one hand, to having the ease of creation of a Lego set on the other. That is not to say that building virtual worlds is easy, but it's much easier than it used to be.

Before we leave this glorification of democratization in media, let me not forget to mention the price point for Unreal Engine (Unity as well). Unreal's business model suggests that, if you make money from using their products, you should give them a percentage of what you're making. And to entice you to this end, they offer the full use of their software for free, either to start building your company or for educational purposes. It's free to use, free to learn, and heaven help me, if I start making money using this software, I'm happy to share the wealth. I don't know enough to be able to say if this Faustian model is mutually beneficial in the long run, but what I do know is that I have the opportunity to get my feet wet in the same software that is being used to make Disney's *The Mandalorian*, a technology that is revolutionizing the television and film industries, for no dollars out of my pocket, other than to purchase a computer with enough guts to run it.

2.2 Jumping in to the deep end

When I took on the projection design of *She Kills Monsters*, the number of hours I'd spent in Unreal Engine was zero. Some 6 months before, I had downloaded the rival engine Unity. I opened it. I poked a couple of tabs. Thought to myself, "This is pretty powerful." I then closed the program and never opened it again. But when I read *She Kills Monsters* I had a couple of aces up my sleeve, that made me certain that I could jump into the deep end pop out the other side with some at least serviceable projections for the show.

The first ace up my sleeve came in the person of a member of my Media Arts cohort, Kristina Mahagamage who has spent the last 6 years learning and then working professionally in Unreal Engine. Though I didn't take advantage of Tina as much as I might have, it felt like having a lifeguard in my end of the pool, just having her around. I knew that if I got in trouble or behind, I had someone who knew their way around the Engine.¹⁴ Had the Covid-19 pandemic not cleared out the Grad Lab offices and scattered us all to our various home offices, I would

¹⁴ <https://www.tinamdigitalart.com/>

have availed her constantly, our working relationship being one of collaboration and mutual inspiration.

The other hubris booster in this arena was watching another cohort member and frequent collaborator, Charlie Apple¹⁵ jump into the pool first. Charlie is a visual and performance artist who had, like me, spent zero time in Unreal Engine. Over the course of a week during the fall of 2019, by playing around and watching a few YouTube tutorials, he had a character running around a 3D, virtual world that he sculpted out of the digital media.

2.2.1 Dynamic World Building

We live in a 3 dimensional, dynamic world. Why not build projections in such a world? A world that, when thrown up on a wall, looks less like a painting and more like a window onto a fantastical landscape. A world that moves. A world that breathes. And a world with perspective.¹⁶

Perspective is viewpoint. The point that we view or the view that we point to as we scan the world around us. If I construct a set on a stage, I am imposing point of view on the audience. They are free to turn around and look behind them, but what they will see is not the point, the view being the walls of the building or the knees of the person behind them. By stretching the stage into thrust or the round I, as the director, am attempting to multiply the opportunity of viewpoint, folding my theatre out from the funnel of the proscenium in which all view is pointed inward. In proscenium view, the whole of the audience sees basically the same show, with slight variation in angle and size, dependent on proximity to the stage. By taking the audience and surrounding the stage with them, I then not only force differences in perspective, the front you see is the back I see, should we sit opposite, but we also make the audience a part of the perspective. In the round, I watch my fellow audience members, as well as the performers. I place a mirror in the space, having my own response reflected back to me as I watch. Should I then take the set, or in my case, the projection screen and wrap it around the audience, they are now not only ensconced in the scene/world of the play, but they become embodied in the

¹⁵ <http://charlieapplemusic.com/>

¹⁶ Perspective became even more important when making the shift from the projection screen to the virtual background, where perspective shifts from world building to establishing our characters within an actual geography. See Chapter 4.

geography of the place. Should my end game be to immerse the audience in the theatrical experience, bringing the audience into the physical space of the world through the projected image, it transports us all into some new world. And it gives us the final perspective of immersion, the knowledge that, if I turn around, I see the world continue behind me. I take the ball of the 360 view of VR and plug the audience as a community into the immersive space.

I recently re-watched a Ted Talk by Diego Prilusky¹⁷, talking about volumetric filmmaking. To shoot volumetrically, one not only needs to shoot picture information, the standard 2D model, but also to capture point clouds, so that the shape and distance of the space and performers is also being captured. This type of work can be done in giant capture stages, with cameras and lidar scanners capturing every angle of the room simultaneously, as demonstrated in Prilusky's talk. It can also be captured through DIY capture systems like Depthkit coupled with a camera and an infrared camera like the Kinect Azure or Intel RealSense.¹⁸ The iPhone 12 Pro Max also has a lidar scanner built in, a promise for future potential. But the reason that I bring all of this up

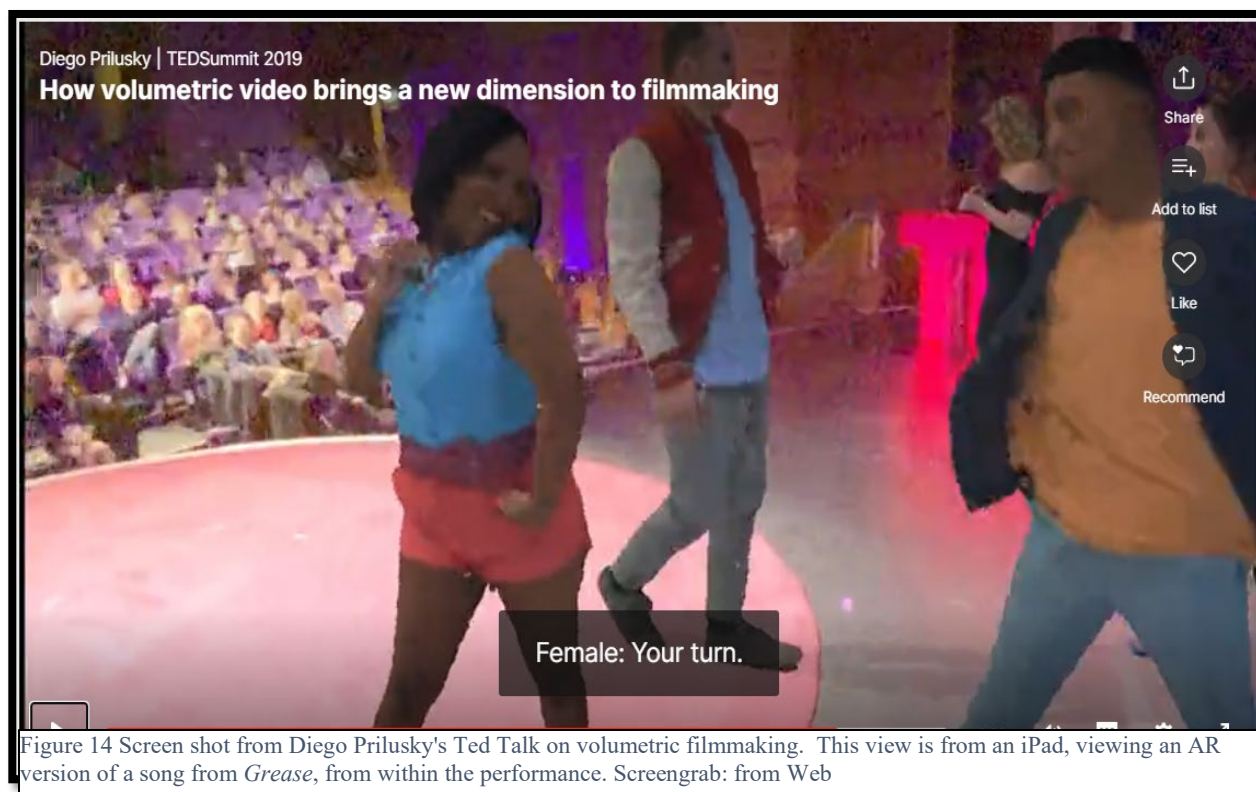


Figure 14 Screen shot from Diego Prilusky's Ted Talk on volumetric filmmaking. This view is from an iPad, viewing an AR version of a song from *Grease*, from within the performance. Screenshot: from Web

¹⁷https://www.ted.com/talks/diego_prilusky_how_volumetric_video_brings_a_new_dimension_to_filmmaking?language=en

¹⁸ If you want to dig into this, you can go here: <https://www.depthkit.tv/>. Depthkit by scatter has setups for the DIY volumetric enthusiast as well as industrial grade setups that are way out of my price range.

is that at about the 10 minute mark of the Ted Talk linked below, we get the view in Figure 14. The picture is pixel-ated, a low res render of a volumetric capture of a performance of *Grease*. What jumps at me from this angle is not its aesthetic as a shot, because it's not pretty. What grabs me is that this is the view that I have from the stage as a performer, seeing both my fellow actors and the audience beyond us. This perspective has been the intimate purview of the performer alone. That is, excepting the occasion of some metatheatrical, experimental, or interactive performance.¹⁹ The round, I suppose is the attempt to give more of the audience a front row seat, to bring them into the intimacy of the performance. To draw them into the action, pulling them in so close they feel they must be a part of the story. Likewise, with 360 world building, we have the chance to surround the viewer with even more of our communal space.

2.2.2 The Parallel between Virtual, Real, and Theatre Realities

To pull in another element of my research life, 360 filmmaking, let me make a quick comparison to the world of immersive theatre, 360 world building, the perspective of the performer, and the immersion inherent in VR, and then we'll run off to other adventures.

“Technical immersion manifests through cues to direct the viewer’s attention and cues to acknowledge the viewer as a part of the virtual environment. Narrative immersion, on the other hand, is influenced by the setting, as well as by the interplay of story, characters, and viewer integration... narrative and technical aspects support each other to strengthen immersion.” (Elmezeny, Ednhofer, Wimmer, 2010)

In treating a theatrical space like the interior of a VR headset, we are in a way utilizing the two elements of immersion discussed above. Technical immersion, which is immersion through technical means, by enveloping the viewer in a VRE²⁰, they are immersed. But this must be balanced with Narrative Immersion, which is immersion through story, setting, and the elements of narrativity.

If I treat my theatrical space like the virtual world or 360 space, which luckily is not so hard to imagine as Real Reality is in fact a 360 space. By wrapping our audience inside the world of a

¹⁹ Suddenly I'm remembering my days touring interactive dinner theatre shows, performing in the midst of hundreds, with the fourth wall being something that surrounded performers and audience, or performative viewers. Whatever. We was all a part of the show.

²⁰ Virtual Reality Environment.

360 projected landscape, we are also wrapping our performers inside the 360 projected landscape, lending to a communal, immersive experience. The VR headset expands to encompass the theatrical playing space. Viewer and Performer together dive into Theatrical Reality.

