OCCLUSION: CREATING DISORIENTATION, FUGUE, AND APOPHENIA IN AN ART GAME

by

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Abstract

Occlusion is a procedurally randomized interactive art experience which uses the motifs of repetition, isolation, incongruity and mutability to develop an experience of a *Folie à Deux*: a madness shared by two. It draws from traditional video game forms, development methods, and tools to situate itself in context with games as well as other forms of interactive digital media. In this way, *Occlusion* approaches the making of game-like media from the art criticism perspective of Materiality, and the written work accompanying the prototype discusses critical aesthetic concerns for *Occlusion* both as an art experience borrowing from games and as a text that can be academically understood in relation to other practices of media making. In addition to the produced software artifact and written analysis, this thesis includes primary research in the form of four interviews with artists, authors, game makers and game critics concerning Materiality and dissociative themes in game-like media.

The written work first introduces *Occlusion* in context with other approaches to procedural remixing, Glitch Art, net.art, and analogue and digital collage and décollage, with special attention to recontextualization and apophenia. The experience, visual, and audio design approach of *Occlusion* is reviewed through a discussion of explicit design choices which define generative space. Development process, release process, post-release distribution, testing, and maintenance are reviewed, and the paper concludes with a description of future work and a post-mortem discussion. Included as appendices are a full specification document, script, and transcripts of all interviews.

Acknowledgements

I want to extend my deepest appreciation to my thesis advisor Brian Moriarty and my thesis committee members Dean O'Donnell and Ralph Sutter for their guidance, advice, and help throughout the course of this project. I also want to extend gratitude to the other members of the Interactive Media and Game Development program, in particular Dr. Alexandrina Agloro, who provided me with moral support, research material, and Milka. And thank you to all the IMGD graduate students who offered Unreal Engine advice, playtesting, and comradery during the course of my work.

Finally, endless thanks to my life partner Allison Stout, who has these many months lifted up me and my work and believed in the both of us.

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Introduction

This thesis is written to accompany the experimental art video game *Occlusion*. It first reviews the Critical Context in which *Occlusion* was researched and developed, a section that provides information similar to that of a literature review but written from an art criticism perspective. The Critical Context focuses on aspects of digital art, art games, or traditional art of particular importance to the formation of *Occlusion* and offers analysis which relates these different disciplines and perspectives to one another.

The Experience Design, Art Design, Audio Design, and Technical Design portions of this thesis act as high-level overviews of design practices with design justifications. They include research that builds on the material in the Critical Context, but are more focused on process and production and discuss *Occlusion* specifically. A review of the design and development process is discussed in the Development Overview section, which is written as a formalized "development blog" which works through the ideation, development, and release of *Occlusion* chronologically.

Following the discussion of development activity are sections on the Assessment and Maintenance of *Occlusion*, as well as possible Future Work and Distribution as extended from the work presented here. These sections are Project Management-aligned and include actual assessment results, statistical analysis, and release schedule planning data.

The Conclusion section serves as the post-mortem discussion of the game development process, reviewing successes, failures, and possible future improvements for the project. The Conclusion also offers a final word on *Occlusion* as it is situated in the Critical Context and what might be learned through continued art game making in this space.

Included as appendices are: the entire Design Specification of *Occlusion* which includes detailed requirements sufficient to reproduce the game or a similar effort; the Dialogue Script for the placeholder dialogue in v0.1.0 and v0.1.1 of *Occlusion*, with delivery notes and sources for quoted material; and Interview Transcripts for all four original interviews used in this thesis. Interviewees are Christina "PhaZero" Curlee, art game maker; Ramy Daghstani, developer for Artifact 5; Gillian Smith, game maker and games scholar whose work focuses on procedurality; and Chris Solarski, art and games scholar and author.

Critical Context

Glitch Art, Internet Art, and net.art

Occlusion should first and most importantly be understood as a work of Glitch Art. Glitch Art as a practice can best be understood as an umbrella term for "a variety of techniques that manipulate digital images by altering their digital encoding in unconventional ways" (den Heijer, 2013, p. 109) which is strongly associated with error, failure, effacement, recombination, and recontextualization, and is sometimes associated with proceduralism, generative art methods, (den Heijer, 2013) and Materiality (Greene, 2004). Additionally, Glitch Art can be seen as an emotional or emotionally evocative art practice, acting as political activism (Betancourt, 2016), queer activism (Brooks, 2015), or even humor (as with YouTube series *CAR BOYS* and *Monster Factory*). Glitch Art can be visual, sonic, or ludic. However, this thesis predominantly discusses Glitch Art in visual media.

True Glitch Art is by definition necessarily at least partially digitally produced, focusing in particular on the aspects of error or failure in a digital system. These errors are exposed explicitly in order to show the nature of the system as digital, to show the failure of such a system, and to offer commentary on the system as a vessel of experience, art, or information. Such efforts frequently involve the modifications of an image through procedural tools which produces a series of mutated or "failed" images (Figure 1).

Figure 1: Simple procedurally glitched 2D images made with Eelco den Heijer's "Glitch genotype," which performs iterative mathematical transformations on an image (2013, p. 119). Many similar techniques are available for free use on the internet.

Because an integral identifying characteristic of Glitch Art is its effacement of the digital image to expose the digital material, Glitch Art can be read from the perspective of Materiality. *Materiality* is an approach to art making and criticism which centers the meaning of the work on the meaning of the medium. Typical of Glitch Art is the imagery of the wireframe, lines of code, VHS scan lines and other obviously digitally produced visual phenomena which serve to destroy, mutate, or obscure the image exactly as they reveal its nature as digital. This can be seen as an extension of classic Surrealism, a connection explored further in Digital Surrealism and Psychedelia. However, aspects of Glitch Art practice also cleave very closely to those typical of Post-Modernism and Post-Structuralism, particularly the subversive, image-destroying and system-destroying aspects of Glitch Art. As PhaZero notes, "both net.art and glitch art are arts of subversion. They take things that are highly corporatized and "de-market" them….It's a rebellious way to play with conventions and redefine art…. [It's] a sort of ode to the internet and technology, and

the collapsing of space. Often in my teleporting games I'm talking about the instantaneous transfer of information and spaces, and making them literal" (personal communication, February 8, 2017). In this way, Glitch Art can be seen as in tension with Materiality and with Post-Modernism, explicitly exposing material while simultaneously infinitizing the image, using the images derived from computer or internet information to free an image from its material entirely. This tension is further explored in Materiality in New Media and, from a procedural architecture standpoint, in Glitch in Architecture and Space.

A second aspect of Glitch Art that must be considered in relation to *Occlusion* is that it often involves the recontextualization of images which have been modified, effaced, or destroyed in a sort of digital collage ethic, constructing image and meaning through juxtaposition with other images, glitches, and even text. This practice is far more common in multimedia Glitch Art, such as video art and game art, than in static image art, perhaps because the inclusion of any narrative component or experience of change over time requires a progression of images and therefore puts multiple image components in dialogue with one another naturally. This dialogue can be seen as an act of world creation in which disparate images, some effaced, some whole, act together as elements of a collage to create a new imagined world.

Games such as *Artifacts* (2016) by Christina "PhaZero" Curlee (Figure 2) and *Oĩκoϛpiel* (2016) by David Kanaga (Figure 3) are excellent examples of this practice, where glitch imagery and sound is collaged together with other elements to create an interactive art experience.

Figure 2: Artifacts *by Christina "PhaZero" Curlee, an abstracted exploration simulator featuring images of corruption and repetition as well as imagery generally associated with Internet Art (2016. Made in Unreal Engine 4.*

In *Artifacts*, as well as in *Symposium*, packaged together in an art games series, PhaZero plays with glitch imagery and Internet Art imagery to construct a splintered, disorienting world through which a player may (attempt to) navigate. Gone are most usual constructs of games, such as enemies, health, and menus, as PhaZero puts the emphasis unflinchingly on the glitch experience.

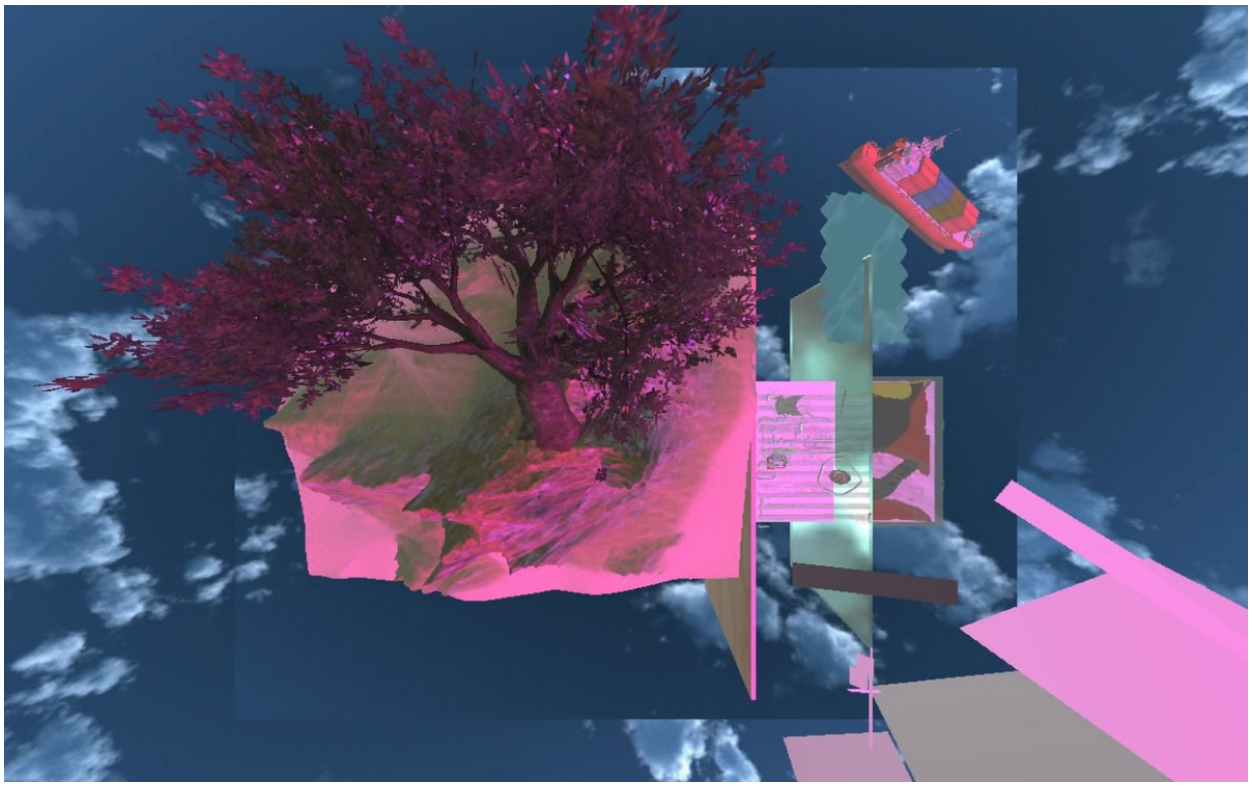

Figure 3: Oĩκoϛpiel *by David Kanaga, an interactive Glitch Art "opera" or perhaps "rhapsody" (Pedercini, 2016).*

Similarly, in *Oĩκoϛpiel*, Kanaga constructs what might be described as a glitch opera, a series of small game-like experiences that proceed from one to the next with no spatial relationship or mechanism allowing navigation between these "scenes." Visually and experientially, *Oĩκoϛpiel* is more interested in surprising recontextualization between elements than it is in the 'pure' glitch aesthetic per se – such recontextualization for Kanaga extends past intradiegetic elements like meshes and into extradiegetic elements like menus, credits, and camera changes, all of which he plays with as experiential elements subject to reuse, manipulation, and effacement. *Oĩκoϛpiel* is theater of the absurd, rapid-fire glitch and collage combining into a rhapsodic experience in the strange.

Historically, Glitch Art has long been associated with art movements that seek to expose the absurdity of reality, such as the mid-century Western art traditions of Dadaism, Events and Happenings (Greene, 2004). And as with many Dadaist works, Glitch Art often plays with humor through absurdity and benign violation. Two popular humorous YouTube series, *Carboys* and *Monster Factory*, both produce content based on the "misuse" of game technology which creates images of comically exaggerated destruction or comically exaggerated player characters, respectively. Part of what viewers find humorous about these images is their denial of the prescribed system behavior and violation of the digital boundaries drawn by the designer which allows for extraordinary amplification – a car twisted inside out, a human face with eyes larger than its mouth, and so forth. This use of glitch is funny in its absurdity, contradictory nature, and explicit denial of a game's anticipated norms or boundaries.

Similarly, Glitch Art is often seen as highly politically charged due to naturally being situated as contradictory. Michael Betancourt argues in *Glitch Art in Theory and Practice* that a political reading of glitch is a necessarily Materialist one (2016). And while certainly Glitch Art must be seen as a Materialist

discipline, queer theory is also a powerful paradigm through which to examine the political implications of glitch.

Andrew Brooks approaches glitch studies as studies on the minoritarian politics of perceived failure or error, metaphorically presented in his work through sonic glitch. Specifically, Brooks looks at how "sonic glitch works alongside queer theory and critical theory, which articulate the productive political possibilities of failure and negativity….[and] uses failure as a methodology….queer theory has reclaimed failure as a site of resistance to normative modes of knowledge production" (2015). Glitch Art as a site of resistance, then, owes as much to its effacement of the current systems of understanding as to its insistence that the negation of an image is meaningful in and of itself, an insistence of the importance of the void, aesthetically and politically.

José Esteban Muñoz identifies this act of alternative space creation via recontextualization action separately from Glitch Art or Internet Art, looking exclusively at queer culture and drag culture. In *Disidentifications*, Muñoz provides a framework to understand efforts of political resistance in the queer community as the process of "disidentification", that is, "the process in which the artist reformulates the actual performativity….[as] treasure troves of queer possibility" (1999, p. x). Muñoz sees this as primarily performative, looking mostly to theatre and drag, but situating game and participatory art as at least partially performative opens the idea of disidentification practices to Glitch Art and Internet Art studies very naturally. "Disidentification is about recycling and rethinking encoded meaning [here, "encoded" can be taken literally]. The process of disidentification scrambles and reconstructs the encoded message of a cultural text in a fashion that both exposes the encoded message's universalizing and exclusionary machinations and recircuits its workings to account for, include, and empower minority identities and identifications" (Muñoz, 1999, p. 31).

Even though Muñoz was working without connection to Glitch Art or Internet Art, his observations are uncannily applicable to glitch studies – he invents a term, *disidentification*, to encapsulate the act of reconfiguring media and recapitulating it as having new meaning, through juxtaposition with other elements or through the modification and effacement of the original media itself. This is, essentially, both collage and non-digital glitch.

In connection with the queer theory critical approach, seeing glitch as political resistance offers a mode of criticism which acknowledges the potential of glitch art to address political injustice through the symbolic reconfiguration or destruction of the current system – here, system being sociopolitical rather than computational. Again, in terms of sonic glitch, "the 'hopped and screwed' tradition seen in R&B and hip-hop offers a unique entrance into how we reconfigure attempts to destabilize colonial, racist, and sexist discourses…the glitch proffers up new imaginings of social justice movements, [and] offers the black digital body a new mode of subverting the traditional structures found in modern day digital games" (Kimberly Bain via Alexandrina Agloro, personal communication, April 15, 2017).

Discussion of glitch in song necessarily invokes remixing, addressed in Procedural Remixing; however, taken from an art criticism standpoint, Glitch Art can be seen as an extension or alternative perspective on remixing (with all its folk art implications) and therefore as an extension of the democratization of digital media which followed the advent of consumer computer products and ushered in the birth of Internet Art and net.art.