2.3 The Trajectory of the Film and Television Industry

Disney+ released *The Mandalorian*, a television series taking place in the *Star Wars* Universe, in November of 2019. At the time I was half-way through my 3rd year of grad school, prepping to declare my thesis project, with the use of digital media in live performance being a strong contender. As I was also approaching the finalizing point of an MFA thesis in Media Arts



**FINLAND BECOMES
THE ICE PLANET OF HOTH**



**TOZEUR, TUNISIA STANDS IN FOR
LUKE SKYWALKER'S HOME PLANET
OF TATOOINE**



**THE REDWOOD FOREST, CA
HOSTS THE EWOKS OF
ENDOR**



**WADI RUM, JORDAN IS
PLANET JEDHA**



**SKELLIG MICHAEL, IRELAND
AS PLANET AHCH-TO**



**AGAIN ON SKELLIG MICHAEL,
ACTORS+EXISTING STRUCTURES
+ACTUAL LANDSCAPE**

Figure 15 A few *Star Wars* filming locations where Earth becomes the galaxy... Photos: Getty and Lucas Films. Collage: by Mills-Low

at the same time, I didn't have time to waste watching TV. But I'm also a lifelong fan of the franchise and so the curiosity was killing me.

One of the features of the original *Star Wars* Trilogy, that made it such an epic adventure, was the use of landscape to create beautiful and distinct worlds. While much of the filming takes place on sound stages, where the environment can be carefully controlled, with digital elements put into place in post-production, the most stunning shots tend to be real-world locations that, when shot out of context, look other worldly. These actual locations lend a gravity to a shot, the weight of being carved from actual soil, rather than being digitally sculpted and eroded. In fact, when George Lucas shot his second trilogy, he often tried to substitute digital for actual, but at a time when the technology couldn't yet support the side by side comparison of the two. The digital looks fake, cartoonish. Either too real, or outside the bounds of physics. But when we see Rey and Luke Skywalker in *The Rise of Skywalker*, talking on the top of Skellig Michael,



Figure 16 *The Clone Wars*. Photo: Web

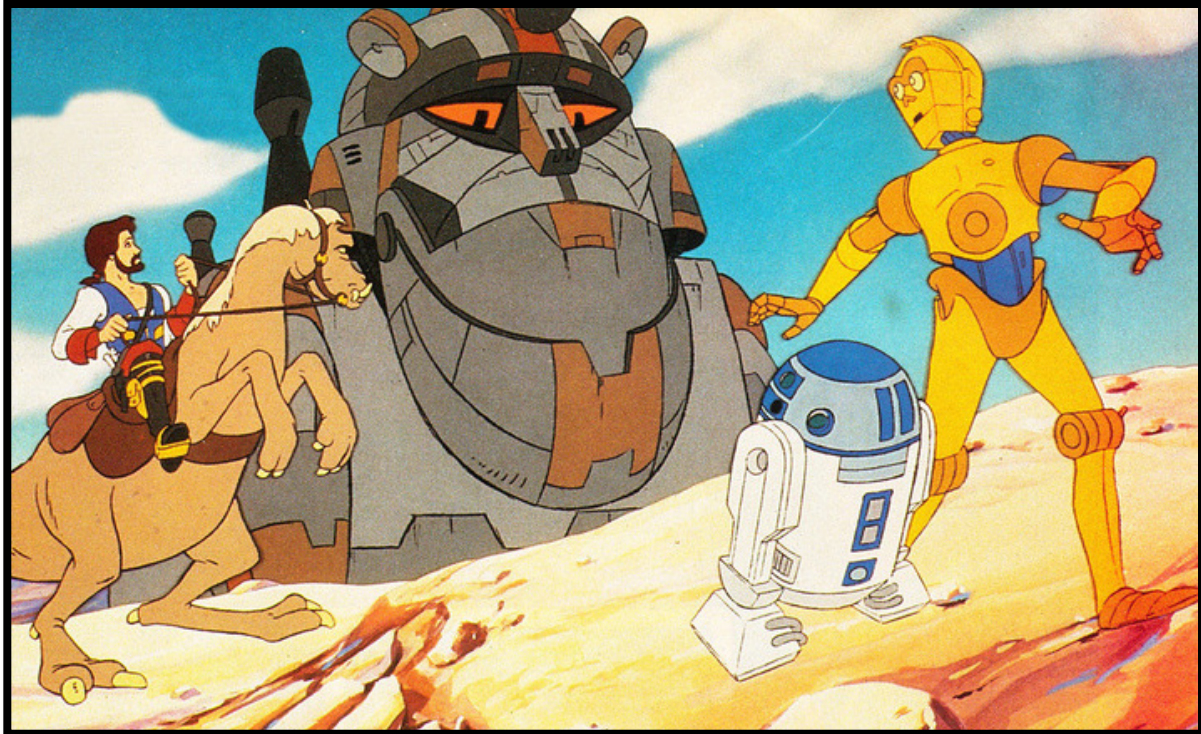


Figure 17 Star Wars the Animated Series. Photo: Web

Ireland, in a hut that was built in the 6th century as part of an actual monastery, we feel that we are at a place that is real, that is lived in, and that has the gravitas of age (see Figure 15.)²¹



Figure 18 *The Ewoks Battle for Endor*. Photo: Web

When the *Star Wars* Universe has been translated for the small screen, the results, in the past, have been sometimes highly stylized, in the form of *The Clone Wars*, forgive the pun cartoonish, as with the animated series, or downright dismal, as in *The Ewoks Battle for Endor*. While there may have been some effort put into pushing the canonical realms of *Star Wars* forward in each of these, they mostly come off as a crass attempt to cash in on the piggy bank that the franchise presents.

The Trailer for *The Mandalorian*²² showed a more cinematic style, much more akin to the films than previous made-for-tv iterations. And aside from the fact that it excited me in much the same way that its ancient forebearer had back in 1976, when I made my first Lego Light Sabre as a toddler, I started getting curious to know how they were producing this new show. Television budgets are never at the scale of film budgets and so corners have to be cut. This fact is illustrated a couple of times in the trailer, linked below. (For instance at :45, the shot with mother and daughter in a pool of water looks like it had to have been done on a sound stage and not in a natural body of water. Or at :22 where the background looks as if it may be composed from an actual environment, but the foreground looks like digital composites, having that slightly too-clean look of digital assets.) But there are also plenty of epic looking landscapes and environments that either look real or really expensive to produce. But the shot that told me that something new was happening, though I didn't realize how at first glance, is Figure 16, from :46. It looks "real," but why? The answer is light, and not just the brilliant light that's bouncing off the top of these trooper's helmets. It's also the light that is bouncing off the building that is behind the camera, onto helmets, and then into the lens of the camera in the form of a reflection, a visual artifact that speaks to a three-dimensional environment. In our every day lives, reflections surround us, whether clearly in mirrored surfaces, or opaquely, from walls, ceilings, and floors. Any light you see is coming from a source, but then also reflecting from the various surfaces around you in order to inform the quality of light in which you exist. In the digital realm, this sort of action is very expensive as far as processing goes, especially if you were to

²¹ As a side note, filming in that particular location brought an unexpected challenge in the form of puffins that swarmed the island at the time of shooting. Rather than digitally removing all of these birds, the production team decided to turn them into a new creature in the form of the Porg. See the following article for more on that: <https://www.cbc.ca/news/canada/newfoundland-labrador/puffins-porgs-star-wars-1.4465146#:~:text=But%20the%20charming%20creatures%20described,Jedi%2C%20released%20earlier%20in%20December>.

²² https://youtu.be/aOC8E8z_ifw



Figure 19 Screenshot from *The Mandalorian*. Screengrab: from *Mandalorian, Behind the Scenes*.

model, not only the directional light that is beaming off helmets, but creating the reflection of the building, in each helmet, curving and shifting according to their individual heights and positions in space, the amount of instances per second that a computer would have to perform in order to track these features is mind boggling. All to re-produce a naturally occurring phenomenon.

This rendering technique is called ray tracing. When you see ray tracing in action, unless you know what you're looking at, it's not astounding. In fact, it looks normal. It is an algorithm in which the machine looks at the light source, determines what the light is hitting, what the reflective properties of that surface might be, extrapolating where that light will go next, how it

will bounce from the next surface, and so on. Future versions of Unreal Engine are tackling this, as well as other software, but for now it is extremely expensive for your processor to take this task on. It is a computer, building a world that looks like the one that we live in. What we mostly notice is when it's absent, like in Figure 20.