Internet Art is an art movement that arose with the widening availability of networked media, and is constructed from and distributed through web-based tools such as websites and email (Wands, 2006; Greene, 2004). net.art, a subgenre of Internet Art, is an early, experimentalist arm of Internet Art particularly concerned with globalization, commerce, and cultural change (Greene, 2004), although in

many ways it has become synonymous with the whole of Internet Art. Rachel Greene characterizes Internet Art as essentially concerned with Materiality: "central to the evolution of internet art are the intertwined histories of the computer and electronic data" (2004, p. 15). Greene also situates Internet Art as primarily concerned with "dematerialization, networks, and information," defining it as preoccupied with communication and distributed activity and marked in particular by an ethic of collaboration and participation, although it is not exclusively participatory (p. 9).

The typical imagery of Internet Art is explicitly digital, self-consciously 'computerized' and often humorously referential to typical website design vernacular; in this way it can be seen aesthetically as Glitch Art's cousin – Materialist and deconstructed but with a focus on networking and communication rather than destruction and revelation. Beyond being superficially aesthetically similar to Glitch Art, Internet Art also shares the sensibilities of recontextualization, and democratized access to the tools of making. Indeed often glitch imagery shows up in Internet Art, especially through the modding or hacking cultures of Internet Art (Greene, 2004) which are themselves approaches to collage, digital surrealism, and remixing.

Procedural Remixing

The second overriding critical concern for *Occlusion*, after Glitch Art, is the aesthetic of "procedural remixing." Procedural, or generative, remixing is the practice of performing remixing non-manually, with mathematical or algorithmic transformations, and while it is not necessarily a digital process it is discussed here as digitally computational. Procedural remixing cleaves very closely to procedural generation but differs critically in that procedural remixing does not create material during processing but rather recombines pre-created elements, such as 3D objects and textures, in a prescribed way. Procedural remixing is a subdomain of Generative Art, or GenArt, which Philip Galanter defines as "any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art" (quoted in Matt Pearson's *Generative Art*, 2011, p. 3).

This paper discusses only procedural behavior during a computer program's runtime, as opposed to procedural pipeline, i.e. procedural computation used to create assets before runtime. Although some procedural pipeline tools were used to create glitch assets used in *Occlusion*, this is not a focus of the research; these tools and their use are described in Appendix A.

An extremely early effort at procedural remixing within the discipline of video games is Osamu Sato's PlayStation 1 Japan-only *LSD: Dream Emulator*, an extraordinary prescient and extraordinarily bizarre 'walking simulator' game released in 1998. In *LSD*, a player navigates a dream with ever-increasing surrealism and abstraction, achieved by moving the player randomly between areas where textures on objects, as well as music and some models in the game world, randomly recombine in increasingly stranger combinations (FirstThirtyMinutes, 2013). *LSD: Dream Emulator* soon achieved cult status and was remade by UK developer Figglewatts as *LSD Revamped* (2014), a faithful but incomplete remake.

Figure 4: Images from LSD Revamped *by Figglewatts, a remake of the original* LSD: Dream Emulator *(2014).*

The degree to which this procedural remixing activity is randomized rather than controlled is primarily determined by the design of the system boundaries, i.e. the definition of what Gillian Smith calls the "generative space" (personal communication, March 18, 2017). According to Smith, the action of defining this generative space can be viewed as both a mapping exercise and "a collaborative conversation between human design and computer algorithm" (personal communication, March 18, 2017). Navas, Gallagher, and burrough expand further on the idea of procedural authorship by defining the author as programmer and computer program as author (2014), or, as Larry Cuba put it, "writing computer code [for generative art] is creating a pattern that creates a pattern. An unpredictable visual composition emerges from a mathematical structure" (quoted in Wand, 2006, p. 148). In this way authorship for generative methods, both creation and remixing, is obscured, a negotiation between a human agent and an algorithm which creates a self-perpetuation, sometimes unpredictable but always ultimately shaped by the (human) designer's mapped generative space.

The act of mapping, of drawing boundaries for procedures that create or modify digital elements, is an act of defining not what a thing *is* but what it *could be*. It is an act of "defining a space of all potential things that the system can generate…*sculpting* a generative space - every line of code you change, every data source you provide, is shaping a multi-dimensional space of objects that the system is going to be able to create" (emphasis added) (Smith, personal communication, March 18, 2017). So this mapping action can more precisely be seen as sculptural, a process by which one author – the human author – of GenArt creates boundaries which are then filled in unpredictable ways by a computational procedure. There is a tension here, between the human/intentional authorship and the computational/unintentional authorship, a tension which Philip Galanter identifies as crucial to the act of generative art creation: "the key element in generative art is then the system to which the artist cedes partial or total subsequent control" (2003, p. 3).

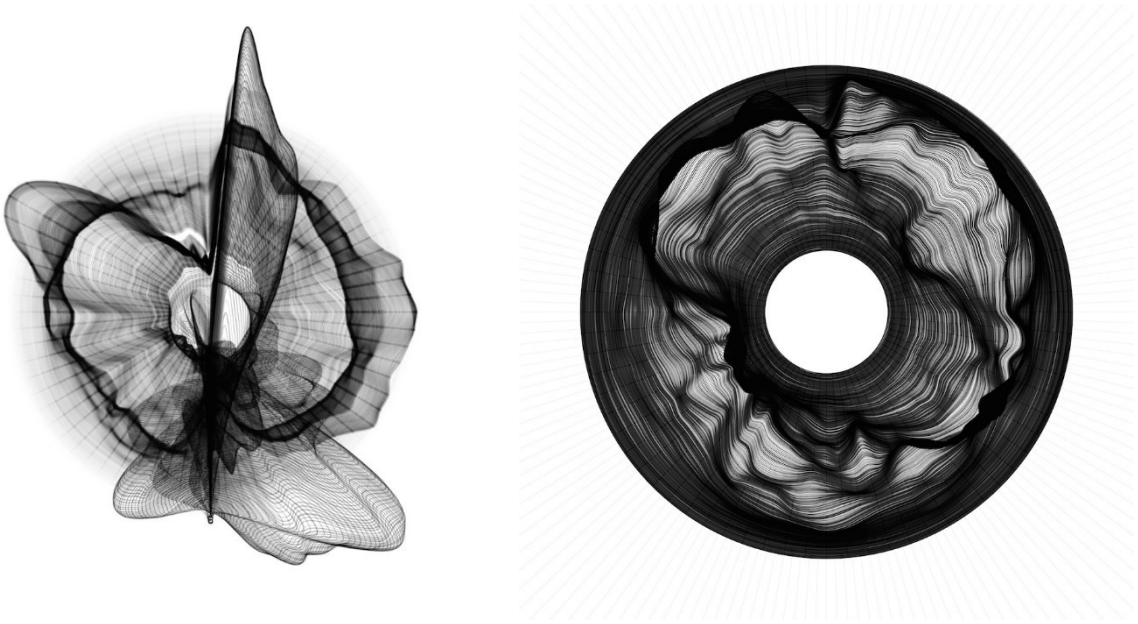

Figure 5: From left, LP27_31_S01 *and* LP21_s11 *from the series* DEATH POP *by Matt Pearson, generative artist and generative art scholar (2015a; 2015b). Matt Pearson's work is a negotiation between artist and algorithm which embraces emergence and chaos.*

The act of ceding authorship and even authorial intent is required by the process of generative art such that expressivity of the generated image is emergent. Emergence, "the observation of how complex and coherent patterns can arise from a large number of small, very simple interactions," (Pearson, 2011, p. 108) describes how small intentional choices on the part of the human author, such as boundary drawing, leads to unpredictable, expressive outputs created by the algorithm. The human author sculpts a superset of possibilities inside which meaning may be unintentionally constructed or at least interpreted: "…expressivity emerges from both the generation algorithms and the input to a system, and…such expressivity can be unintentional. Humans assign meaning to the content that the system creates, without the system itself needing to understand this meaning" (Smith & Whitehead, 2010, p. 6).

Ascribing meaning to meaningless patterns or perceived patterns is called *apophenia*. Apophenia is often engendered through procedural generation or remixing due to the mediated authorship and semi-random nature of production, and this effect is a critical experience goal for *Occlusion*.

Though procedural approaches to content creation or remixing are not perfectly controllable, the sculptural act of defining generative space produces a superset of all possible forms and therefore limits the expressivity of the system. In this way boundary drawing carries meaning.

> Creative computers are restricted in the kind of messaging they can provide and critique they can accept; the cultural context within which these systems operate are informed, often unintentionally, by the perspectives and biases of their human creators. The programmers and designers who author these creative systems make a set of commitments to the nature of the content they create (Philips, Smith, Cook & Short, 2016, n.p.).

Whether an intentional act of design or an unintentional consequence of bias, the sculpting of generative space determines both all possible generated forms and also how widely distributed possible generated forms are, or in other words, the breadth of generation for a given procedure. The wider the breadth of possibility, the more chaotic and unpredictable the output – or, rather, the heavier the burden of

authorship on the algorithm. Smith and Whitehead, in their investigation of the expressive range of level generation, suggest that determining potential breadth, or expressivity, of generative space can be metaphorized through the language of traditional elements of design such as rhythm and line (2010). So here the act of defining the breadth of generative space along different criteria, such as frequency of certain repetitions and degree of continuity between generated elements, is akin to a traditional design task of creating rhythm, continuity, and harmony on, for example, paper or canvas.

This metaphor extends even to architectural design in which parametric methods (generative methods) require defining boundaries (parameters) that are tightly enough controlled to always yield a workable architectural space as well as to bear meaning. These parameters are drawn to yield valid configurations of architecture that must be implementable and beautiful. As Greg Lynn wrote in his review of experimental parametric architecture, *Animate Form*, "the shape of statistics, or parameters, may yield a culturally symbolic form" (1999, p. 39).

Digital Surrealism and Psychedelia

The aesthetics of Surrealism and Psychedelic Art have been inextricably linked to the computer-generated imagery in entertainment arts nearly since its advent, as seen in many early technical demonstrations such as *Adam Powers, The Juggler* (Information International Inc., 1981), *Computer Dreams* (Digital Vision Entertainment, 1988), and *The Mind's Eye* (Miramar Images, Inc., 1990), screenshots of which are shown in Figure 6.

Figure 6: From left, Adam Powers, The Juggler*,* Computer Dreams*, and* The Mind's Eye *(Information International Inc., 1981; Digital Vision Entertainment, 1988; Miramar Images, Inc., 1990). Each technical demonstration is saturated with Surreal and Psychedelic imag*

In part because of the technical limitations of early technology in faithfully recreating more familiar images such as realistic human figures, and partially because of the ability of computer technology to represent imaginative, colorful imagery made for an attractive demonstration, Surrealism and Psychedelia have been linked to digital image making from the very start. Indeed even Glitch Art and Internet Art can be seen as emerging from Surrealism and Psychedelia in this way, following the patterns of image making set in the 1980s.

Surrealism – whether traditional or digital – is made powerful by being rooted in reality, where a familiar context such as a recognizable setting frames and magnifies the strange (Hughes, 1999). Certainly this can be seen in Surrealist paintings such as those by Salvador Dalí and René Magritte (Figure 7), in which familiar elements (accurately rendered fruit, for instance) sets up an expectation of reality which is then subverted. This subversion is achieved by either an unusual recontextualization (obscuring a face or being juxtaposed with non-associated elements), a suggestion of placement or movement that could not exist in the real world (floating), or both. It becomes easy to see how Surrealism, with its emphasis on absurdity, decontextualization/recontextualization, and the destruction or modification of a previously "whole"

image, is truly the wellspring from with Glitch Art and Internet Art emerged with the rise of computer technology.

Figure 7: From left, Son of Man *by René Magritte, 1946, and* Dream Caused by the Flight of a Bee Around a Pomegranate a Second Before Awakening *by Salvador Dalí, 1944.*

Thomas Mical, in *Surrealism and Architecture*, identifies a key feature of Surrealism as revealing the "(uncanny) effects produced by the fusion of decontextualized fragments, human or spatial" (2005, p.6). This uncanny quality can be directly tied back to collage, juxtaposition, and apophenia.

Psychedelic Art, conversely, is specifically imagery produced through the use of psychedelic drugs such as LSD or psychotropic mushrooms, a practice extending as far back as 1000 B.C.E. and perhaps even earlier (Hughes, 1999). *Psychedelia* refers to the general art practice which employs a similar aesthetic but which does not necessitate the use of psychedelic drugs and is the preferred term here, as this research focuses on product rather than process. Psychedelia is related to Surrealism in that it shirks a strict reading of reality in favor of alternative imagery, recapitulating the whole image through visual transformations which are chaotic, non-linear, and repetitive (Briggs, 1992). This differs critically from Surrealism in that the context of reality becomes far less important, with Psychedelia sometimes wholly departing from abstraction into non-objectivism, decoration, and pattern arts.

Such fixation on repetition and pattern is evinced in Fractal Art, an art tradition bridging the gap between GenArt and Psychedelia. Concerned with chaos theory, turbulence, non-linearity, repetitions, self-similarity, scaling, and nesting, and produced through nonlinear mathematical operation such as the Mandelbrot Set (Briggs, 1992), Fractal Art is at once deeply psychedelic and deeply generative. Emphasis on nonlinearity and chaos in Fractal Art means that fractal systems exhibit "*extreme sensitivity to their initial conditions*" (emphasis original) (Briggs, 1992, p. 18), or in other words extreme sensitivity to parameters which define the potential fractal output – although, because fractal systems are chaotic, this is much harder to anticipate than with other types of GenArt. A final defining characteristic of Fractal Art of

critical importance to *Occlusion* is the feedback terms of nonlinear equations which produce fractals: "Continually rerunning an equation inputted back into itself [is called] iterating the equation. This leads to fantastically complex, sometimes eerily beautiful structures that display fractal self-similarity" (Briggs, 1999, p. 25) as seen in Figure 8.

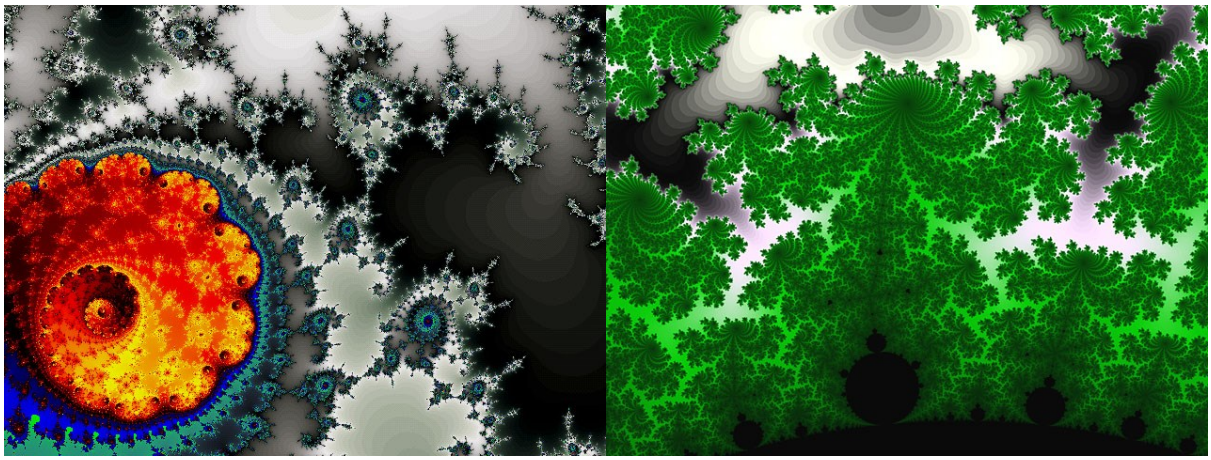

Figure 8: Ice Queens in Sunset *(1997) and* Storm over the Tale Forest *(1997), Mandelbrot-based artworks by Ingvar Kullberg using the MandelZot shareware (Kullberg, 1997a; Kullberg, 1997b). Works like this bring together Internet Art and net.art through the practi*

Repetition, self-similarity, and chaos are critical issues in Fractal Art. They are also dealt with in Surrealism and Psychedelia, and have broad implications for the aesthetics of video games. In games, Fractal Art has been used as a generative method for landscape during runtime, such as in 1984's *Rescue on Fractalus* (Reichert, n.d.), and in many, many other games since, either in the pipeline or during runtime. However, Fractal Art contributes more to the theory approach supporting *Occlusion* than to its direct inspiration, opening conversations of repetition and self-similarity echoed in Glitch in Architecture and Space.