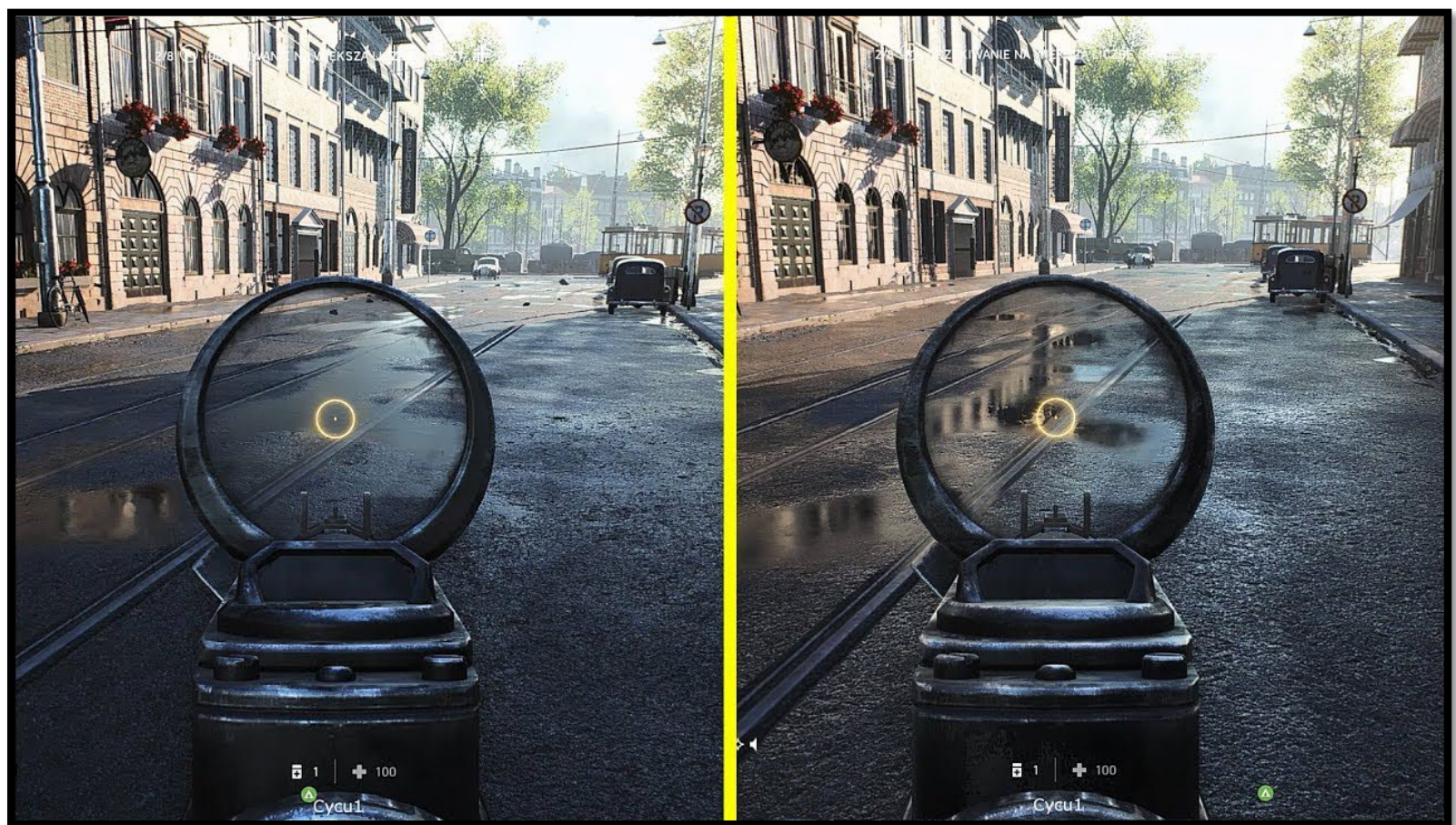


Figure 20 Screenshot from *Battlefield V*, with a side by side comparison, ray tracing off on the left, turned on on the right. Note the clarity of reflections in puddles, more robust lightplay in the background, and more contrast in shadows. Ray tracing makes the space look more “real.” Photo: From video by Cycu1

When working with green screen technology, you are able to “key out”²³ the background and replace it with other information. But the fact that you’re shooting on a giant green canvas, influences the light quality in your shooting space, meaning that you’re going to have to also adjust your color to make up for the fact that there is green light reflecting off of

²³ The process of removing a color and replacing it with something else, typically video or digital assets. This technique was developed in 1940, by Larry Butler, on the film *The Thief of Bagdad*. It has been one of the dominant forces in special effects, up until recently, as it allows actors to be placed into fantastical worlds, like the Marvel Universe, *The Lord of the Rings* epics, and a million others. It is also the technique that is used on the News to put infographics up behind the weather person. It’s also the same basic idea as the virtual background on Zoom.

every surface. When working with strictly digital assets, you often have to bake your reflective light into your build, or augment the lighting with virtual lights in order to make up for the fact that you can't rely on the reflective light that would occur in a real world setting. The big problem in both of these techniques is that they just don't look quite "real."

But, back to that trailer and the trail of breadcrumbs. In a strange bit of kismet, February 20, 2020 brought me a pair of coincidences that fed into one another. The first, I've discussed in chapter 1, in the form of the email I received, telling me about the upcoming UM School of Theatre and Dance season. The second piece came in the form of a making of video, linked below²⁴, that outlines some of the techniques of how director Jon Favreau was approaching the filmmaking of *The Mandalorian*. For me, watching this video was akin to watching someone invent the wheel. There was a moment of, "this is going to change everything."

To summarize: Jon Favreau and the team at Industrial Light and Magic were employing a circular LED wall²⁵ (A LED is a Light Emitting Diode) and ceiling. The images on the wall

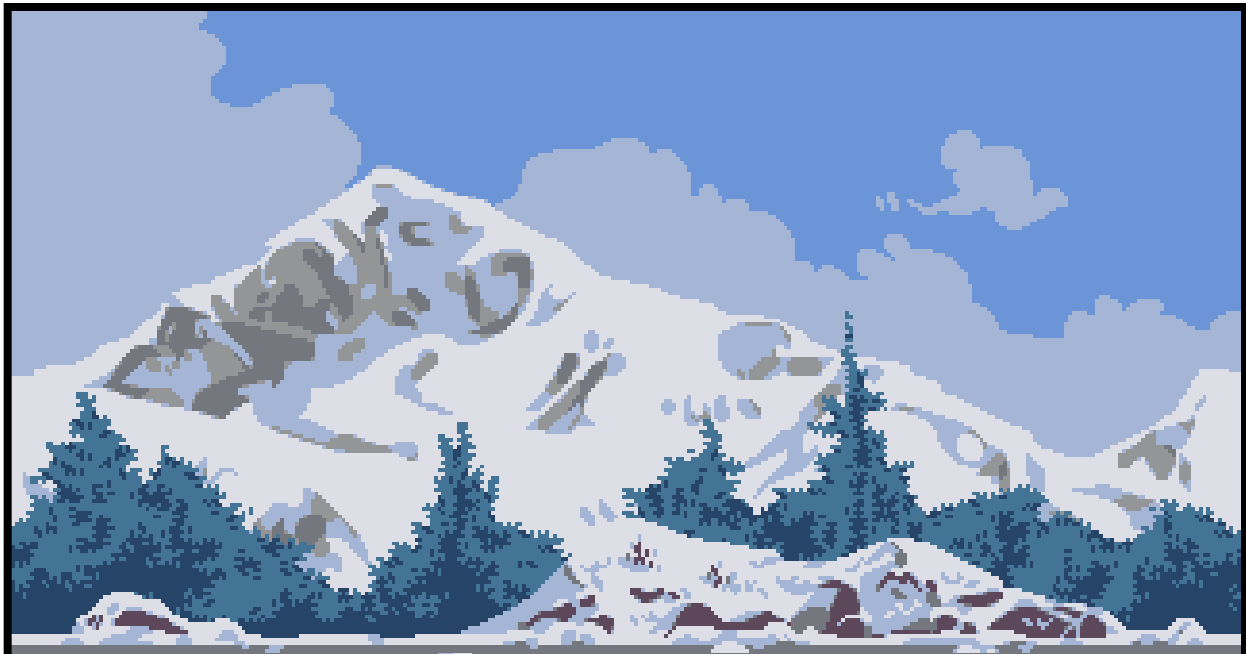


Figure 21: Imitation of Parallax in the style of an 8 bit video game, side scroller. (Gif from DeviantArt.) If viewing outside of Word, follow this link. <https://www.pinterest.com/pin/466896686362782654/>

²⁴ <https://youtu.be/gUnxzVOs3rk>

²⁵ This wall is made up of hundreds of Black Pearl Led Panels, made by ROE Creative Display. These panels have a 2.8mm pixel pitch, the distance between individual LEDs. These individual, dynamic lights/pixels are spaced such

are created in Unreal Engine, and are real-time rendered onto the walls and ceiling, creating a fully immersive, fully dynamic acting space. The camera is tracked in real time, so that its position in space can be reconciled with the background, offering an interactive filming environment. This interactivity comes in part as the parallax view of the camera, orienting around an object, with a 3 dimensional background behind. Parallax is full of math and physics. There are a number of awesome applications of parallax, for instance using it to map stars, their position and distance in astro-physics. Some cameras suffer from the Parallax Distortion, in which there is a slightly different view through a viewfinder than what the lens sees. Where I first was introduced to Parallax was through the Nintendo Entertainment System. Side scrolling games on this system imitate parallax by having objects closer to the screen move at a higher rate of speed than those further in the background (see figure 18). When we apply this idea to the filming of *The Mandalorian*, by tracking the camera's position in space and calculating this against the position of the object being filmed, the background should shift according to the distance it "exists" from the camera. This allows us, as an audience, to orient ourselves in space and to "buy" the environment that our characters are inhabiting. It also creates the illusion of 3D from a 2D screen through the manipulation of assets on that screen. Basically, as we move from side to side, we can see around corners, not just on foreground objects, but also in the background. The lack of Parallax is one of the reasons why projections on stage can come off as flat and two dimensional, as the picture is frozen in a single point of view, rather than adjusting to the eyeline of the viewer.

Another game changer in this process is Unreal Engine's daylight simulators. The ability to stop time and have an infinite sunset means that shooting can be dictated by storytelling and not limited by whether there is enough daylight left to shoot. Matching light²⁶ in shots is a thing of the past. And, because Unreal Engine is a dynamic system, the world can be changed, morphed, resized, or simply spun on an axis, all happening on the screen around the

that they provide a sufficiently high definition image, with a high enough resolution to be camera ready. Research is fun. <https://www.roevisual.com/en/products/black-pearl>

²⁶Matching shots is an editing process where shots are compared between different days and times in order to achieve a consistency across them. This is frustrated by having weather change mid shoot, storms roll through. The real world is not accommodating.



Figure 22: Screenshot from the *Making of The Mandalorian*. The fade to blackness on the ceiling is due to the angle of the photograph. When seen from underneath, it forms a seamless transition from wall to ceiling. Photo: from Web.

performers. Instead of picking up the camera and moving it around the performers to move from shot to shot, the world itself can be spun, cutting set up times dramatically. But the revelation that really pops here has to do with light and the LEDs that make up the walls.

The Light Emitting Diodes that make up an LED wall are individual points of light in a wall of points of light. These diodes can be any color, any intensity. But the game changer comes with the emissive nature of the wall. When you shoot out of doors, you often don't have to light your sets. You may need to reshape or reflect it. Shooting indoors however takes massive amounts of light in order for the camera to be able to capture well exposed scenes. But look at figure 19. There is an important difference between this set and other indoor sets. There are no lighting instruments.

The environment surrounding the performers also lights the performers. This light is consistent. The sun only comes out from behind the clouds if you want it to. And the reflections that appear, in eyes, on armor, in puddles, the play of light on skin, is exactly the way that light behaves outside of the sound stage, in the real world. Building worlds in Unreal Engine, and then showing those worlds on LED walls takes ray tracing out of the processing equation. All of the effects that used to have to be applied in post production, like replacing green screens with backgrounds or adding reflections, are happening in camera now, meaning that the effect is captured live. This speeds production. It lowers costs. It puts those savings into the storytelling. And it means that filmmakers are working in the biggest, coolest, digital Lego set of all time.

2.4 So what? A.k.a. an argument for theatre as Virtual Reality

How far do we go back? To the cave paintings dancing with the flicker of firelight? To the Egyptians living their ceremonies of life and death? The Greeks using masks to enhance and obfuscate the individual performer, transforming man to god? Or to find our place among the Groundlings as the Globe rocks with the opening lines of *Henry V*, “Oh for a muse of fire...” in which prologue begs the audience to build in their minds the vastness of space, containing within the walls of the theatre the actions of two warring monarchies, entreating the viewer to conjure up the paraphernalia of the proceedings while the actors provide the story. “For it is your thoughts that now must deck our kings.” (Shakespeare, 2020) Jump forward to the Restoration of Charles II to the throne, when lights come inside the theatre, the set takes form, perspective is forced in order to recreate the world inside the building? The Noh too brings the roof indoors, building the formalist world that stands for all nature. Stanislavsky built a set to exactly mirror life, built an actor to exactly mirror life, built a virtual world and called it a real world. When Eleonora Duse²⁷ sank so deep into her character and the trappings of her performance that she

²⁷ Eleonora Duse (1858-1924) was an Italian stage actor, considered by many to be the greatest of her age, a contemporary and rival of Sarah Bernhardt. Their contrasting styles, the bravado and declamation of Bernhardt versus the realism of the emotional conviction of Duse, were in some ways a demonstration of the sea change that was happening in acting styles of the day, with the development and rise of realism and Stanislavski’s Method. Duse was renowned for giving herself over so fully to her role that she would exhibit a blush response when her character’s suffered embarrassment or shame. This goes beyond the parlor trick of crying on cue and borders on the realm of the magical in terms of giving one’s self over to the given circumstances.

exuded the very picture of veracity of emotion on stage. She believed in her virtual world to the point of bodily excitation. She did not feign embarrassment, she blushed. There's a case to be made for the virtual reality of Duse's Blush, that the impetus for the reaction is not real in the moment but is believed to be real enough in the moment to instigate a physical response.

All theatre is virtual reality, to some degree. Our attempt to lose ourselves in the story being told, to weep with the mothers of Synge, those sons and husbands too often claimed by the sea. To call up to the balcony and woo with the fire of first love, casting aside the blood feud of Montague and Capulet to bask in the warmth of blind, unfettered romance. To stand under the dead tree and wait for the one who never comes, that Godot who sends his messenger to promise arrival anon. To challenge the storm by calling down the destruction of the world, King Lear standing upon the firmament – none of those is real. None of those exist. But they are a world, a reality, the stage a virtual space made from a real space upon which we call out all frames of the imagination to invoke the sacred that feeds souls through the communion of strangers in dark rooms. We at once do, and believe that we do, and know that we play at doing. All theatre is Virtual Reality.

Chapter 3: When the Pandemic forces the Pivot

“I was recently talking to an advisor, bemoaning the shift to online presentation. I just wanted a normal show I said. And then I instantly shifted to say, I’ve never had a normal show (in my career), I don’t know why I should have one now.” (Mills-Low, 2020)

3.1 The Call is Made

I don’t remember the exact day. I remember July. I remember standing in the middle of the fishing gear at Sportsman’s Warehouse when my phone rang. Caller ID says Dr. Bernadette Sweeney, my faculty mentor and the Head of Practice and Performance. Answer. Small talk and then she drops the bomb. All shows are going to a streaming format. We are switching scripts. Production meeting is scheduled. Taking it in stride. Smile. Goodbyes. Buy some hooks and weights. Gravity press. Feel like I just lost a child.

3.1.1 We knew it was coming, but we didn’t want to admit that it was coming

In these unprecedented times... the words my bank wrote when closing the lobbies. The words my school wrote when shifting from in person to on-line classrooms over the course of spring break. The words that became the go-to cliché for a nation. In these unprecedented times it is more important than ever to own a Honda Civic.

The onslaught of the Covid-19 pandemic of 2020 broke like a wave of terrifying molasses. From the denials and mixed messages coming down from the President of the United States and his slapdash cabinet to the patchwork quilt approach of states left to fend for themselves, it’s not surprising that education institutions were slow to take evasive action. When a decision to shift practice places a financial strain onto an already embattled system, there is a tendency to wait for explicit instruction, to maintain course until action is forced. This approach saves resources in the short term, and, should the crisis pass without diversion being necessary--saves the shift back to the status quo, avoiding the evocation of *The Boy Who Cried Wolf*. The problem with waiting until all signs point to go however, means that occasionally you’re going to slam into a brick wall when you should have already been turning. A show is kind of like an ocean liner. It’s big. There’s a lot of people involved. And it takes time to change direction. Sometimes everyone is on top of their stations and there is a certain amount of nimbleness, like when I had to pull sick

or injured actors from vaudeville shows in the hour before the audience arrived. Easy. The slower but no less risky shift that happens when the crew disappears, like the time I had to take over as artistic director while selecting and casting a season over the course of a weekend because the former artistic director walked at the last minute. Stressful. And then there's the unforeseen catastrophe that looms out of the dark like an iceberg made of pandemic shutdown. I've never had a ship sink beneath me, but I've seen a lot of icebergs up close.

Projection design, in certain cases, requires a lot of planning, which has to happen fairly quickly so as to leave plenty of time to shoot/render/build and re-build the digital elements that will populate the stage. In the case of *She Kills Monsters* I was facing the dual challenge of building either a world, or portions of worlds, to pull video clips from in order to dress the fantasy elements of the play²⁸ and learning how to navigate an unfamiliar digital platform at the same time. Luckily, I got an early start on building during the design process, so as to be somewhat ahead of the game. But, when the pivot came, I had to re-think entire sections of the script and re-build sections that had changed from version to version. I will be dealing with some of these changes in this chapter, as they directly pertain to The Pivot, and I'll be dealing with some of them in Chapter 4, as they pertain to things we learned from The Pivot.

3.2 Discovery – Photo-Realism vs. Hyper-Realism

When I started building my worlds/scenes for *SKM*, I built with the projectors that we have in stock at UM in mind. These projectors are not particularly powerful, clocking in at only around 3000 lumens. This is a fine luminosity when using a short throw projector in a dark space, but a theatre is not often a dark space, meaning that I was going to have to be fighting the lights in the space. I'd already been in talks with the lighting designer, Hannah Gibbs. We'd agreed that the fantasy realms would be my domain, with less stage light being used to illuminate the space so as to get full effect and color pallet from our projectors. Likewise, she was going to be creating the drabness of the "real" world and I'd keep my projectors out of the way for that.

²⁸ The fantasy elements of *She Kills Monsters* take place on an imaginary island. One of the techniques that I started working with in my first builds was to create an island in Unreal, where I could have all of the various locations in detail, but could also pull back into an overhead shot, revealing the geography in its entirety. I did use portions of this island for some of the show backgrounds, (Scene 3, The Beach; Scene 17, Mountain Ridge; Scene 20, The Castle of Evil) But others needed to be built in different ways or were changed completely in the new script.

Through experience with other projects (*Assassins* and my installation *The Christmas Machine*²⁹) I had discovered the color falloff of these. In *Assassins* our projectors were fairly close to the projection screen, approximately 5 feet. At that distance the brilliance of colors that had been pretty intense on the computer screen, faded down to serviceable, but by no means dazzling. Likewise, when setting up *The Christmas Machine* I found that if my projector was more than 8 feet from my projection surface, my color palette faded from bright red and white to gray and white. With this deterioration of color and light in mind, I intentionally built my landscapes with very saturated colors so as to try to preserve as much fidelity as possible.

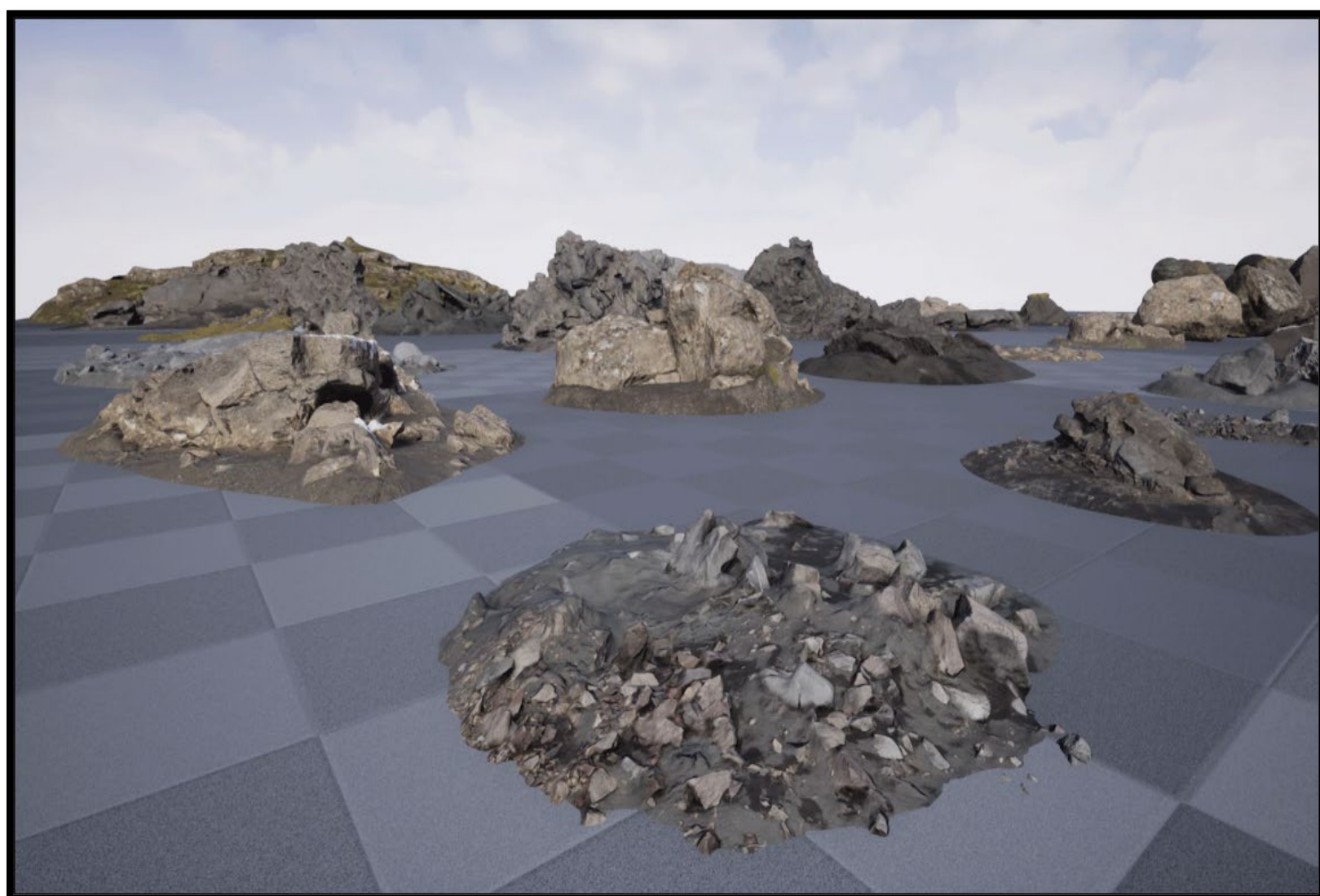


Figure 23 A few of the landscape assets from Megascans Iceland Vol. 2 pack. Each of these assets are moveable, resizable, and meld seamlessly with one another. Screenshot: from the author's Unreal Engine asset library.