Surreal and Psychedelic imagery in games in general has been very influential to *Occlusion*, and is very common in games that take an experimentalist approach to creation and eschew trappings of commerce, profit, and the AAA industry – another echo of Internet Art.

the static speaks my name (2015), a free Unity game developed and self-published by the whale husband, is an excellent example of soft Surrealism in video games integrated into the entire experience design of the game, not just the visual art design. Throughout *the static speaks my name*, the player explores their (assumed) domicile, an interior space littered with absurd interactions and puzzles with even more absurd and dark solutions. The atmosphere is oppressively strange, and key images repeat in nearly endless variations, twisted, reconfigured, inverted, and virtually wheat pasted across the interior of the architecture (Figure 9).

Figure 9: the static speaks my name *by the whale husband (2015).*

Off-Peak, another short, free, demo-style game developed and self-published by Cosmo D, pushes the idea of Surrealist recontextualization and disorientation by setting a game in a liminal train terminal set up occasionally like an art gallery, mall and meeting place. Here again the mood of the game is severely strange, sometimes alienating and sometimes delighting the player with surreal beauty (Figure 10).

Figure 10: Off-Peak *by Cosmo D (2015).*

Off-Peak acts often as a simulated art gallery, placing art objects with requisition gallery lighting within a non-gallery game world: criticism through recontextualization (a political formulation in parallel with the political glitch). As a collage, *Off-Peak* is both beautiful and constructionist, building meaning through the juxtaposition of art objects with game objects and the conceit of a transportation terminal, pushing the idea of transition and visitation throughout the experience.

Other Surrealist and Psychedelic games rely on the metaphor of a dream or of multiple constructed realities between which the player may travel. *Even in Arcadia, There I Am* (2016, self-published by Aleks Somoylov) and *Dream* (2015, developed by HyperSloth and published by Mastertronic) are both perhaps best described as Surrealist game-like experiences emphasizing transition, movement between

perceived realities, and the denial of the real. *Even in Arcadia, There I Am,* like *the static speaks my name* and *Off-Peak,* presents a dark, ruminative visual aesthetic suggestive of depression or mental illness. *Dream*, conversely, has a much brighter, more gossamer quality of color and lighting throughout, perhaps in part due to the fact that it is developed using Unreal Engine 4, a tool with a very particular and powerful aesthetic explored more in Materiality in New Media and Art Design (Figure 11).

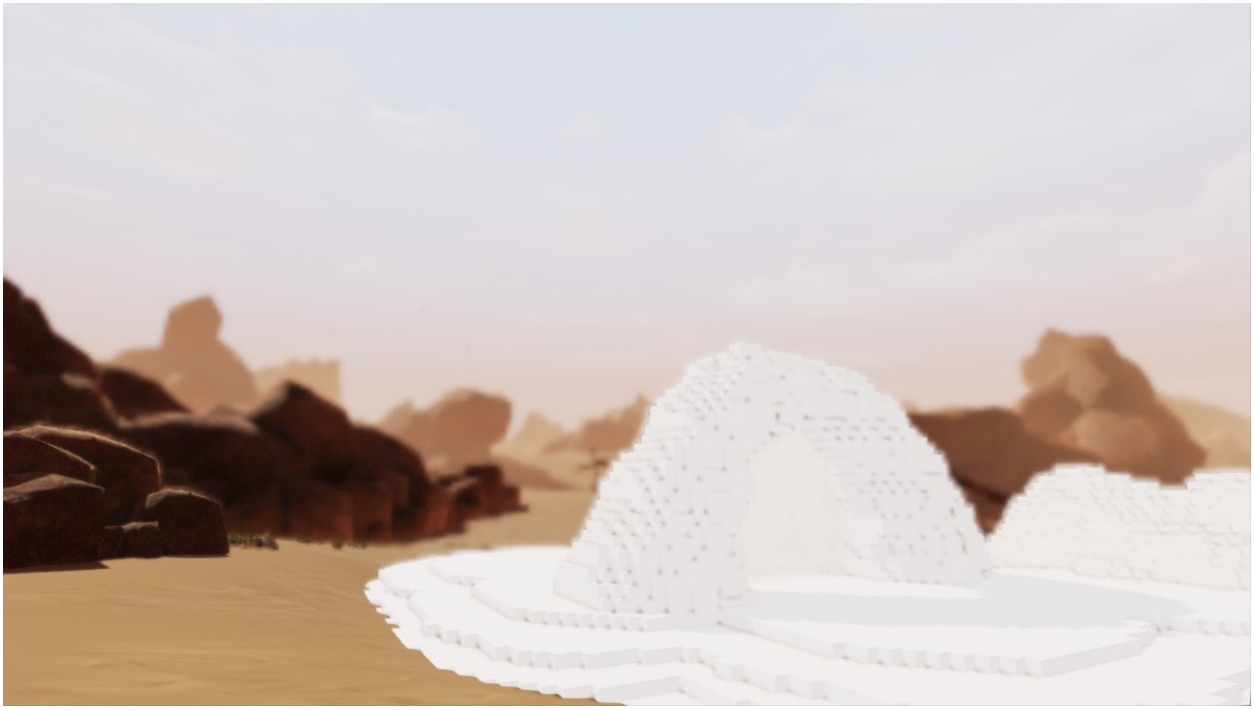

Figure 11: Dream *by HyperSloth, made with Unreal Engine 4 (2015).*

This brighter, somewhat more playful imagery is very common in Surrealist and Psychedelic games, in particular games like *PANORAMICAL* by Fernando Ramalla and David Kanaga (2015), *Psychic Cat* by George Royer (2015), and *Mediterranean Voidland* by Sticky Toffee Games (2017).

In *PANORAMICAL* (Figure 12), Ramallo and Kanaga present what is far more a software toy than anything – a series of scenes which players may manipulate visually and sonically to produce roiling, psychedelic imagery and sound. The designers have drawn a series of relatively forgiving parameters in each scene, allowing players to set values within these bounds via two-dimensional graphing in a sort of manual recreation of generative design. The results are always psychedelic in style – repeating, nested, colorful and unpredictable – and often beautiful, so much so that the designers provide a screenshot mechanism as one of the game's only extradiegetic components, fully situating *PANORAMICAL* as a software toy in the process. This toy-like function is not uncommon in Surrealist games such as *Second Life*, described "Legos on acid" in which players may explore a "very eclectic and surreal" game space to rope play with "the ultimate goal being creativity" (von Borries, Walz, & Böttger, 2007, p. 156).

Figure 12: PANORAMICAL *by Fernando Ramallo and David Kanaga (2015). Once scene is shown here, although many are available in the game, each with their own set of parameters for the user to manipulate to influence the visualization and audio of the scene. It can be described as an art-making tool or toy.*

Psychic Cat (Figure 13), free and self-published, presents playful and even humorous Surrealist imagery by situating the player as, indeed, a psychic cat, who must do psychic battle with inexplicably naked green giants whose mind attacks warp the screen occasionally so severely that the experience is unplayable. True to the humor and absurdity of Surrealism, even a synopsis of the game is quiet funny.

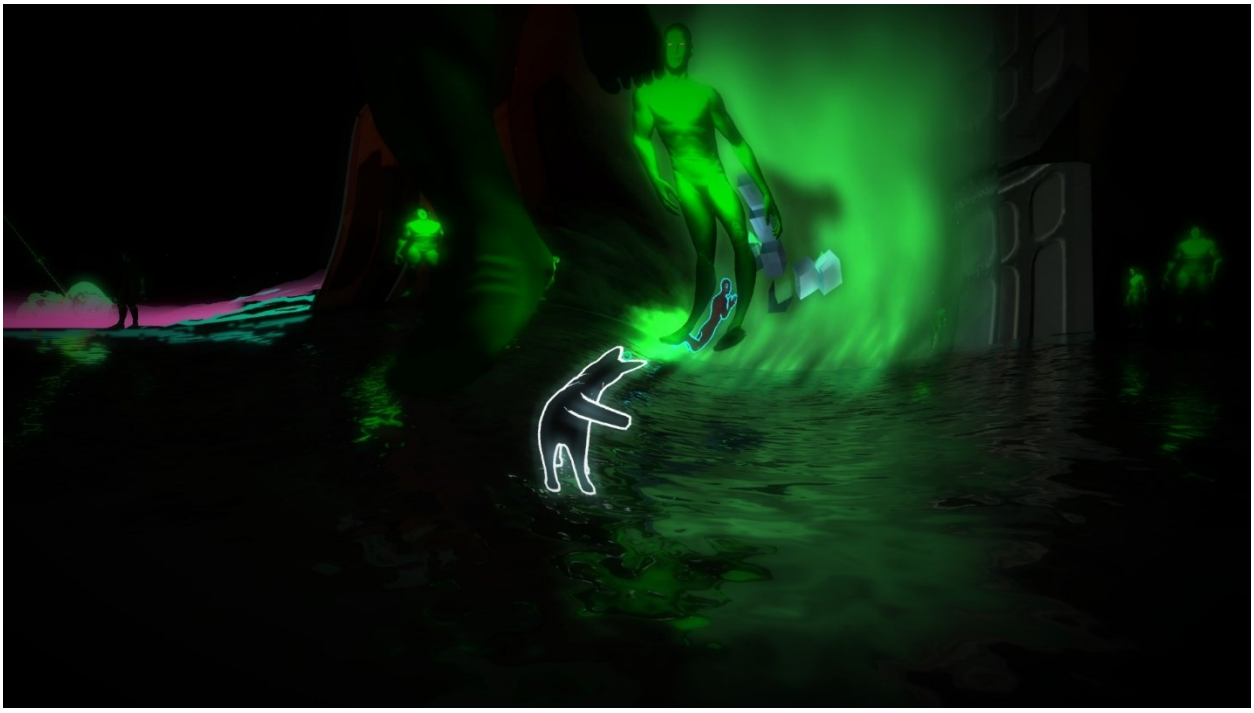

Figure 13: Psychic Cat *by George Royer (2015)*

Even more optimistic and playful in its imagery is *Mediterranean Voidland*, also free and self-published, which gives players strange, expansive views of a charming but incomplete Mediterranean village such as that seen in Figure 14.

Figure 14: Mediterranean Voidland *by Sticky Toffee Games (2017).*

Each of these games presents a view of a constructed world that is bizarre, mutable, or incomplete. And each of these games leverage their nature as worlds constructed in digital – and therefore subject to revelation and change – in a way that demonstrates the Materialist nature of video games.

Materiality in New Media

"Glitch may serve as an interruption of the aura of the digital's illusion of perfection" Michael Betancourt notes in *Glitch Art in Theory and Practice*, but "…glitch becomes political when it creates a stoppage that creates an awareness of that work as a material product" (2016, n.p.).

Materiality is not Materialism. While *Materialism* is a philosophical standpoint that denies the existence of anything outside of the physical manifest world, ascribing all phenomenon to matter and form, *Materiality* is an art movement and critical perspective in which the material of a work of art must be accounted for in its meaning. Or, as Petra Lange-Berndt described, "materials become willful actors and agents within artistic processes, entangling their audience in a web of connections….[this sometimes] attempts to expand notions of time, space, process, or participation" (Lange-Berndt, 2015, n.p.). Of particular importance is this notion of process – that *what* a thing is and *how* it is made are inextricably linked to each other, to the object itself, and to the meaning of the object.

Here, the term *Materialist* is used only to refer to Materiality.

Materiality in video games has already been discussed in previous sections of this paper, but Materiality is more than just one paradigm through which to view video games and video game art. Indeed, it is argued here that Materiality is always a valid perspective on video game art and that any critical conversation on video game art is incomplete that does not address the Materialist perspective.

Materiality can be evoked through sound, through image, through mechanics and even, in certain types of games, through artificial intelligence in which artists "introduce glitches in the artificial intelligence controlling the bots in the game, introducing jerky, repetitive or irrational movement which draws attention to the fact that this behavior is more artificial than intelligent" (Clarke & Mitchell, 2007, p. 17).

Materialist origins of video game art began to form in earnest in the 1980s, with the approach being codified in popular media with the movie *Tron* (Disney, 1982) which gave consumers a coherent vision of what the inside of a computer would look like: a wireframe (Figure 15). This synonymized the revelation of digital material with the video game.

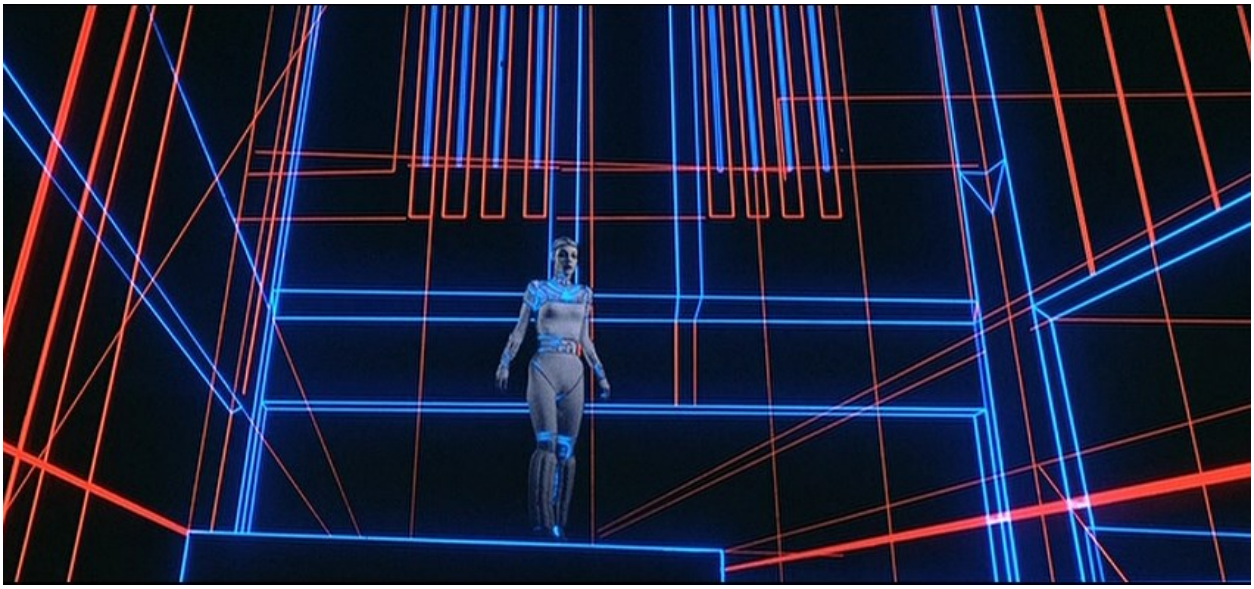

Figure 15: Tron *paints an image of the computer world as wireframed, glowing, and rectilinear – natural imagery to represent discrete, digital data passing through silicon chips at light speed (Disney, 1982).*

Because "digital art is intimately linked to science and technology," as well as to photography, "which are fundamental to its creation and physical substance" (Wands, 2006, p. 11), it is no surprise that digital art and by extension video games, through *Tron* and other pop culture material, is so completely Materialist. The influence is heavy in modern video games as well, from AAA games like the *Assassin's Creed* series, *Fallout* series, and *Portal* series, to indie games like *Asemblance* and the *Ramblings* series by Breogán Hackett.

Ramblings (2016) is a self-published series of six walking simulator games that are at times playful, frightening, and meditative. One particular member of the series called *So We Were All Stuck in the T Pose* (Figure 16) is a humorous and almost confrontational recognition of a game as a digital material, presenting the player with an island littered with human models indeed stuck in the t-pose. The figures reflect human interaction – congregation, both social and religious – and one begins to wonder if their own unseen player avatar is stuck in the t-pose as well.