²⁹ https://www.youtube.com/watch?v=cJ_e7m1BG8

In addition to playing with color, I was also pushing for as much photo realism as possible. If an image or video is reliant too much on computer generated assets, there is a disconnect between what “feels” and “looks” real and the image takes on a patina of artificiality. Unreal Engine allows for the use of a huge library of digital assets, some of my favorites being those produced by Megascans. This company produces 8K scans of actual rocks, formations, and landscapes. My Underworld cavern was built from basalt rocks from their Iceland Packs. My



Figure 24 Scene 6, a screengrab from performance. Krstin Hagins as Agnes, Anica Johnston as Tillius the Paladin, Sarah Hertig as Kaliope, Jade Ware as Lilith, and Stephen Blotzke as Chuck Biggs. Photo: David Mills-Low

forests were populated by trees from their forest scans. My ocean and rivers were not built from Megascan Materials but were created using the Unreal Engine water planes and assets, creating ocean waves that moved and rippled, a river that flowed.

The goal of using this saturation of color, coupled with the realistic, dynamic landscape for projections is that I could then create a backdrop for the action of the play that is at once both playing as a believable world for our fantasy characters to inhabit while also, due to the softening of image and color from deterioration of projected images, a backdrop that is not overwhelming. It is present enough to place us in a space, but not so present that it blinds us to the performances. The bleaching of color saturation of the projected image actually makes it look more like a real space and takes some of the hyper-reality out of it. (For side by side comparisons of the original saturated photo and the washed out projection, see the photos at the end of this chapter.)

It's all well and good to talk about the differences between the various “feels” of background, but the true extent to our Hyper-Realistic world didn't start jumping out at me until we started putting actors in costume onto the backgrounds. At that point, the juxtaposition of the fantasy background against the color palettes of fantasy character costume came into sharp relief. We were creating a live action cartoon. Hyper-real characters on cartoonishly colored backdrops, in little boxes... the result is an animated comic strip. I don't know that any of us had this in mind when we started, but could be looked at as a happy accident.



Figure 25 Kyrstin Hagins as Agnes and Jade Ware as Lilly, in their respective rooms.

But more than an accident, this “look” was also the culmination of the work of a number of artists working together, with a harmonious goal in mind. Whether in the live, in-person format, or online, our elements were the result of group think. Lara Berich, the Costume Designer brought bright colors to the fore for fantasy characters, while linking up accents of characters who cross over from the real to fantasy realms. Jacquelyn Simonis, our Scenic Designer took on the world of Ohio, creating bedroom looks for each of the characters in the show, from which they all operated. And Lighting Designer Hannah Gibbs, was tasked with tying this all together, creating a light plot for each actor's home studio using actor triggered ring lights and colored LED strips to match the mood of their virtual environment.



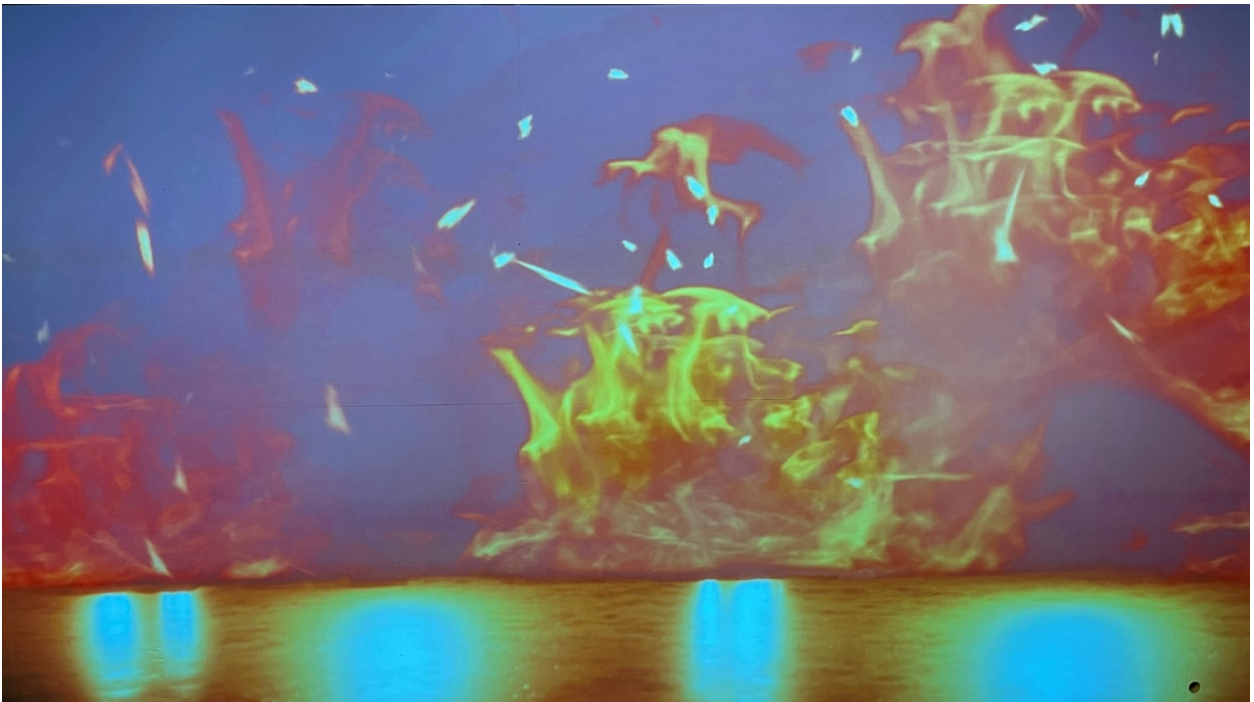
Figure 26 The real world. Each of the actors are in a "studio space" in their own homes, with a green screen behind them. The only time we switched to this view was for the curtain call. Shown are Kyrstin Hagins, Anica Johnston, Stephen Blotzke, Jade Ware, Sarah Hertig, Joshua Griffith, Rory McLaverty, Kinsey Sternad, Emma Swartz, Elsa G. Horgan, and Elijah Miller. All green screens were the same shade, but due to the different webcams and light setups, they all look slightly different. Photo: David Mills-Low

3.2.1 Side by Side Comparisons of Original vs. Projected Images

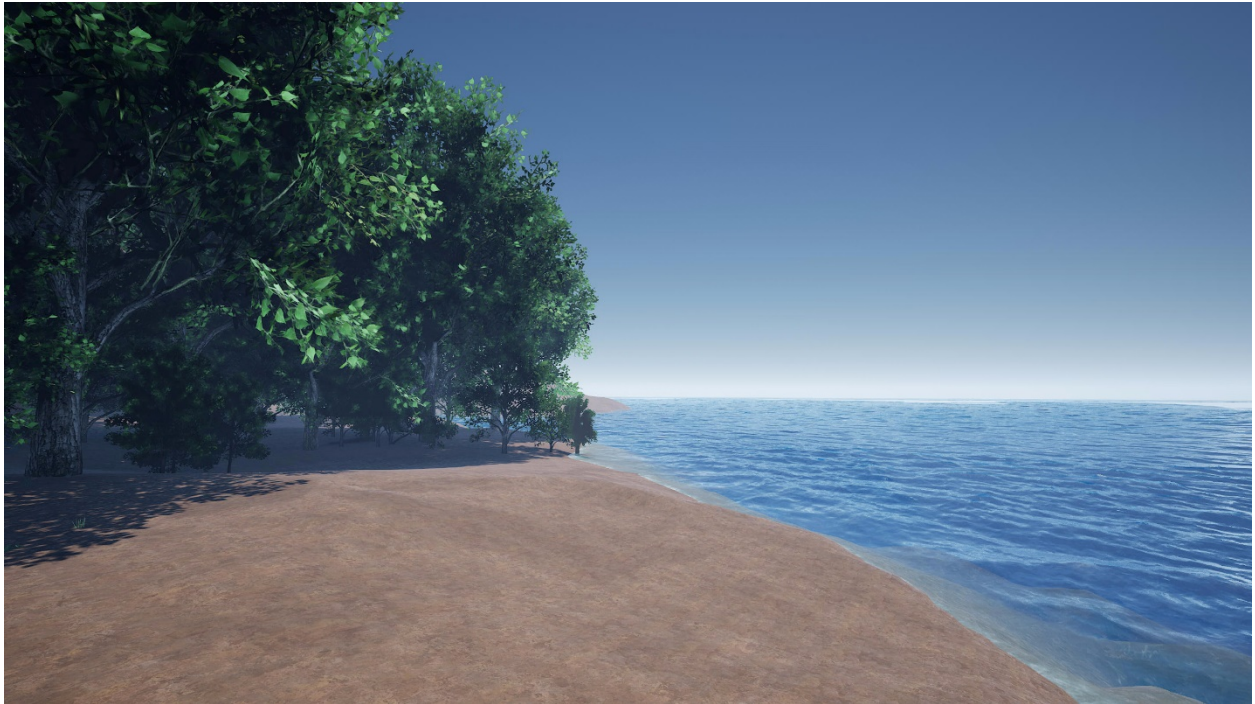
Original (Chuck's Epic Background)



Projected



Original (Magical Beech Forest)



Projected



Original (Exterior of The Underworld Cavern)



Projected



Original (Magical Fairy Forest)



Projected



Chapter 4 Adjusting for the Small Screen or Working Within Our Means

As I adjusted for the flat world of Zoom and out of the trappings of 3D performance space, there were two principles that I had in mind, that were specific to the size of the screen that I was working with. These involved movement versus stillness and the way that I approached geography building.

4.1 Movement vs. Stillness

In my pre-pivot design and build process, I assembled assets and began sculpting my scenic elements with the idea of full motion video on a screen behind my performers. Full motion, not in the sense of constantly moving, but full motion in the way that, when you stand on a hill and look at the landscape around you, it is full of motion. Grass moves in the breeze, as do leaves, and depending on the strength of the breeze, trees sway. A pond may find stillness, but it responds to the wind as well as the bugs buzzing across its surface, or the ripple of a turtle dropping off a log back into its depths. Clouds scuttle or drift or loom or churn. Rocky terrain may seem still and solid, but even there, the atmosphere shifts and changes. This movement is the breath of the world.

Some of this movement is baked straight into Unreal Engine. Cloud systems are on volumetric sliders and transform, through algorithms, overhead. Water is automated to form waves, ripples, and the glisten of flowing. Trees and plants are animated to sway or bow in the digital breeze. The amount of movement controllable by slider.

The first fantasy/game environment that we enter in either script is an island beach. Chuck sets the scene. “You are standing on the sands of a mystical beachside. To one side of you is the endless ocean, on the other is an ominous dark forest. And from the distance, a hooded stranger approaches.” (Nguyen, 2011)³⁰ I had a lot of false starts as I worked on this particular environment as it was one of the first that I was building. (I tend to build sound and projections in order so that I make sure that I’m not missing anything. Often the first cues take the longest,

³⁰ This particular line is identical in both scripts.

because I'm still learning what the show wants.) It doesn't look perfectly photo realistic when taken as a whole, but what was more important to me was that the elements of what Chuck describes are in place in our scene. This is where the building diverges for the two styles. For stage projections, what I'm looking to do is find the best framing backdrop for the scene, so it's not as important that the environment be perfect in every direction, only in the direction that I'm showing the audience (more on this element of geography building in the next section). The look that I was going for was best embodied in Figure 27.

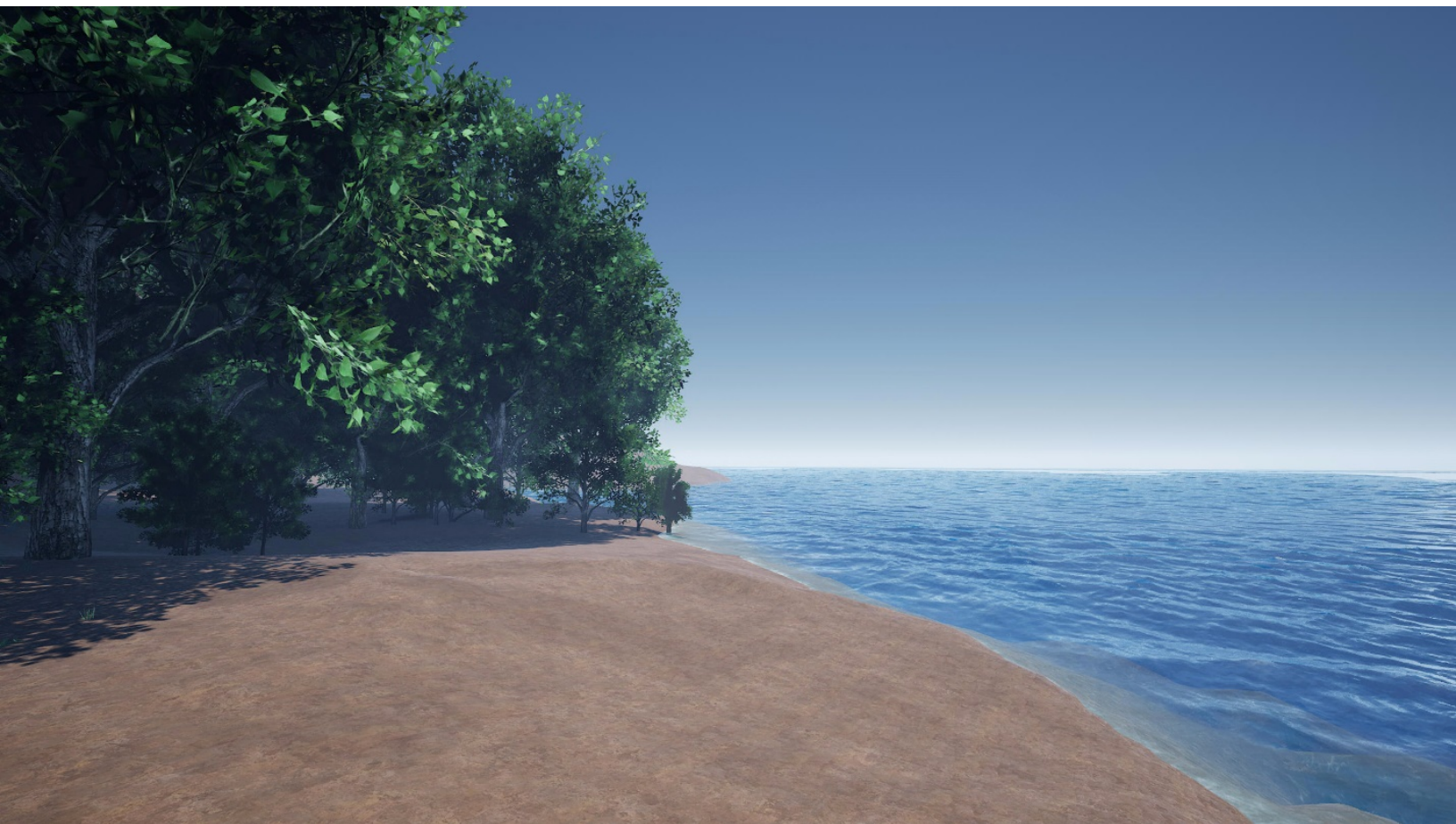


Figure 27 The Mystical Beach from *SKM: VR*. Scene 3b, pg. 15. Photo: David Mills-Low

In this image we have the elements mentioned in our narration, sandy beach, endless ocean, and dark forest, with the addition of some sparse sea grass. When broken into a triptych, on the DM screen, it would provide a fine, moving backdrop, with water that moves and ripples, trees that sway, with leaves coming right up to within feet of the frame. It also has a foreground surface that could, if I pointed my camera straight down, become another projected surface, the sand upon which our characters stand. This view looks epic when projected on a 12 foot tall

projection surface (or on the wall of the Media Arts production studio, which is the only place I've actually been able to project these images and videos). The movement of the elements also aids in furthering the illusion of perspective on a two dimensional surface. It is like looking out of a window. Not exactly real. But we're playing in fantasy land here. If it looks like a video game, then the feel still fits.



Figure 28 Lilith Morningstar (Jade Ware) in action. *SKM:VR*, Scene 3b, pg. 15. Photo: David Mills-Low

But when we pivot to the small screen, movement becomes a distraction. Figure 27 is one of four stills that I took of this environment. Figure 28 shows the exact same location, but now as a Virtual Background. Because of distortions caused by the greenscreen the performer is standing in front of, the fidelity of the image drops dramatically. The performer's camera is also not HD, so their clarity is further compromised. If a bunch of blurry leaves are waving around them, or ocean waves moving beside them, we have distractions that pull focus from the story, rather than building an immersive world. It would be one thing if the feed coming into our zoom call was crystal clear, but due to the lo-fi environment, we want to save movement for the important elements on the screen, namely, the individuals telling the story. Keeping that blurred movement

behind the performer triggers the eye to track movement, while delivering very little information. This natural instinct, to pick out the motion from stillness served our ancestors well when trying to avoid being eaten by lions on the Savannah. This evolutionary holdover is the key to why the Inflatable Tube Man is used as an advertising gimmick. Full motion that is indecipherable is the equivalent of using a used car lot as our setting.



Figure 29 Artist's rendering of *She Kills Monsters: Used Car Lot Edition*. Jade Ware as Lilith, head of sales. Photo: Mills-Low

4.1.2 Building for pandemic tech

It's all well and good to pontificate about how awesome 12 foot high, full-motion projections look, or to debate whether full motion Virtual Backgrounds posed a distraction or stood to help build the world of our story, the fact stands that we made all of our decisions for proceeding on a fairly short turn around, testing platforms as we were able, in the middle of a pandemic with all of the trappings and slowdowns that are inherent there. We were the first show to be mounted in with a pandemic protocol, the guinea pig for the shows to follow. Actors were working with their own computers, of varying power and capability. They were performing in their homes, streaming on random wifi routers, with varying strengths of bandwidth. Their machines were overheating or dropping out of rehearsals or suffering severe lag and freezing-up. All of this before we even started using Virtual Backgrounds. The actors were all provided with green screens to help with backdrops. A number of the computers we were using were too old to even be able to turn on the greenscreen setting. And it seemed as if actors who had the most screen time, had the oldest machines, most prone to freezing. It became clear very early that video backgrounds would be a fool's errand.

Projected images have a clarity that comes from the resolution of the projector coupled with the resolution of the image, all supported by the processing power of the computer pushing the image or video. This can be optimized for the space and for the needs of the show. But when dealing with streaming video, especially that coming from aging laptops and sub-par webcams, degradation of image is inevitable. It would have been a different story perhaps, if we'd been able to secure a fleet of identical computers, had been able to position all of the performers, socially distanced, in a space or series of spaces on campus, where the internet is a little more reliable and speedy. Unfortunately we didn't have the time or resources at our disposal to make this work.

I made a series of decisions, as I assessed the limitations of our hardware, to simplify movement, to simplify the number of screens transmitting information, with the aim of stretching what we had in place as far as possible. Moving video backgrounds, gamification, and immersive environments were all set aside for the sake of clarity of storytelling.

4.2 Geography Building

In preparation for making the jump to our online platform, I started searching around to see how other productions were handling world building for streaming this show. What I found was that most of the companies that took on *SKM:VR* (at least the ones kind enough to share photos or video) seemed to be using stock fantasy photos. In addition, they tended to use the same backdrop for every character. This makes sense if your only context is the stage, where everyone shares the same set. My goal with the backgrounds that I was creating was to create a geography, is if all of the performers on screens were standing in the same environment, but due to perspective, the landscape behind them was of a slightly different perspective. But how do you create 3D geography on a 2D platform. Well...

In Filmmaking geography, one of the considerations for cinematographers and directors is to be aware of the Axis of Action, also known as the 180 rule. The basic “law” of this rule is that, if you imagine an imaginary line running between two actors in a scene, you must stay on one side or other of that line for the whole scene or the audience loses the geography of where performers are. Jack was on the right of the screen, Jill on the left, if we cross the axis and Jack is suddenly on the left, the brain balks. The only way that you can really break this rule is with a moving camera, which reveals the 3D nature of the space and walks the viewer through the swapping of position.