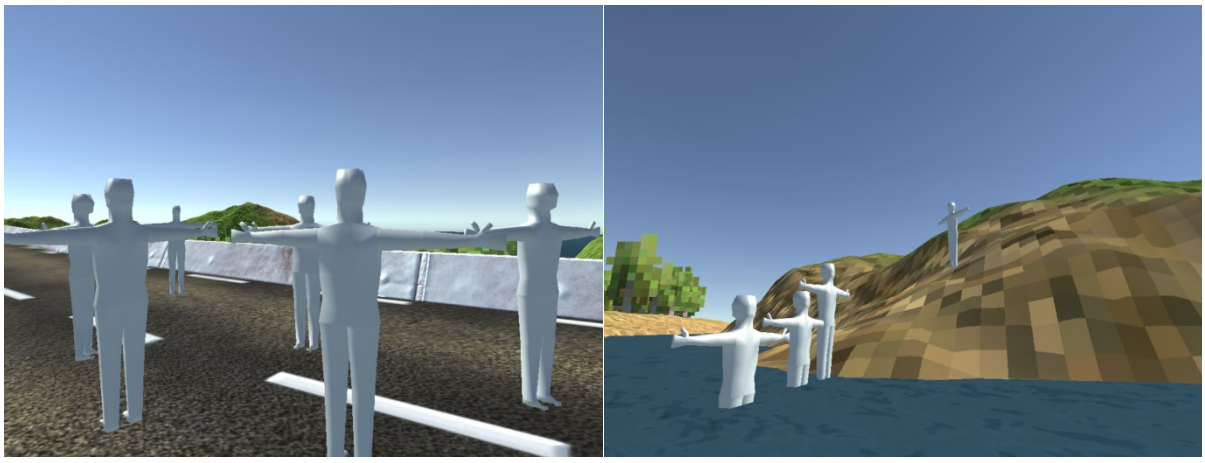

Figure 16: So We Were All Stuck in the T Pose *was originally a test scene before being packaged and sold as a video game (Hackett, 2016).*

The Materiality influence is so pervasive in video games that it influences even the mechanics of play such as player controls. “It is possible for a piece to comment intently upon the nature of games…by frustrating the user’s expectations of what a game should be and how it should act” (Clarke & Mitchell, 2007, p. 17), essentially acknowledging and subverting the expectations attached to work made through a video game medium. Chris Solarski echoes this perspective in his discussion of video game controls, where he extols the virtue of simplistic controls found in games like *Journey* in order to improve immersion, i.e. the erasure of awareness that a game is in fact a game: “the simpler the controls the more easier [sic] it is to be immersed in the experience. You don’t have to think about what you have to do, you can be more fluent as far as interacting with the art experience…And overly complex controls are also a very big barrier” (personal communication, January 30, 2017). If controls are changed mid-stream in a game experience, the “challenge for the player becomes kind of trying to re-reinterpret the controls every time there is a change,” removing the player from an immersive experience by reminding a player that they are playing a game (Solarski, personal communication, January 30, 2017). So even game controls can push this Materialist effect if formulated in a certain way, and many AAA games with complex controls and UI elements do precisely this, especially competitive games such as *Defense of the Ancients* and *Overwatch*.

Finally, game-making tools themselves are strongly indicative of a video game’s digital material in a way that is difficult for makers to avoid, and some game artists even leverage this effect intentionally. PhaZero, who uses Unreal Engine 4, discusses her choice to do so as being influenced by UE4’s unique, recognizable aesthetic, saying that it’s “a running joke that things like the ambient occlusion and light effects in Unreal are just ‘too much’….I like using this overpowered machine and subverting it for these crazy little art projects. The tension between the technology and the idea, just feels right to me” (personal communication, February 8, 2017).

Gillian Smith expands on this idea and also includes architectural modeling tools in the conversation:

> So, I think [people recognizing certain game-making tools by the aesthetic of the product] is something that happens in games as well as architectural modeling tools for sure. It's often pretty obvious if a game is made with Unity, especially if the people making it have kept certain default behavior….I think this is something to be expected, and not necessarily bad. The tools we use shape the artifacts we create with them. Doug Engelbart (famous for inventing the mouse) had a nice piece on "augmenting human intellect" where he talked about how the tools we use circumscribe our behavior….Game engines and generative design software are more complex examples of this, where the space of potential artifacts that can be made are framed and limited by the capabilities of the software (personal communication, March 18, 2017).

David Myers calls this effect the “anti-aesthetic,” language which certainly recalls Glitch Art and Internet Art, and links this directly to mathematical recursion:

> Recursive contextualization establishes the basis for a computer game aesthetic, or, perhaps better, an anti-aesthetic. This anti-aesthetic is an aesthetic of the psychophysical and, as such, borrows assumptions and claims from evolutionary psychology.
>
> …These invisible and mysterious domains may be as mundane as those portions of the electromagnetic spectrum beyond our natural vision or as exotic as quantum-level physics. We access such domains, if at all, through anti-intuitional means—for example, through some mechanical device substituting for natural perception (e.g., a radio telescope)—or, alternatively, through the formal abstractions of mathematics or some other, similarly non-linguistic representational system.

> A computer game anti-aesthetic posits a formal and cognitive aesthetic, which, strictly speaking, reveals, rather than constructs, emotional response. This aesthetic is located in the interpretation and manipulation of symbolic form rather than in the assignation of any particular content, value, or meaning to that form (2010).

To Myers, the material of the digital is prima facie subversive to a traditional concept of the aesthetic because of its denial of the physical material of our manifest world. This so-called anti-aesthetic, or perhaps more easily read, "contradictory aesthetic," is a defining characteristic of the video game. And this contradictory aesthetic reveals instead of constructs the image – just as Glitch Art reveals the material beneath the illusion, or as décollage reveals the construction beneath the image.

Glitch in Architecture and Space

It is possible to represent Glitch Art through architecture and the design of space just as it is possible to express Surrealism through architecture. In fact, because many early applications of computerized visual representation were architectural or spatial in nature – design specification, blueprints, CAD, and digital camera work in cinematography (Wands, 2006) – and of course continue to be, digital material and architectural design remain tightly interwoven.

Surrealist architecture affords a perspective to begin discussing Glitch Art in architecture: "The destabilization of space was one of the means through which surrealist subversion challenged the architectural paradigm within which reason orders tangible reality. Space, after all, is defined through the architecture that contains it, as well as the architecture that is contained within it" (Mical, 2005, p. 60). And it is no different in a simulated world, such as the world of a video game, where space is more freely delineated and can explicitly challenge this "tangible reality" with non-Euclidean arrangement – just as Glitch challenges the real. Notable examples include the hugely popular *Portal* series, *Antichamber*, and the unreleased *Manifold Garden*.

Parametric, or generative, architectural design is usually performed with the aid of software such as AutoCAD. The technique can help artists represent what is "underneath" the architecture. One such approach is what Grey Lynn, in his review of experimental parametric architecture *Animate Form*, called *phenomenal transparency*: "Phenomenal transparency is the tracing or imprinting of a deeper formal space on the surface" (1999, p. 12). Simulated or real architectural space which is moved through again and again can be designed to bear that usage just as it reveals it, which in practice will result in a sort of "averaging" effect on architecture which reveals the patterns of usage that underlie the architectural form that contains it.

In a more literal sense, architectural form is often glitched – effaced, destroyed, or contorted – within digital art and art games. This often coincides with the 'holodeck' type Materiality approach that reveals the digital material of a game or involves uncanny repetition in architectural environments. As with *P.T.*, *PuniTy*, and *Asemblance*, all discussed in Designing for the Aesthetic of Change, repeating interior space contains small variations that build meaning in layers over time, each iteration adding additional information.

Anamorphine, in development by Artifact 5 (unpublished), uses unreal, twisted, or destroyed architectural spaces as a narrative device. In *Anamorphine*, players often do not have the ability to backtrack through the architectural spaces of the game, with screen effects that appear to erase, destroy, or break the current play space as shown in Figures 17 and 18.

Figure 17: Scene from Anamorphine *showing one architectural area, a doorway and wall, being effaced to give way to another, a balcony scene with a female character (Artifact 5, 2017).*

Figure 18: Scene from Anamorphine *showing cabinetry and doors which stretch up towards exaggerated ceilings, extending interior space in an eerie effect (Artifact 5, 2017).*

Here, architectural effacement is mimicry of the emotional process of moving through memories, as one memory gives way to the next related one. It is also a metaphor for an emotional state, the visual

deterioration of a doorway, for example, standing in for anxiety and regret. Magnifying these experiences is the fact that the deterioration effect is used as a spatial transition from which the player cannot backtrack.

It is, however, worth noting that this type of architectural destruction – that leads to another play space rather than revealing some underlying reality or material – is less akin to Glitch Art. It is a denial of the material that infinitizes the scene as symbolic: "The denial of reality, of the material, is necessary if form is to emerge as a meaningful symbol, as an autonomous creation of man" (Costa, Riley, Robbins, & Betsk, 1998). So this type of architectural effacement is not Glitch Art per se but shares with Glitch Art an interest in destroying image as a revelatory act. Architectural effacement that reveals an underlying function or principle that guided the design practice, such as revealing phenomenal transparency, can be said to be Glitch Architecture.

Collage and Décollage

Traditional critical analysis of collage and décollage (deconstructive, or subtractive, collage) can be very informative for understanding aspects of Glitch Art, procedural remixing, and Surrealist Art.

The act of construction in collage is performed through the collection, aggregation, curation, and juxtaposition of elements. In décollage, an image is created through removal, destruction, or breaking to reveal the fabrication of the material or the illusionary nature of the image the material once depicted. In this way collage can be seen as akin to architecture and Surrealist Art whereas décollage is a practice related to Glitch Art, a strongly Materialist act in which, like the video Glitch Art of Victor Lui, "…features are effaced, leaving behind ghostly traces of what was never meant to be visualized" (Greene, 2004, p. 194).

Collage is a rich source of critical analysis for understanding Glitch Art and remixing. As a discipline it is primarily concerned with juxtaposition, context, and semiotics. As collage artist Matthew Rose describes it, semiotics is important to collage because it is "the study of signs, symbols, and the construction of meaning….Studying sounds and signs of all kinds open you up to the real – that is – the fragmentary nature of reality" (quoted in Randel Plowman's *Masters: Collage*, 2010, p. 74).

Joyce Hill, New York-based collage artist who focuses on images of city life, displays the breadth of expression collages are capable of in her work (Figure 19) (Plowman, 2010). Her imagery spans the playful to the serious, the colorful to the mundane, and the human to the industrial. Joyce Hill uses a layering, additive collage technique to create her images and playful, bold juxtaposition that recontextualizes humorous or glamorous human elements with rough industrial textures, chicken wire, and scribbled writing.

Figure 19: From left, L.A. *(2008) and* Ladies, Please! *(unknown year) by Joyce Hill (Hill, 2008; Hill, n.d.).*

Although Glitch Art and procedural remixing are very rarely talked about in terms of collage, the practices share an essential ethos: "an innate sense of design and a passion for their materials…[along with] an uncanny gift for visual choreography" (Plowman, 2010, p. 7). The characterization here of uncanniness is no mistake – it is a specific descriptor of the effect of intentional juxtaposition of disparate elements or the perceived relationship between juxtaposed elements when none was intended, i.e. apophenia. For this reason, the critical context of traditional collage is an important and fruitful paradigm from which to view Glitch Art and remixing.

Regarding remixing, even randomness is an important aspect of collage, analogue as it is – Kim Printz, abstract collagist, asserts that "some of the collages that I've been the most satisfied with were total accidents," a sentiment echoed by many collage artists (quoted in Plowman, 2010, p. 148). Although it is worth noting that this randomness is in the "pipeline" rather than at "runtime." However, a collagist could also be seen as determining their procedural space by curating materials that will be included in a work and allowing any possible connection between those elements (the "randomized" results of their practice) to arise to their audience.

Collage is also a useful critical perspective for Glitch Art and remixing because it is strongly related in process and approach to the modding and hacking communities of computer art that are so influential in those digital art practices (Greene, 2004; Clarke & Mitchell, 2007).

Experience Design

Summary

Occlusion is a procedurally remixed walking simulator created in Unreal Engine 4 about physical and psychological change. It combines aspects of Glitch Art, digital Surrealism, Psychedelic Art, and collage to present a short experience with the narrative theme of a *Folie à Deux*. The design of *Occlusion* is also heavily influenced by research in Internet Art/net.art and architecture, particularly parametric architecture.

Play in *Occlusion* is contained within one interior space, reminiscent of a partial domestic living space, consisting of a hallway leading to three rooms. The player moves through this area only to return again to the entry of this same interior space again and again, each time finding that objects, textures, narration, and other elements have changed. Each iteration, these change becomes increasing unpredictable, glitchy, and surreal, until the player reaches the 12th iteration.

The 12th iteration of the interior space is identical to the first except for the narrative component, which represents an 'end condition.' After this iteration, play may proceed indefinitely, but after a certain amount of time the player movement will slow down until the player comes to a complete stop, frozen within the game world. After this point *Occlusion* must be reset.

Occlusion has no UI or paratextural material and the only support controls are WASD + mouse movement. Jump (spacebar) is supported to help clear obstacles in later iterations. There are no other intradiegetic affordances, although ESC will quit the game and Delete will restart it, for ease of play and demonstration. This is the entirety of the control design for *Occlusion*.

Experience Goals

The experience goals of *Occlusion* are:

- **Disorientation**: The player will experience confusion and disorientation due to shifting audiovisual elements and narration. This experience will magnify over time.
- **Dissociation and Fugue**: The player's sense of disorientation will magnify into a feeling of dissociation in which the player knows neither who they are within the game world nor their role, seeming to be both a part and apart from the experience. This is related to the experience of fugue in which an individual loses sight of their perceived reality and role in that reality.
- **Apophenia**: The player will encounter scenes and juxtapositions between elements within remixed iterations which are entirely coincidental but which are interpreted by the player as intentional or as having meaning.
- **Curiosity and Wonder**: The act of repeated exploration will engender a sense of curiosity and discovery, fulfilled by the continuous action of discovering unique procedural objects in the game environment which may appear in unexpected ways. Each iteration is highly random, and in later iterations some items will be completely unrecognizable, further amplifying the sense of newness the player will feel during discovery.
- **Anti-Catharsis**: The player will never feel a sense of closure or catharsis during play. Although the narrative component will have an aspect of finality, narration will continue after the 12th iteration and play will progress, seemingly infinitely, until the player begins to slow, eventually stopping game time completely. This effect will not be scaffolded in any way, and by the time a player realizes what is happening the game will already be greatly slowed. Once stopped, the

player can only quit the game, abandoning an infinity of iterations awaiting them which they can never reach.

Core Design Approach and Inspiration

The core design of *Occlusion* is of an experience that becomes increasingly randomized as it is further experienced by the player. To create this magnification of randomization, the procedural space of randomized elements widens over time.

Elements that are fully or partially randomized include:

- Object meshes
- Object materials, the first five materials of a mesh being remixing separately for each mesh
- Object transforms (scale, rotations and placement)
- Ambient music
- Narration (except for iterations 1 and 12)
- Post-processing effects
- Lighting color and intensity
- Skysphere effects and time of day
- Timer values for timed events: time between narration cues and time between door openings

In addition to being heavily shaped by Glitch Art, Internet Art, Surrealist Art, and Psychedelia, the Materialist critical approach, studies in architecture, and traditional collage and décollage, all of which are reviewed in Critical Context, *Occlusion* is influenced by readings in the psychological phenomenon of apophenia and by one particular video game glitch encountered in Bethesda's *Fallout 4*.

Apophenia, "the experience of seeing patterns or connections in random or meaningless data" is not just a pattern-identification process but also "a kind of psychotic thought process" in which people, essentially, see things that are not there (Poulsen, 2012, n.p.). Apophenia in this way connects the narrative theme of madness and the technical approach of procedural remixing. This effect is amplified in *Occlusion* through the use of Glitch Art-inspired procedural remixing, the kind that produces unexpected and seemingly meaningful combinations of elements, for example combinations of certain textures applied to certain objects.