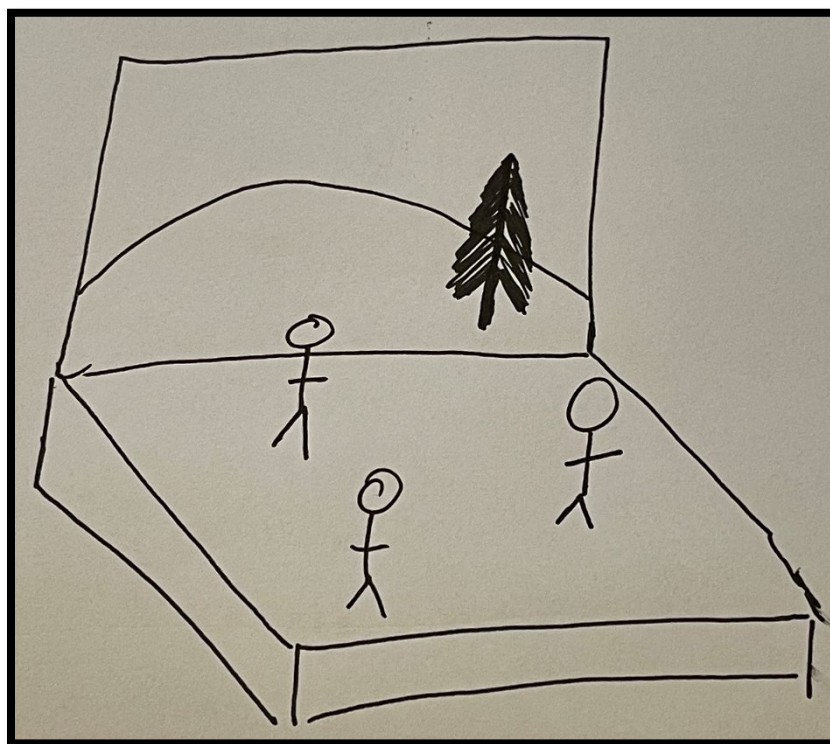


Figure 30 Representation of 3D performers in front of a 2D backdrop. Illustration: David Mills-Low

On stage, we orient our actors, through blocking, with (most often) a stationary backdrop behind them. We don't have to worry about crossing the access or confusing the perspective of the viewer because there are not cuts. There is only the point of view of the spectator, relative to their position in the theater. But in this case, we are only creating geography in relation to the actor's position on stage. Their relative position in a greater universe is left to the imagination. (See figure 30)

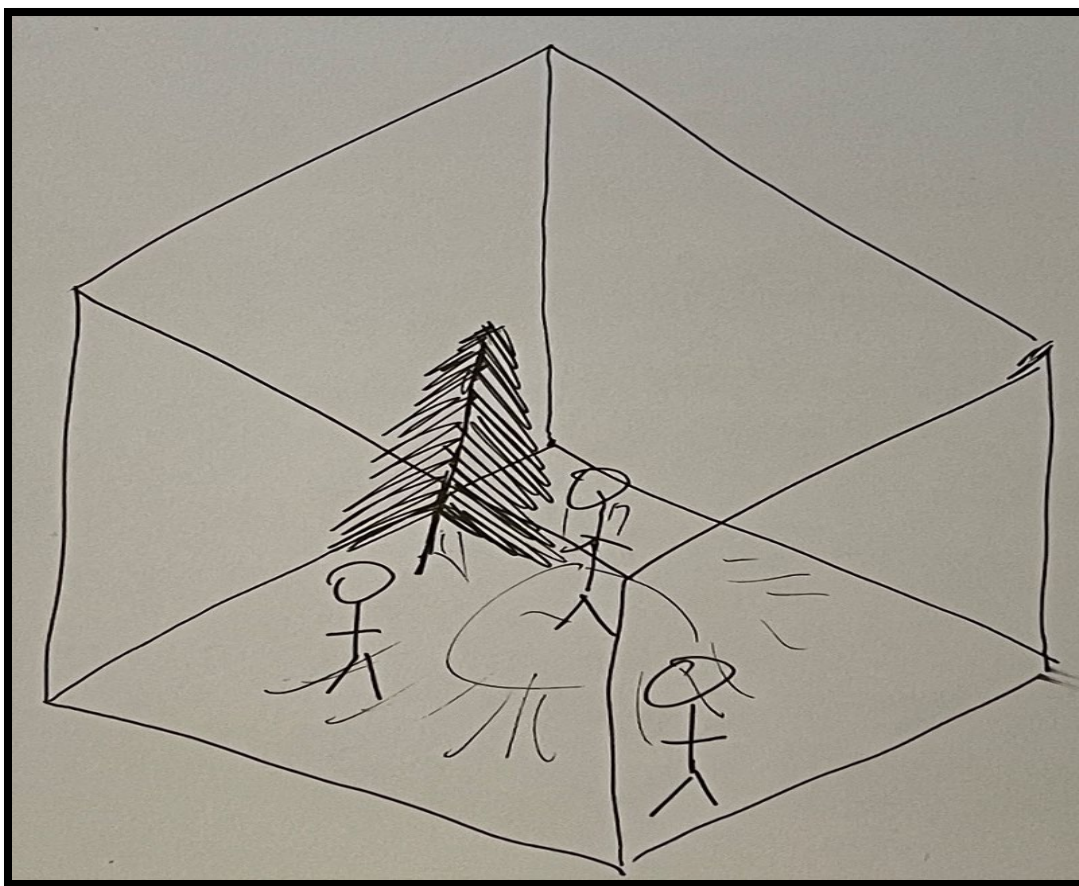


Figure 31 3D performers in a 3D space. Illustration: David Mills-Low

The next step in the formation of geographical space is to place our performers into three dimensional space along with our environment. Basically, we make the background a cube instead of a rectangle. This looks more like figure 31. This formation gives us characters in relation to one another as well as in context with the artifacts around them, like the tree and the poorly drawn hill. If we were hanging out in a virtual space, we might be able to move around the characters, which is fun, but doesn't give us the perspective of the audience, the fixed perspective. In order to do that, we're going to need to pick a rotational point in the middle of our figures. This point represents the pivot point of a viewer, standing in the middle of the

action. This viewpoint is the same viewpoint we achieve with 360 video. But unlike a 360 video, in which the audience can look wherever they want, we want to use the filmic technique of framing our shot, in this case, framing the backdrop, which the performer will stand in front of. Our pivot point is figure 32. (Probably my most compelling illustration yet.)

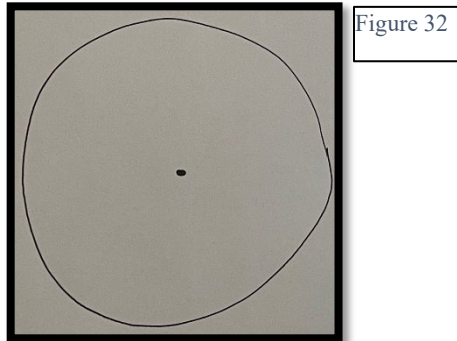


Figure 32

Now that we have our pivot point, we can range our performers around that point, making sure to stagger them in virtual space so they don't look like they're standing in a line (blocking 101). When we imagine each of our performers in the virtual space, we can then make plans for where we are going to take snapshots, capturing the framing of background to go behind them in Zoom. That looks like figure 33.

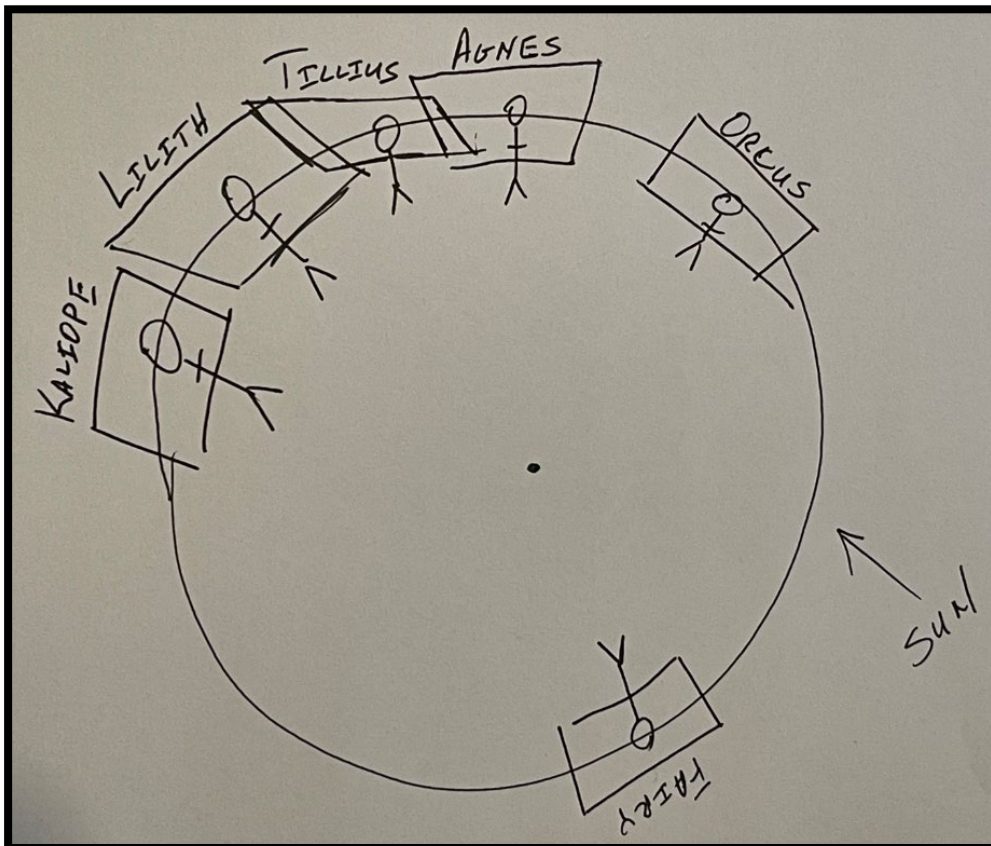


Figure 33

If we then plop down onto that pivot point in Unreal Engine, we can make a virtual sequence, that is, a series of camera moves, using a virtual camera, to export a video of our 3D space.³¹ Once you have this video, you plug it into Adobe Premiere (or comparable software) to capture screen grabs of the points of stillness.

At this point you have a series of 2 dimensional shots of a 3 dimensional space that, when applied as backgrounds, should give the impression of characters standing in a formation that approximates the natural scatter of a group of people in conversation. Something like Figure 34. Each of these backdrops are at a slightly different angle. They also overlap so that the shared landmarks hopefully spark some recognition of context.