Sometimes the apophenic response to glitch is not a designed experience but is instead "natural." *Fallout 4* (2015), developed and published by Bethesda under Zenimax Studios, is a AAA game released in 2015 with a flourishing modding community of which this author is a member. A major inspiration for the aesthetic of *Occlusion* is an accidental glitching of *Fallout 4* most likely due to a bad mod install, not an uncommon experience in modding culture (Figure 20).

Figure 20: Fallout 4 *images showing unintended behavior in which materials (textures) are misapplied to in-game models during runtime (Bethesda Game Studios, 2015).*

These images are unlikely ever to be reproduced on another consumer's copy of the game. Whatever the root cause of this behavior, the manifestation is the misplacement of textures onto meshes that were never meant to support them. In Figure 20, an unknown pattern resembling lightning or perhaps roots or branches is placed erroneously onto the Road Leathers clothing model, road sign textures are placed onto stone retaining walls, text is placed as the surface of water, and machine parts cover the skysphere looming over the game world. Because models in Creation, the *Fallout 4* game engine, support many layers of textures in addition to the base diffuse and normal textures (such as specular and metal maps for realistic robots), these errors don't always completely destroy the intended textures of models but sometimes simply overlay them. And because LOD (level of detail) textures on models are also stored separately, these misplaced (remixed, in fact) textures may "pop" in or out of existence depending on the distance of the player character camera to the model – the lightning Road Leathers being an example, only discernable at close distance.

Both of these effects are produced by *Occlusion* and are inspired in part by the accidental corruption of *Fallout 4*.

Finally, there have been two overriding game inspirations for the formation of *Occlusion: LSD: Dream Emulator* and *Anamorphine*, both discussed in Glitch Art, Internet Art, and net.art

LSD: Dream Emulator was the earliest major art game that featured what this research calls "procedural remixing." Its atmosphere was at turns playful and frightening, and the unendingness of the experience and its abstraction of its constructed world in a way that revealed its digital material are all aspects that *Occlusion* seeks to capture.

Unlike *LSD: Dream Emulator*, *Anamorphine* forms an explicit, though wordless, narrative that is rooted in the emotional relationship between the player character and another character. Within *Anamorphine*, the player navigates architectural spaces with occlusion-based and emergence-based screen effects,

discovering a narrative about depression, relationships, and change over time. Rather than glitchy or effacing, the visual aesthetic of *Anamorphine* is classically surreal, using familiar contextual imagery to showcase discomfiting elements such as images within images, glowing elements, and elements affixed to the ceiling or walls in a suggestion that space is wrapping in on itself. This is a huge influence on *Occlusion*, in particular the way *Anamorphine* dealt with narrative and the navigation through space as a narrative component. Small touches in *Occlusion* such as the inclusion of moving boxes owe to *Anamorphine* as well as to *the static speaks my name*.

Interaction Design

User interaction in *Occlusion* is fairly limited, since the game only supports WASD + mouse movement and jump, in addition to two extradiegetic commands: quit and restart.

The simplistic navigation controls are chosen to focus attention on the audiovisual experience of *Occlusion* and to generally simplify the interaction process, while quit and restart commands are conveniences.

Even still, there are many considerations around the player controller and user experience. Firstly, the player movement speed is reduced from the First Person Shooter presets in Unreal Engine 4 to produce a slower, more thoughtful exploratory action within the game world.

Similarly, the field of view (FOV) will be reduced from FPS presets. Reducing the FOV has two effects: first, it recalls 1990's console games such as *LSD: Dream Emulator*, from which this experience draws, and second, and most importantly, it narrows player's vision and cuts off their peripheral vision. A reduction in FOV will result in a sense of "gaminess" (in the Materialist paradigm) and unreality. Narrowing the player's vision will also magnify the player's sense of uncertainty and discomfort.

Raising the camera is necessary because the default camera height is unrealistically low, and a higher camera makes architecture and set dressings appear more natural. It also increases the impression of low ceilings discussed in Architectural Design.

Finally, to avoid visual clutter and the implication that items within the experience are interactive, the HUD crosshair is removed.

These player character modifications strip down the UI/UX components of *Occlusion* to their bare minimums, allowing exploration and nothing more, and allowing users to view the world through a limited window. Players will be reminded they are using a computer and in many ways are playing a game – a game which in other ways contradicts game conventions.

Folie à Deux: A Madness Shared by Two

For an experience as abstract and randomized as *Occlusion*, a scaffolding mechanic is required to help shape the experience into coherence. In addition to repeating architecture which contains the remixed elements, a narrative component is used to give structure and cohesion to an otherwise very abstracted game. Narrative as a structuring component to an abstract or psychotic experience is a natural choice; as Marie-Laure Ryan notes in *Narrative across Media*, "the act of narrating enables humans to deal with time, destiny, and mortality…through narrative we also explore alternate realities and expand our mental horizon beyond the physical, actual world" (2004, p. 2-3).

The story of *Occlusion* is the story of two characters experiencing a *Folie à Deux* (French for "a madness shared by two").

> 'Folie à Deux', a relatively rare syndrome that has long since attracted much clinical attention. Although 'Folie à Deux' is probably the most widely used term for this type of disorder, many other terms are used synonymously such as 'double insanity' and 'psychosis of association',
>
> In this context exposure to the primary could act as a psychosocial trigger for a 'transient psychotic phenomenon' in a subject who would have developed a psychotic episode in any case.…
>
> The shared psychotic symptoms themselves need not only be delusions but also be hallucinations. Secondaries, traditionally described to have a submissive role in the dyad but otherwise mentally sound, could actually be extremely vulnerable to developing or having a significant mental illness themselves (Arnone, Patel, & Tan, 2006, n.p.).

Not only does the theme of a *Folie à Deux* reflect the theme of dreams or unreality very common in Surrealist Art or Glitch Art games, it also helps connect a potential narrative to the deconstructivist, fragmentary visual aesthetic of the game and emphasize transitions, movement, and hidden relationships or associations. Additionally, a narrative based on *Folie à Deux* is a natural fit for engendering the experience of apophenia because it is a psychological process involving imagined information extrapolated from real information – seeing things that aren't there – and because it is a "psychotic" process of creating erroneous connections.

The creation of the narrative component draws also from the narrative-based walking simulators *Gone Home* (2013, Figure 21), *Dear Esther* (2012), and *Eidolon* (2014). In all three of these experiences narrative material (audio, written, or both) is parsed out over time as a player explores a play space. Narration slowly becomes increasingly complex and even, in the case of *Dear Esther*, increasingly cerebral and confusing.

Gone Home in particular is a great example of how audio narrative can be paced within a single interior environment and be successful even if the player does not experience all, or even most, narrative audio cues.

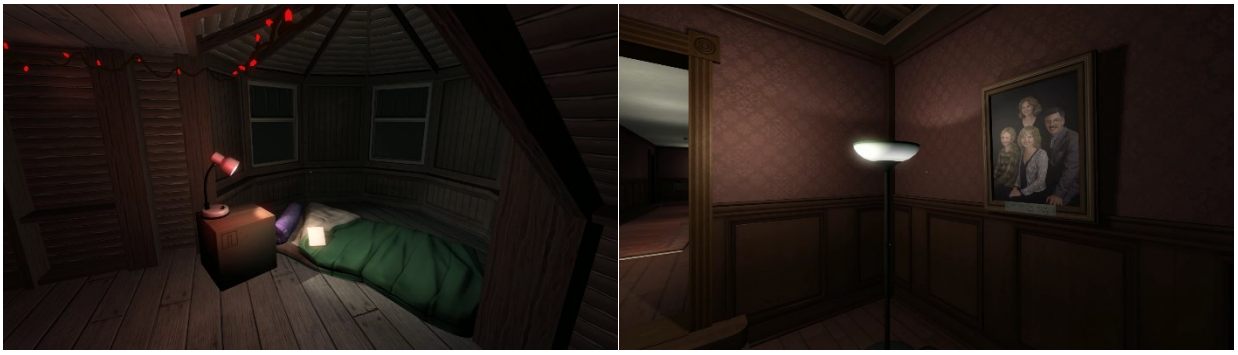

Figure 21: Scenes from Gone Home*, a game by The Fullbright Company that uses environmental narrative and audio narrative to pace a walking simulator experience entirely within a home interior (2013).*

Even though *Gone Home* takes a very different approach to narrative than *Occlusion*, it is an excellent example of a narrative told through distributed cues in a small interior space.

There is a rich history of the signature of madness and psychosis in narrative construction, reaching back much farther than the advent of computer technology. David Myers noted that video game narrative practices spring from previous unconventional narrative practices that reflect madness, impermanence, unpredictability, and even mysticism or philosophy through what Myers calls "paradoxical recursion."

> …forays into the un- and anti-conventional within narrative are translations within that narrative form–unless or until these become something else, either something untranslatable entirely or something other than narrative: for example, "mysticism" (Blake), "philosophy" (Nietzsche), "madness" (Blake, Nietzsche, Kafka), or some other.
>
> Indeed, "poetic" language itself can be considered an excursion into a sort of linguistic "madness," in which words and meanings range—sometimes uncontrollably and unpredictably—beyond their conventional use.…
>
> Literature remains most essentially a process of communication in which meanings and values are transmitted (or shared, if you prefer) from person to person through a common language/code system that is, importantly, grounded in human experience. In contrast, during computer game play, meanings and values are neither definitively made nor permanently grounded (2010, n.p.).

The narrative of *Occlusion* then is formulated as an "anti-narrative," something neither concrete in meaning nor "permanently grounded" as Myers says. To emphasize this effect as well as to emphasize the collage ethic of the experience as a whole, narrative lines are written as a collage, with lines sourced from wide-ranging material, both fiction and non-fiction, coinciding randomly to form new meaning as a cutup or blackout poem might. This is narrative reflecting psychosis, reflecting transition, and reflecting change.

It is also a narrative design which defies the "correct" or "whole" narrative image. Marie-Laure Ryan writes that "the standard case of dissociation occurs when the story is so poorly presented that the audience cannot reconstrue the proper script" (2004, p. 10). Here Ryan is making a valuation of "failed" narration just as one may make a valuation of a "failed" image in Glitch Art (and here Ryan gives no criteria for success, but in *Narrative across Media* a successful narrative is generally taken as one with clarity, coherence, and meaning communicated to the reader). But when the goal of the narration component is a dissociative effect, as it is in *Occlusion*, this "failure" of narrative becomes the objective. One could accurately call this practice Narrative Glitch.

See Audio Design for details on how the narrative script itself is written.

Design for the Aesthetic of Change

Because *Occlusion* incorporates procedural remixing and therefore unpredictable behaviors during runtime, designing for continuous change must be addressed specifically during the design process. Although the activity of designing for change is in part a matter of designing the generative space of the remixing processes, the activity must also include a design process that conceives of how this generative space must change over time to present an experience with sufficient magnification to support the experience goals and narrative. Magnification, or escalation, is achieved through script design which broadens the procedural boundaries of remixing elements over time (see Scripts). However, this magnification can quickly become untenably alienating without experiential scaffolding to provide some kind recognizable or stable context for player navigation.

Providing this stability is critical to the success of *Occlusion* as a game experience. Movement through repeated architecture is used as a scaffolding device to provide a sense of rhythm and predictability within

a highly disorganized and unpredictable experience. Architectural studies are well suited to draw from for a game like *Occlusion* since architecture is both highly aligned with Materiality and has a long history of dialogue with Surrealist Art (Mical, 2005). André Breton characterizes surrealism in architecture as "pure psychic automatism…based on the belief in the superior reality of certain forms of association heretofore neglected, in the omnipotence of dreams, in the undirected play of thought" (quoted in Mical, 2005, p. 3). Here Brenton also acknowledges the tension between the revelatory function of Surrealism – showing a so-called superior reality – with the obscuring action of Surrealist Art – the dreamlike and the undirected.

Repeatedly returning to the same architectural space each iteration provides the player with a grounding element of rhythm, a literal and metaphorical container for the procedural remixing action of the game; the architecture becomes the stability to the set dressing's dynamism.

Unlike stasis, or unmovingness, architectural stability is engendered precisely because of the player's rhythmic, iterative motion through spaces: "**stability** is the ordering of motion into rhythmic phases…multiplicity, change, and development are characteristic of stability" (emphasis original) (Lynn, 1999, p. 14-15). Stability of architectural space, then, is dynamic tension, the action of constant but predicable motion and countermotion. In parametric architecture this tension is literal, an action in which linked shapes "either (1) mutually redefine their respective surfaces based on their particular gravitational properties or (2) actually fuse into one contiguous surface" (Lynn, 1999, p. 30). This tension is a recapitulation of the tension identified by Brenton in surrealist architectural practice and this language could just as easily be applied to the psychological phenomenon of a *Folie à Deux*, in which interactions between a Primary and a Secondary sufferer modify each other's experience of psychosis stabilizing a psychological relationship which contains unstable psychological behavior.

In practice, designing for this type of change within an architectural space has a few forerunners: in addition to *LSD Dream Emulator* and *LSD Revamped, Occlusion* can look towards *P.T.* and its Unity fan remake *PuniTy* as well as to *Asemblance*.

In *P.T.* (Figure 22), short for "Playable Teaser" (its function for publisher Kojima Productions), a player navigates a hallway that repeats, each time with small changes that progress the narrative and imbue the experience with a powerful atmosphere of horror as well as discovery, since players must check everywhere – even their UI – for clues to get to the next iteration (Robinson, 2015a). *P.T.* is informative to Occlusion's design not only in terms of the repeating interior room structure, but also with the pacing of changes and distribution of changes over time within such a structure. However, *Occlusion* takes a very different approach than *P.T.*; whereas *P.T.* has a strictly designed progression across iterations, *Occlusion* is far less prescribed and controlled and is a surrealist experience rather than a horrific one. *Occlusion* also only uses a few key prescribed changes during the whole experience to communicate narrative content.

Figure 22: Scenes from P.T.*, a horror game about continuously looping through a single interior space, the most similar navigational arrangement to* Occlusion *seen in a commercial game (Robinson, 2015b).*

In 2016's *Asemblance* (Figure 23), developed and published by Nilo Stuidos, the player is tasked with returning again and again to a limited number of environments which are explicitly simulated within the fiction of the game (a common 'holodeck' approach, and a strongly Materialist one). Upon each return to these areas, small but significant changes have occurred that move the narrative forward and provide environmental storytelling, very much like *P.T.*

Figure 23: Asemblance *from Nilo Studios requires the player to return many times to simulated environments to solve problems and resolve an ambiguous narrative told with only sparse audio and text narration (Nilo Studios, 2016). Glitch effects are used to signal some story elements such as approaching key events.*

In these games, backtracking is impossible. *P.T.* moves only forward, *Asemblance* uses the march of time to prevent going backwards, even *LSD: Dream Emulator* and *Anamorphine* limit backtracking to some extent. And similarly, the central navigation action in *Occlusion* is moving between identical architectural spaces where each space is separated by a portal or boundary which the player cannot return though. In *Occlusion* these boundaries are doors that automatically closes behind the player so that return to previous iterations is impossible. Doors that open before the player, to allow forward progress, are on a randomized delay so that progress is unpredictably impeded, but still always forward-moving.

Forcing players relentlessly forward is a Psychedelic effect, an effect of constantly moving through portals or transitional spaces, ever inwards – a very common theme in fractal scaling and nesting imagery of Fractal Art as well. Continuous movement through 'portals' (doors) in *Occlusion* is not only a stabilizing effect through repetition, but it has a morbid unendingness, a factor which will contribute to the experience of anti-catharsis and fugue.

"We started with portals as …a way of stitching the narrative together." Ramy Daghstani says of early *Anamorphine* development, "but we also want the player to move to another space emotionally….portals go one way, transitions go one way…[there is a] morbid aspect of it and it is in line with like making a

kind of dark gloomy game that's not about usual gaming topics like heroism or bravery" (personal communication, February 6, 2017). There is a morbidity or fatalism in the act of continuous movement, a forfeiture of control over the spatial elements of the experience, a constant relinquishing of the past. For *Occlusion* this is used as a mechanism of fugue and erasure. But for *Anamorphine*, "portals are meant for you to always kind of keep going somewhere....[to not] rewrite the past" (personal communication, February 6, 2017). *Anamorphine*, which uses what Daghstani calls "rendered emotion" as a storytelling device, metaphorizes moving forward spatially as moving forward emotionally, as psychological progress and healing (personal communication, February 6, 2017). And many games do this, but *Occlusion* breaks this metaphor and instead recapitulates forced forwardness as the forcedness of change, a process in which space is constantly laid out before the player and consumed behind them.

Art Design

Art Direction

The main art direction task for *Occlusion* is the definition of the procedural space of each possible remixing element.

This space is defined using randomized choices from manually built arrays for .uasset elements (materials, meshes, audio components) and random numbers within bounds for mathematical processes (lighting, post-processing, skybox, transforms).

The overarching art design goal for *Occlusion* is **that things get stranger the farther the player proceeds**, until the 12th iteration where this experience "snaps back" to the beginning. This heightening strangeness should be consistently and incrementally increased in a way that prevents the player from explicitly identifying when boundaries have shifted.

Finally, the use of Unreal Engine 4 as the game engine for *Occlusion* shapes the visual aesthetic of the game a great deal. Occlusion art design will leverage UE4's strengths such as robust lighting and post-processing for a chiaroscuro-type appearance. See Materiality in New Media for a discussion of the aesthetic of Unreal Engine 4.

Note: The term "material" in this section and in Appendix A: Design Specification is in reference to a specific type of asset within Unreal Engine 4 which contains texture data and not in reference to Materiality.

Architectural Design

Because the interior space of Occlusion is a scaffolding device used as a literal and figurative structure to counterbalance more bizarre or unpredictable imagery within the game, the architecture must be realistic and easily navigable.

Architectural components are not subject to mesh changes or transformations, but they will be subject to material remixing. For architectural components that obscure the player's view of other iterations (walls, doors, and ceiling and floor models), only opaque materials will be included in the valid bounds. All architectural set dressing, such as models for air vents, light switches, outlets and window panes will be considered architectural components and will not be subject to mesh or transform remixing. This is for additional structural rhythm and consistency in later iterations. These details are also critically important to set a realistic, fully realized initial iteration.

The architecture itself will be modeled after an abbreviated and modified version of the designer's home at the repurposed historical Abbott Street Schoolhouse in Worcester, MA (Massachusetts Cultural Resource Information System, n.d.), to suggest a vaguely domestic, but incomplete, interior which simultaneously bears the signs of other usage creating an ambiguous space.

This interior will have low ceilings in comparison to the player character camera height, creating a sense of discomfort and the need to keep moving. See Interior Modeling for exact specifications.

Hallways, doorways, and passages between interconnected spaces (such as between the 'living room' and 'kitchen' areas) are widened to exaggeration, both for ease of navigation and to accommodate slight variations players will make in their repeated navigations of the area. In this way, the interior space can be

said to inscribe movement over time into a static architectural form – Greg Lynn's "phenomenal transparency."

3D Assets

3D assets, or meshes, will be gathered from free and paid sources and will be selected to easily visually read even when unusual materials have been applied to them. Meshes must also interact cleanly with UE4's lighting and post-processing during runtime, since lighting cannot be pre-built for remixing meshes. Therefore, meshes must be fairly simple in construction with a medium amount of detail.

Mesh assets must also span themes, starting with a domestic or public interior space but also covering nature imagery, industrial or cityscape imagery, and more in later iterations.

Vertex Studio's Big Furniture Pack (Figure 24) is used to set the visual tone of mesh assets against which all other assets will be judged to match in terms of level of detail and modeling style. This pack uses simple, clean lines, broad geometric shapes, medium-poly modeling, and materials with no normal maps. Although normal and specular maps are used on in-game materials they should be subtle and muted.

Figure 24: Store image of the Big Furniture Pack by Vertex Studio (2013).

2D Assets

2D assets (textures) are taken from four sources:

- Textures included with downloaded meshes
- Textures included in Unreal Engine 4 (Starter Content and Engine Content)

- Variations of existing textures made manually in-engine
- Glitched textures made using the Image Glitch Tool by Georg Fischer

"Basic" textures (representing real materials such as carpet, tile, metal, and wood) should be clear, bold, and of medium detail. Sourcing them from purchased assets will ensure they match visually with models and with each other.

Glitched textures are produced in the Hex editor/Wordpad manual glitch style, an aesthetic produced by Georg Fischer's Image Glitch Tool (Figure 25).

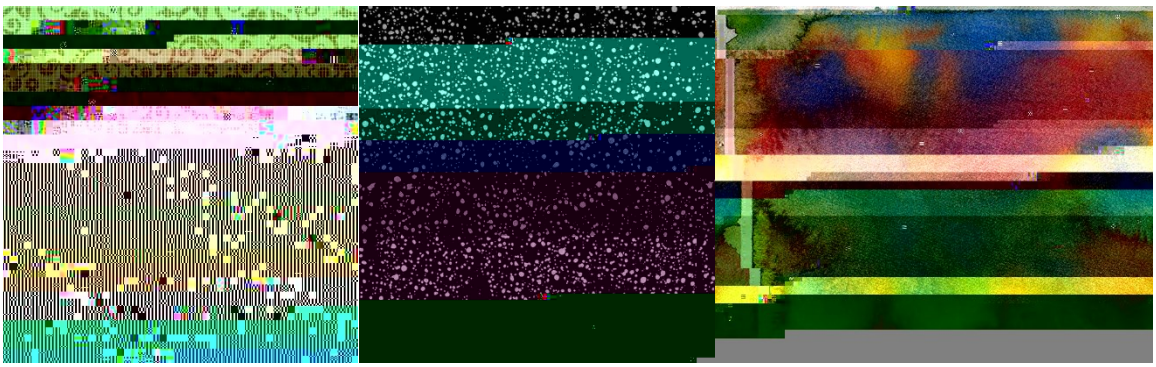

Figure 25: Glitch images produced by using Georg Fischer's Image Glitch Tool on textures from purchased assets (left and center) and original artwork (right).

Animated textures are also used in later iterations, either from UE4 content or from the Open World Demo Collection from Epic. Most of these animated textures are naturalistic, depicting flowers or grass rustling in the breeze.

Manual variations of these animated textures graft non-naturalistic glitch imagery into the scripted animations of the materials, producing bizarre moving glitch imagery that writhes and flows. Manual variations of other non-naturalistic materials such as wireframes, grids, gradients and explosions provide wide variation, especially in later iterations where the main visual aesthetic is formed from the juxtaposition of these moving glitch materials.

Lighting and Post-Processing

Because of Unreal Engine 4's emphasis on lighting and post-processing tasks, lighting design for *Occlusion* leverages a great deal of built-in functionality.

The interior space will be lit with the default skybox, skylight and directional light included in the First Person Shooter content pack in UE4 as well as point lights within the interior space set into lighting fixtures. This will give the scene a base global illumination and cast light into the interior from windows, and will also provide some dramatic, chiaroscuro-type lighting in areas away from windows.

Because more than three point lights cannot overlap each other in UE4, lights will be static but will be subject to intensity (direct and indirect) and color remixing. The procedural space of the lighting remixing is keyed to allow very light and very dark scenes with saturated colors that will interact through reflection or shadowing with meshes and animated materials in the scene.

Post-processing screen effects are used extensively, especially in later iterations, mostly to perform slight color shifts, change saturation and contrast, and add a film grain effect. Post-processing with UE4 is a

very large scripting node with dozens of possible attributes. In *Occlusion*, only the following post-processing attributes are within the procedural space:

- Saturation
- Contrast
- Gamma
- Gain
- Tint Shadow
- Film Contrast
- Film Crush Shadows
- Film Crush Highlights
- Film Dynamic Range
- Fringe Intensity
- Bloom Intensity
- Grain Jitter
- Grain Intensity
- Indirect Lighting Color
- Indirect Lighting Intensity

These attributes and their range of values is set to give the widest possible post-processing variation while still preserving the saturated colors of lights and materials in the scene and supporting the chiaroscuro lighting effect. Post-processing changes are also designed to prevent the scene from being obscured in a way that makes navigation difficult for the user, which is why attributes such as Gamma are not in scope. Sensitive attributes such as saturation and bloom which have the possibility of disrupting navigation or the color integrity of prop elements are have limited procedural space while other attributes like light intensity and grain settings have wider ranges. The ranges for all settings increase with increasing iterations.

The use of film grain and fringe in particular, despite their cinematic providences, are very recognizably part of the aesthetic of Unreal Engine and therefore help recall the digital material of *Occlusion* during play.

Audio Design

The audio design of *Occlusion* follows directly from the visual art design and is approached as a supporting element in the game.

There are three types of audio cues in Occlusion:

- Narration
- Ambient sound
- Sound effects

Except for iterations 1 and 12, all narration and ambient sound is randomized from a list of 6 or 2-3 possible tracks, respectively.

Narration is recorded with a female voice actor and modified with Audacity to be gender and age ambiguous through the use of pitch modification and filters. Some spatialization is applied since the narration cues will be implemented in UE4 as UI sound effects. The voice actor works from a script with direction based on delivery notes in the script (Appendix B: Dialogue Script). In game, narration cues are given three to an iteration, in which the first cue is triggered by location and the following cues are programmed to play after subsequent delay periods, the exactly length of which is randomized within parameters. This will create unpredictable spacing between narration beats and ensure voice lines are not anticipated by the player.

The script itself is written as a collage, mixing paraphrased and quote material from sources as diverse as Greg Lynn's *Animate Form* (1999) through to works of fiction such as *Ashes, Ashes, We All Fall Down* by Irene Schram (1972). The collaged aspect of the dialogue script draws from the critical context of *Occlusion* and supports the experience goals of dissociation and apophenia, as randomized narration cues will coincide in unexpected ways with each other, with the environment, and with the current ambient sound.

An important function of the narration is that it will lengthen and begin to overlap itself over time to create a more disorienting narrative experience. To support this, the script must be written so that lines delivered in later iterations are increasingly longer on average and more varied in terms of delivery. This also requires very finely controlled random delay parameters between narration cues.

Ambient sound and sound effects are sourced from Creative Commons 0 (CC0) licensed material and then modified to suit the intended mood of *Occlusion*; this modification is mostly simply pitch and volume reduction.

Some ambient sound will be musical, although not necessarily (or ever) tuneful; experimental French noise/electronica group Monsplaisir, who releases all their music under the CC0 license, will be used for ambient sound tracks especially in later iterations. Other ambient sound will be simple room tones, nature sounds, and other specialized environmental tracks such as ambient restaurant, street, and church sounds. They will be selected in part to match the themes of 3D assets: domestic, natural, public, industrial, and abstract. The diversity of tracks and their ability to be organized from mundane to extreme (room tone to Monsplaisir) are the main design considerations for ambient audio.

Finally, sound effects are also sourced from CC0 licensed material and are limited only to the player character footsteps and door animation sound effects, neither of which are subject to remixing. These effects are required to create a convincing environment in early iterations and to provide structure to the play experience, along with the architecture and narrative, especially in later iterations.

Technical Design

The *Occlusion* prototype is developed in Unreal Engine 4.14.0 in a Windows 10 environment using the following tools:

- 3ds Max 2017
- Adobe Creative Suite 2
- Audacity 2.1.0

Because development is a team of one, source control and collaboration tools are not necessary. Google Drive is used for non-development file management and local storage is used for development file management. Google Drive is used for software distribution and Qualtrics is used for assessment.

Specification is recorded in Microsoft Word and maintenance including bug and enhancement tracking is recorded in Microsoft Excel; these documents are also stored in Google Drive.

The target platform is Windows 10 64-bit only. Because this is a prototype, optimization will not be a priority; however, some simple optimization has been employed used; see Technical Implementation.

Development Overview

Ideation

The original concept for *Occlusion* was first pitched in IMGD 5099 as a game of similar theme and design but on a much larger scale. Even at the earliest stages, the experience was to feature remixing meshes and materials, remixing area effect such as weather effects, a changing skysphere, and changing ambient music, with transitions between areas occurring when the player's view was occluded by a certain symbol or image – the original namesake of the game.

At this stage the game did not yet have a strong storyline or any ending whatsoever, and all narration was to be carried out via a randomized note system involving written ephemera, computer screens, graffiti, and other readable text. However, the concept of communicating one-way with a character about which the player knew no identifying details but many personal details was already being implemented at this time, with that player being tentatively named "L –."

This functionality was paper prototyped using a paper RPG method and concept art, including a logo, was produced, as shown in Figure 26.

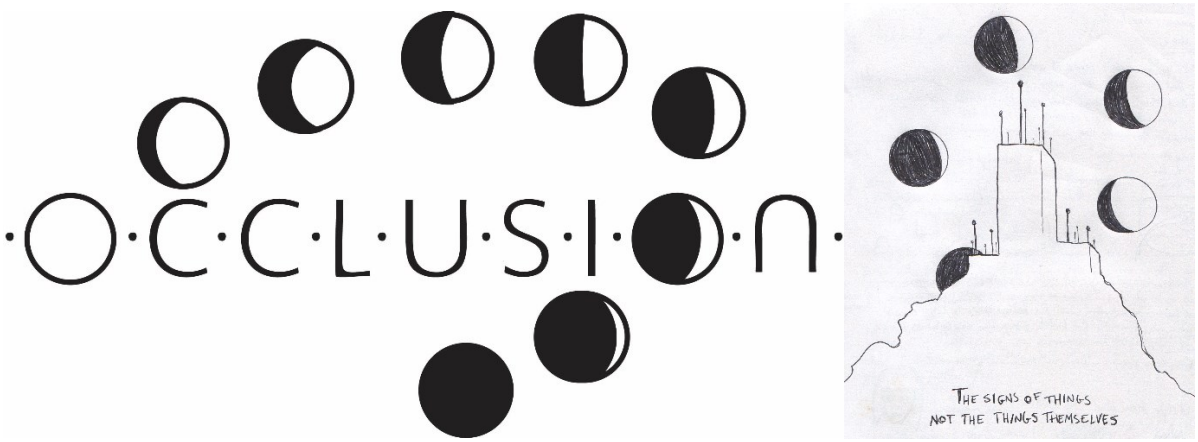

Figure 26: The original Occlusion *logo which features the phases of the moon, on left, and the original inspiration for this imagery, a sketch by Klew Williams included in the project proposal, on right. This imagery was ultimately abandoned due to scope reduction and a movement towards a less intentional and more procedural aesthetic. The logo idea itself was abandoned to eschew the idea of a commercial product.*

This paper prototype included a total of three areas: a city block exterior, a library, and a camp ground (the latter two of which have concept art, see Figure 27, below). There were also concepts for a home interior, beach, alleyway, junkyard, Utah salt flats, steel mill, city park, and desert lake area.