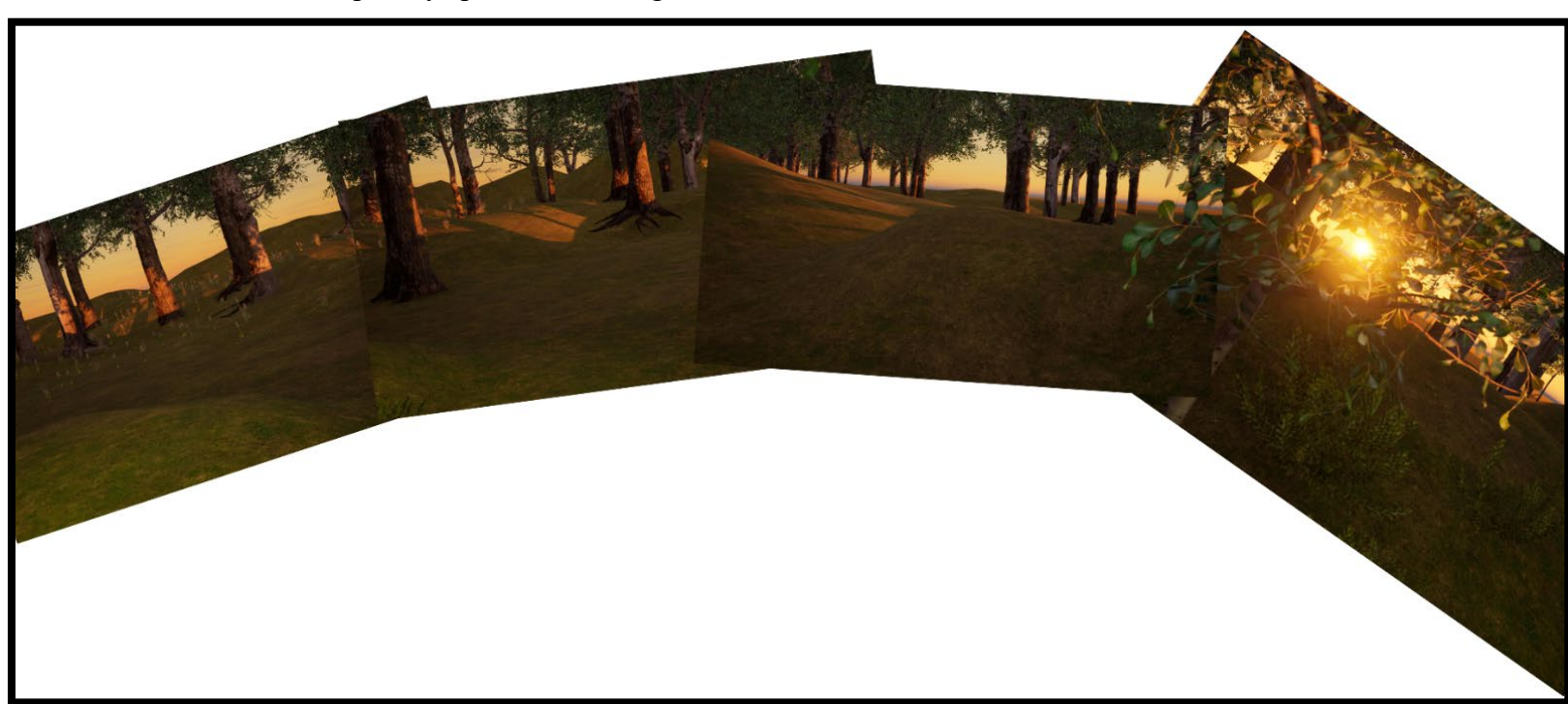


Figure 34: A photoshopped representation of the virtual backgrounds in context with one another, creating the magical fairy forest.. *SKM:VR*, Scene 7, pg. 28. Photo: David Mills-Low

All of this assumes a perfect world. Unfortunately Zoom is not a perfect world. At times, through some bit of luck, elements of the scenery would align. The variable I hadn't taken into account when coming up with this brilliant master-plan, is that, at the time of our production, the arrangement of windows in the Zoom screen is dictated by which camera connected first. At times there was consistency as to where a performer would land, but often they would be in a

³¹ Follow this link for the video I created for this particular scene, that is, The Forest Fairy Fracas of scene 7, <https://youtu.be/IMk5YQ1hQKE>

new location every time, dependent on who turned on their camera a split second before everyone else. With more control over where performers sat, or, if there had been enough time to do some post production editing, we might have been able to strengthen the layout and better establish our characters in the geography of their world.



Figure 35: This was probably one of the better alignment of performers for the sake of geography. Note how the horizon in lines two and 3 match up. In line two, that is because it's a continuation of the landscape that is meeting between the two. In line 3, it was serendipity. *SKM:VR*, scene 7, pg. 28. The performers are Emma Swartz as Farrah the Fairy, Joshua Griffith as Orcus, Kyrstin Hagins as Agnes, Anica Johnston as Tillius the Paladin, Sarah Hertig as Kaliope, and Jade Ware as Lilith. Photo: David Mills-Low

Conclusion:

“The internet has been a thing to keep us connected but it has yet to be a replacement for proximity with each other.” (Taylor, 2021)

Why do we watch theatre? Great question. The answer, as I write this in the spring of 2021, is that we don't. At least not in any form that we expected to be watching theatre. The idea of sitting in the dark crush of a theatre full of fellow humans is terrifying right now, as the world has been shuttered for the Coronavirus pandemic. While the implementation of social distancing is an absolute boon for an introvert like myself, the fact is, that while bars and restaurants have opened for business, theatres in the United States remain shuttered except for a few experiments with reduced capacities. Theatre has not been completely muzzled, but the platform of expression has for the most part moved onto the streaming platforms of the internet. And while Zoom and Google Meet have allowed us to stumble through much of our work and education needs, they make for a lousy theatrical environment. Why? Well, theatre is about immersion. Immersion in a story. Immersion in a concept. Immersion in a communal endeavor.

Zoom is not an immersive medium. I find that, having lived my professional and educational life on played out on this platform over the course of this past year, I suffer from an instant distancing from the other participants in whatever meeting I might be in. Theatre on Zoom is difficult for me to connect with because there is no way to establish that human connection through eye contact, through proximity, through the levels of intimacy that we naturally negotiate in the world. Or imitate through blocking of performers on a stage.

Being in a theater puts you into a context. By establishing rules of proximity we establish context for relationship, between performers, between audience members, between ourselves and the world outside. A film, viewed in a theater captures some of these same elements, the communal experience, the proximity, while adding the bonus of the close-up.³² Zoom, on the other hand, is more like outdoor theatre, where, if you don't show up two hours ahead of time,

³² A filmic close-up allows us to transcend proximity and move into the realm of intimacy. The only time we see someone in a close-up in our day to day lives is when we are standing in the proximity of a lover or someone else for whom this personal bubble popping is welcome. They allow us to dig straight into the soul. But this is a topic for another paper...

you're stuck on wet grass at some weird angle, struggling to make out the figures on the stage, as the most brilliant sunset you've ever witnessed bursts across the sky like the second coming of our lord and savior. To boil that metaphor down, who cares what's happening on stage when there's so much else to look at, so many elements surrounding us that exist in the hi-fidelity of life.

If Zoom Theatre is so rough, why do it? I can't answer this question for every production that approaches the platform, but I can speak for ours, at least to a certain extent. There are probably other reasons that I, as a grad student, was not privy to. But as I see it, if we at the University of Montana are a training institution, then teaching our students to adapt and persist is one of the most important lessons that can be had. Instead of losing a year or more of productions, performance, and practice, we took the risk and gave it a shot. *She Kills Monsters* was the first show of our season and acted as an example to each subsequent production. This platform was our first viable format for rehearsing, performing, and recording a show in the short period of time that we had to make The Pivot. I also believe that this question may be irrelevant. That the question should not be why but when. Of course we should try to do a show on Zoom. Of course we should experiment with form and delivery. The University system is the closest thing that we have in the United States to a "safe place," the place where you can take a theatrical risk and fail. Where it's not only okay to fail, but imperative that failure be a part of the curriculum. That is how we grow and shift and become fearless.

This pivot was a challenge. It was frustrating to lose progress and have to build again. It was heartbreaking to have a grand vision snuffed out. But the lessons learned far outweigh these tiny miseries. By having the scripts shift beneath me, being forced to rebuild, I also learned to build faster and build better. The pivot encouraged an engagement with the technologies that I would probably not have had otherwise, whether this was a deeper understanding of the tools used for building, or the jumping-in-feet-first of learning the software to run and record our streaming show. The pivot made me stronger. The pivot also made me simplify. At the end of the day, movement for movement's sake was more of a flex than a necessity. And perhaps most importantly, I was reminded of the importance to breathe, that often the way through just needs a little more oxygen, a little more time, and the patience to let the way become clear.

As I wind down, I want to reiterate my belief that what we as theatre makers do in theatre should enhance the story, rather than being done for its own sake. New technologies should enhance the audience's understanding or enjoyment of a work, not just wow because they are new. There's a video that I saw a few years ago, of a group using a robotic arm to manipulate a theatrical flat, while at the same time projection mapping shapes onto its surface. My initial response to the piece was "Wow, that's incredible." But that wow factor doesn't give the video staying power. It is using technology to perform a trick. I'm more interested in performing a trick to tell a story in a more compelling way. I think that our embrace of technology is just a trick up the sleeve of the magician, another way of engaging and keeping new audience, or re-energizing that ever dwindling audience base. Technology should be seen as the inevitable evolution of our art form. We can't shun lights just because Shakespeare didn't use them. We don't eschew audio reinforcement just because the Greeks didn't own amplifiers. "According to McLuhan, the cubists linked their painting to the medium of film, which was still new at the beginning of the twentieth century. All modernist twentieth-century art – Poetry, literature, sculpture, music, ballet, film, photography, video art, and so on – links the medium through which it manifests itself to a more modern medium in the hope of discovering what is unique and irreplaceable about its own, older medium." (Mulder, 18)

Here we have theatre. By rubbing it against the new, what fire illuminates our story. With light flickering on theatre walls, we are once again in the cave, seated round the bonfire, taking in the shadow play of our lives cast up on those walls. The pixel is the shadow puppet of the digital age. I recently heard the COVID-19 Pandemic described as The Great Intermission. I think that in many ways this is a perfectly apt description of the theatrical disruption that has virtually shut down our business. But The Great Intermission has also led to experimentation in form, an embrace of technology to disseminate shows to audiences far wider than can fit into our buildings. As we prepare to head into the next act, I think that keeping hold of this spirit of experimentation can only push theatre into more odd and exciting shapes.

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