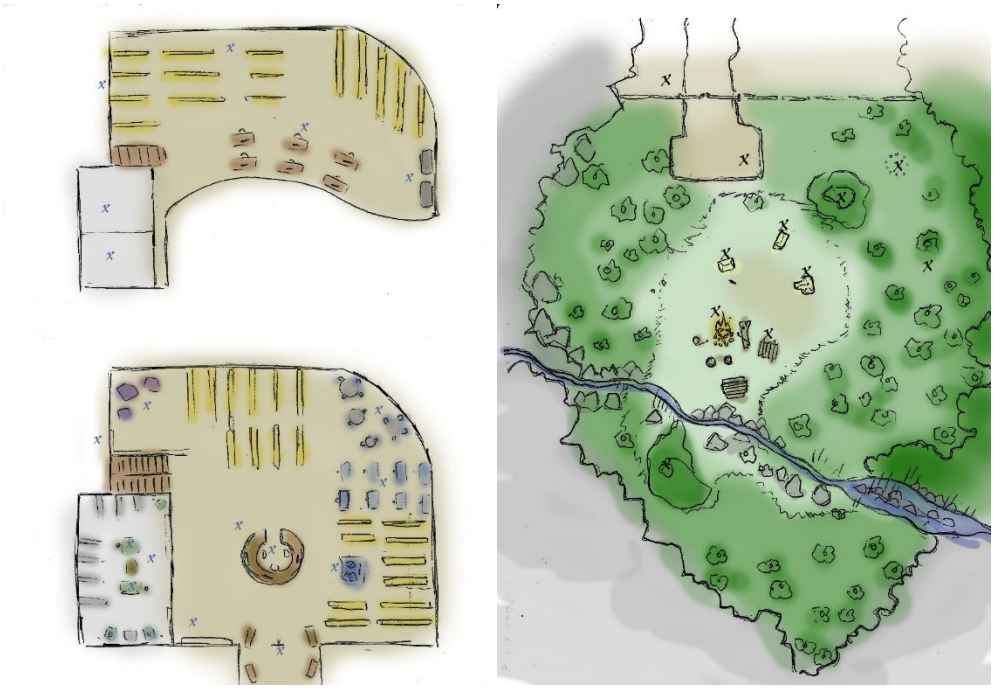

Figure 27: Original Occlusion *concept artwork for (from left) the library and camp ground areas. The library interior was to feature two floors with meshes such as desks and stacks that could remix, while the camp ground area was to featre remixing trees, rocks, and other natural imagery along with tents and a campfire.*

This initial approach was also much more game-like and interactive than the final *Occlusion* prototype. It included an idea of a basic UI and the ability of the player character to interact with objects such as drinking fountains that would then perform animations. Although the UI was ultimately eliminated completely, the concept of animated objects was eventually recapitulated via animated materials.

Paper prototype testing in IMGD 5099 yielded excellent feedback, most saliently that:

- The occlusion-based transitional method was too easy to stumble into early and accidentally
- The note system was not sufficient to scaffold the experience and players were confused about what the game was about
- Areas were too large and numerous even for a large development team

All of these concerns were addressed in the next iteration.

System Design and Initial Work

After the completion of the initial paper prototype, development proceeded with a team of one and the project scope had to be radically redefined. The game was paper prototyped a second time, this time in a much smaller format featuring a single repeating interior space that would change each time the player entered a new iteration. This concept drew from games such as *P.T.* and *LSD Dream Emulator* as well the television tradition of the "bottle episode" (Heller et. al., 2010).

Unreal Engine 4 was chosen as the development platform at this time.

This second paper prototype represented an in-depth approach to designing the whole system to a granular level of detail which also served as an early scoping mechanism. It laid out the remixing

behavior by iteration for objects (those with only material changes and those with mesh, material, and transform changes), ambient music, post processing volume, lighting, and a rudimentary text-based narration system which at this time was conceived of as being a note tacked to the door that the player was forced to read as they entered the next iteration. It also defined the length of the core experience as 12 iterations which persisted through to the final project.

From this, a digital proof of concept was produced in UE4 to demonstrate the repeating geometry functionality, screenshots from which are shown in Figure 28. The repeating interior space was designed and modeled using placeholder starter content and from this point forward the architectural design changed very little.

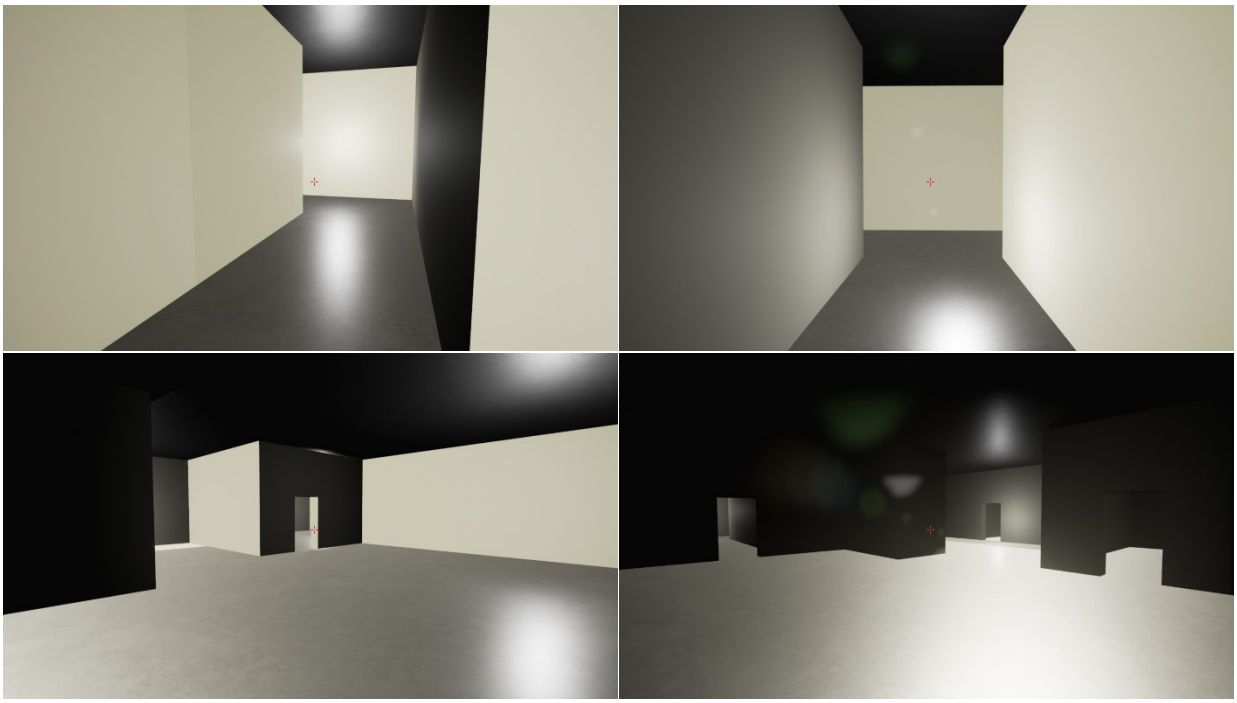

Figure 28: Screenshots of the Occlusion *proof of concept, which was modeled much more spaciously than the final interior area but with almost the exact same layout.*

Partially as a consequence of this decision and partially in response to feedback on the first paper prototype, the view occlusion transition was replaced with the mechanic of walking through generated rooms which would then be closed off by automatically closing doors. At this point the narrative and end condition had not yet taken shape.

This proof of concept was also not without at least one infinite loop bug (Figure 29).

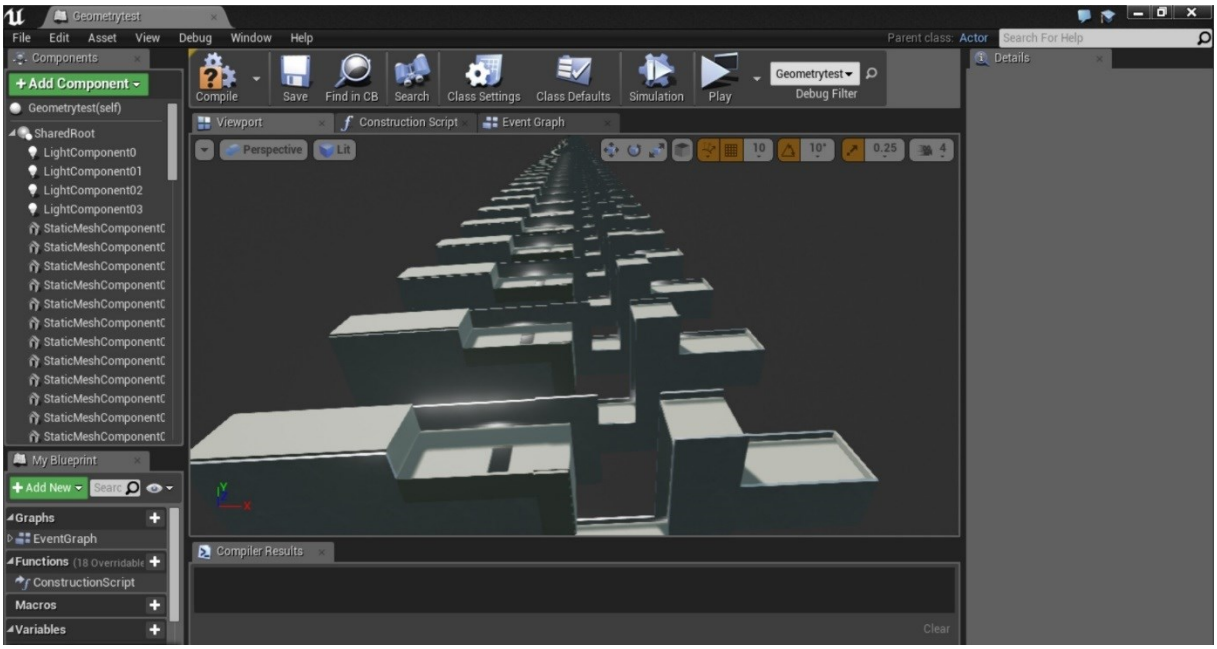

Figure 29: Infinite loop bug in the Occlusion *proof of concept.*

Research, Script, and Interviews

Continuing on from the proof of concept, a great deal of academic research was performed to situate the project in proper critical context. Most formative at this time was the solidification of the *Folie à Deux* storyline and related research, as well as the alignment of the project thematically and visually with projects such as *LSD Dream Emulator* (and *LSD Revamped*), *the static speaks my name*, *P.T.*, *Off-Peak*, *Gone Home*, and *Anamorphine*.

At this time the aesthetic direction of *Occlusion* was still bound somewhat to the *Antimony* project from which it would later visually diverge (Figure 30).

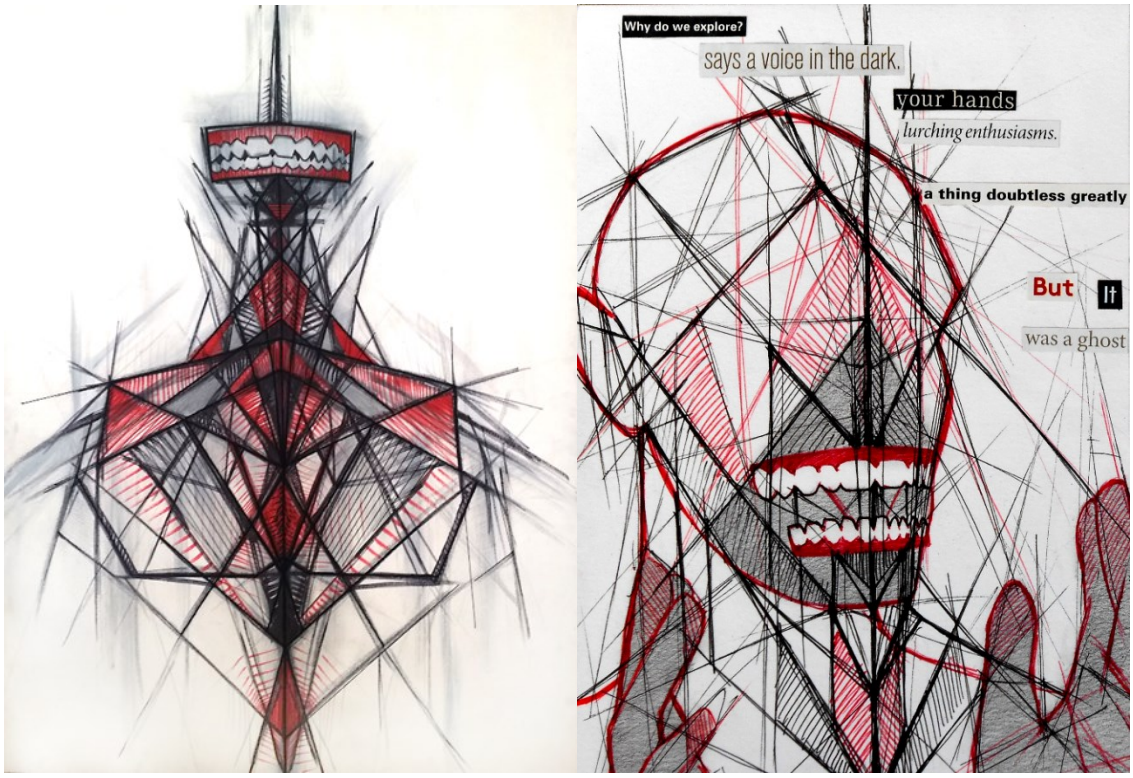

Figure 30: Images from Antimony II*: from left,* Antimony II-1 *and a page from* Antimony (Sb) *(Williams, 2016a; Williams, 2016b). This imagery was originally going to serve as visual guidance for* Occlusion *but was later abandoned in favor of a more Materialist approach.*

Also very influential at this time was research into glitch art, net.art, apophenia phenomena, and general concerns of applying critical art theory to games, cultural framing of games, and games as texts. In particular this research resulted in the situating of *Occlusion* and this written thesis in a Materialist tradition.

During this time the critical decision of delivering narration via audio clips rather than written text was made, and the main thrust of the narrative and narrative resolution was also decided.

Out of the research and these decisions sprang the writing of the script, which drew from the research on *Folie à Deux* specifically and Glitch Art and Interne Art generally, which ultimately lead to the project into the space of collage and décollage much later. The first seeds of this approach were in the script writing which combined original writings with quote or paraphrasing from psychology research papers, novels, and texts on art and art criticism.

Finally, at this time interviews began to be conducted which enabled the project to expand into a mature dialogue with Materiality, procedural generation, spatial and architectural design, and specific techniques and approaches for engendering the project's unique experience goals. These interviews which are reproduced in Appendix C and discussed heavily in Critical Context had a large impact on the content of the paper and some of the finer points of the design of the prototype.

Version 0.1.0 Development

The development of the *Occlusion* prototype started in earnest after the writing of the first draft of the script and began with the modeling of the interior geometry which drew heavily on continued research, specifically *Animate Form* and *Fabrications*. The interior space was modeled in 3ds Max and went through a number of iterations (Figures 31 and 32) to perfect the scale, proportions, and UV unwrapping of the models.

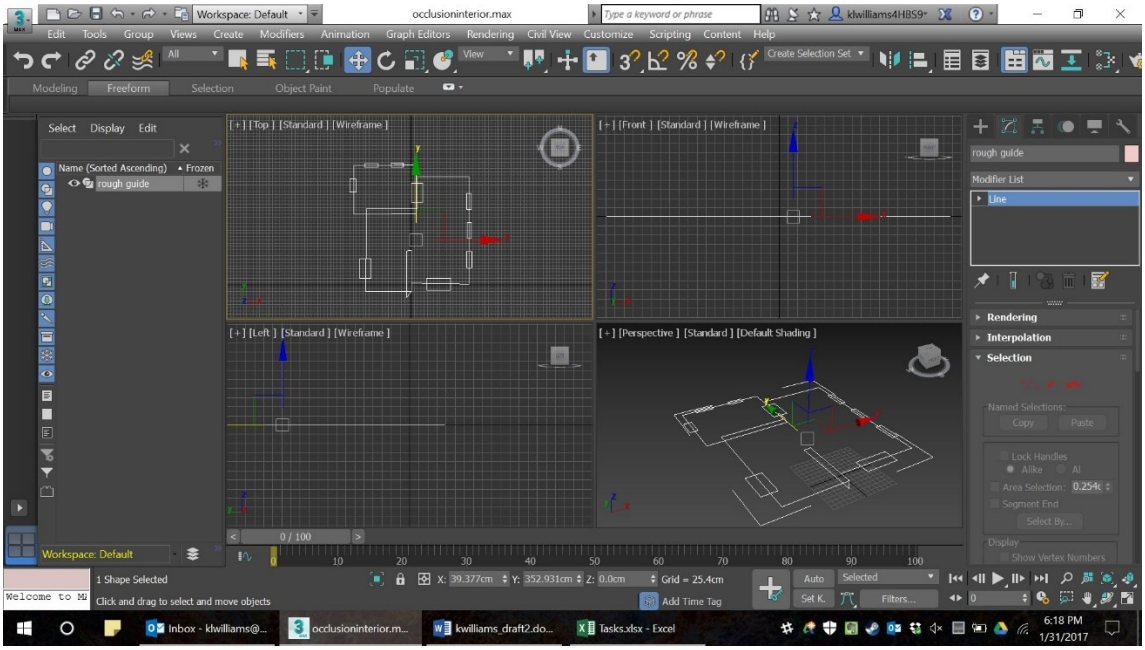

Figure 31: The interior space of Occlusion *was modeled in 3ds Max. First, a 2D sketch of the floorplan was made, over which planes were drawn and then extruded.*

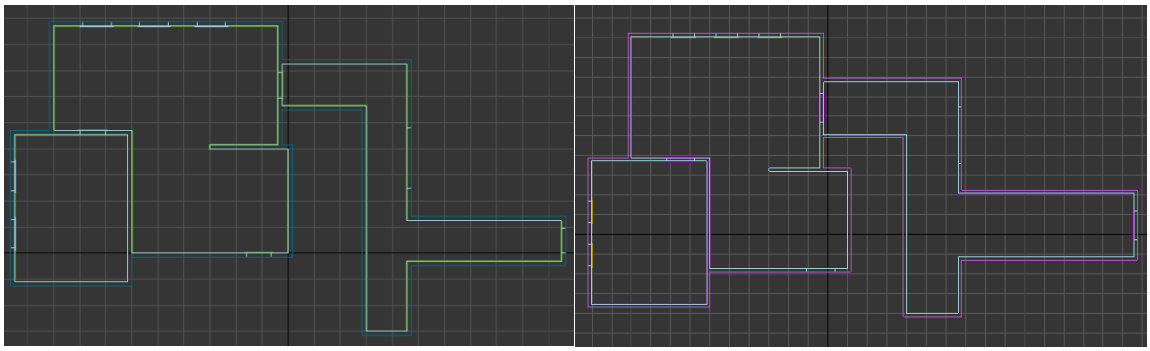

Figure 32: Versions 1 and 2 of the interior space, respectively. Hallways and doorways were significantly widened for ease of navigation and a realistic look in version 2.

Triggers and triggered events were then added to the model when imported into Unreal Engine 4, and the geometry duplication functionality created for the proof of concept was recreated and perfected here by placing all assets belonging to an instance of geometry into a single Blueprint (Figure 33).

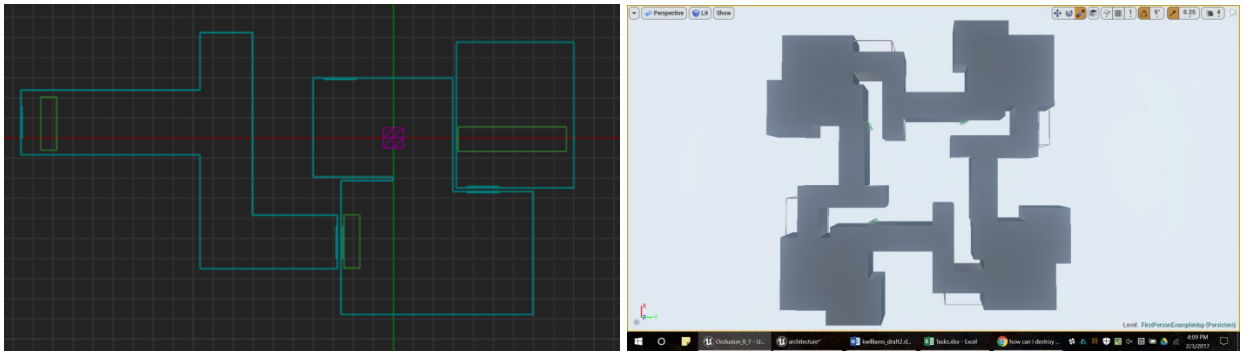

Figure 33: On left, a mid-development image of the interior space with a placement marker (purple) and trigger boxes (green). On right, a top-down runtime image of an early version of the prototype showing four instances of the interior geometry (the fifth is deinstantiated through scripting).

Audio design, scripting, and asset creation and import occurred at this time. Ambient tracks were acquired, modified, and imported, and placeholder narration was recorded from the script, modified, and imported. Scripts and sound cues for audio assets were created which persisted without major revision for the rest of the project.

At this point a number of major setbacks were encountered with the geometry modeling, import, and implementation, including roadblocks with deinstantiation of old instances, UV unwrapping, and proper positioning of generated Blueprints.

Most difficult to resolve were issues with the inflexibility of the 3ds Max-to-Unreal Engine pipeline for architecture assets, including UV unwrapping and scale control issues.

There was also a major time-loss issue in which redirectors in the UE4 folder structure prevented packaging of the project. This was due to using Force Delete and not running the Fix Up Redirectors process regularly, and was resolved by migrating content to a new project and rebuilding functionality in the new project.

However, once these issues were resolved, meshes were imported from the Unity Asset Store and the Epic Marketplace. In order to prepare assets for use in the game, they had to be individually scaled and placed at (0,0,0) in 3ds Max and imported to UE4 where they were assigned default textures and merged using Merge Actors functionality, if necessary. This process, shown in Figures 34 and 35, was extremely time consuming due to the large number of assets (in the thousands). Twice during this time UE4 crashed while saving assets and corrupted more than 1200 texture files. Frequent backups and only running UE4 while no other applications were active helped facilitate this process.

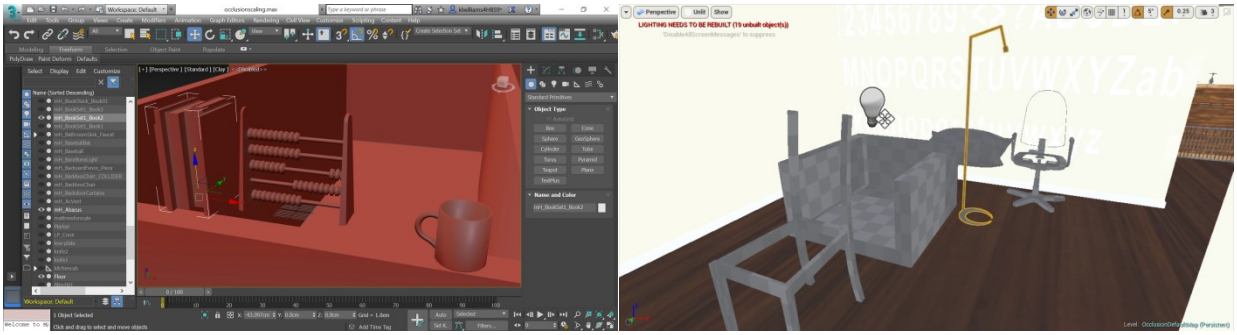

Figure 34: On left, scaling and placing in 3ds Max using the architecture geometry as a relative scaling reference; on right, testing unmerged actors in UE4.

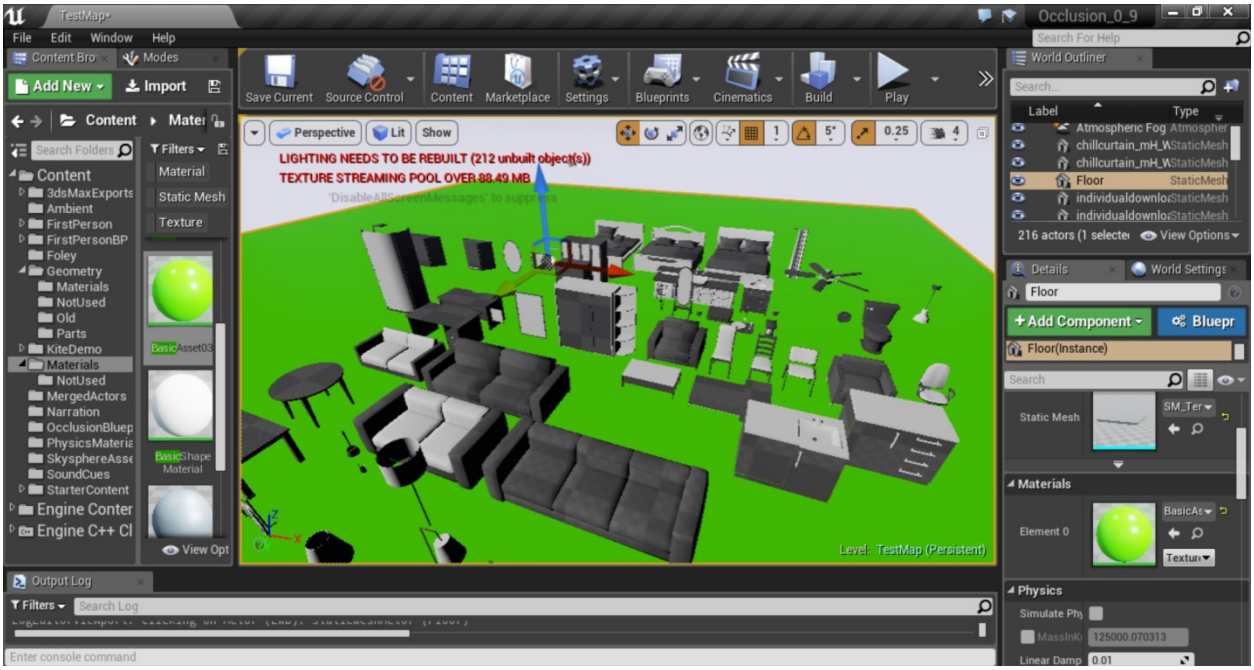

Figure 35: Object curation in Unreal Engine, where separated object sets were placed in a test level and merged using Merged Actors; material separation was achieved by assigning one of two default materials to each separated mesh before merging.

In addition to mesh import, materials had to be imported. This was an extremely time consuming process because importing Unity Store assets into UE4 breaks the references between materials and their variously referenced textures. All materials for Unity Store assets were recreated manually in engine from imported textures, some of which had to be batch converted to .tga format for compatibility. Other materials were acquired directly from imported packages and seed data (starter content and engine content), but their management was also extremely time consuming due to how long shader compiling takes in UE4.

During the time that standard meshes and materials were imported, scripts to remix meshes, materials, skysphere, lighting, and the post-processing volume were first implemented and tested on a small scale. This step was unusually fast and without error due to the strength of UE4 visual scripting tools and online resources.

After standard asset import and basic script testing, glitch meshes and glitch materials were produced using a partially procedural pipeline.

For materials, glitched textures were produced using imported textures and personal artwork using the Image Glitch Tool by Georg Fischer. Variations of other materials acquired through Epic starter content, engine content, or downloaded packages were produced by hand using these glitched textures or other textures. Again, shader compilation times were a blocker here, but less so since glitched materials had only diffuse textures and variation production was done with only a small subset of all textures.

For models, glitched meshes were produced in 3ds Max from purchased prop assets using procedural mesh modification tools such as Tessellate, Optimize, and Twist, with heavy manual adjustment (Figure 36). Two copies of each asset were created: one representing a glitched model that was still recognizable as the original, and one representing a model so thoroughly glitched it was difficult or impossible to recognize.

This glitching process was very quick due to the power of the 3ds Max toolset for procedural alteration of meshes and the power of the UE4 material tools particularly with animated textures. This also enabled the creation of many variations of animated materials very quickly.

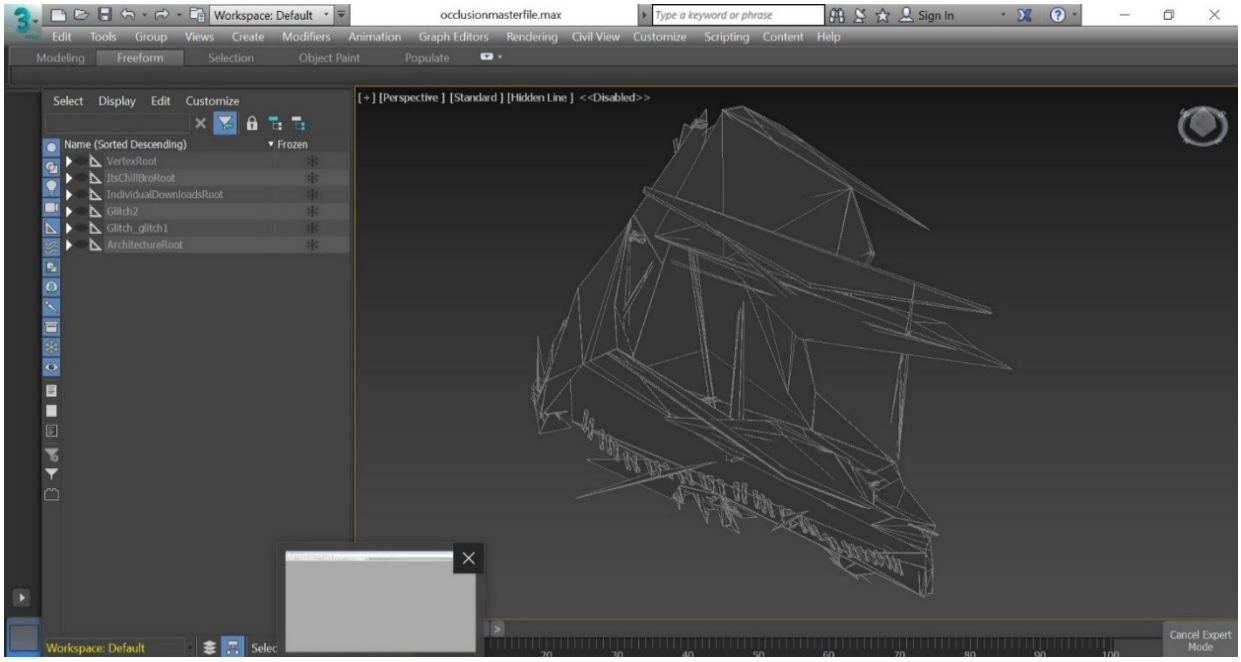

Figure 36: Glitching the piano.FBX model in 3ds Max.

At this time material and mesh tests were run for aesthetic consistency and remixing lists were refined to eliminate unwanted candidates by iteration (Figure 37). The aesthetic of the experience began to take shape and integrate with the music and repetitious mechanics of the experience.

Figure 37: An early material and mesh test featuring animated materials, glitched materials, original meshes, and glitched meshes.

More issues were encountered at this time with packaging the project, specifically with corrupted files within a download Epic Marketplace package and overlong file addresses in UE4 starter content. There were also issues with corrupted meshes and lightmaps in some of the glitched meshes which were resolved simply by excluding damaged assets from the project.

The final packaging process to make the game available for testing was also fraught with issues, mostly hardware issues due to insufficient free space on the drive and the inability for UE4 to package a project to or from a networked drive. However, after moving the project to an external drive and packaging to that external drive, the game was packaged and zipped successfully for testing.

The speed with which the project could be recovered during packaging issues and corruption issues was due to frequent and complete, if ad-hoc, project backups and strong data management practices. However, these issues still cost many, many hours of lost time and minor data loss.

Distribution

The project was packaged and zipped for Windows 10 64-bit operating systems. It was stored on Google Drive where it was shared along with the Qualtrics post-play survey and shown at the Worcester Game Pile Demo Night event on April 13th, 2017 (see Assessment).

Assessment

Assessment Approach and Objectives

The *Occlusion* assessment process omitted many standard types of software testing due to the nature of *Occlusion* as an art game. Interface testing, balance testing, acceptance testing, and outcomes testing were all omitted from the assessment process.

Instead, play testing and functional testing were performed using a post-play survey format. The primary objective of the post-play survey was to test the user's self-reported experiences against the experience goals as well as to capture interesting and informative anecdotal information such as player commentary and interpretation of the experience. A secondary objective of this survey was to collect associated play data such as play length, replay incident, and the use of sound to help inform assessment analysis.

The overriding design constraint for the survey was length and clarity: play testers needed to be able to complete the survey reliably in less than 10 minutes and questions had to be written with sufficient clarity and without game jargon so that players of any level of experience with games could provide feedback.

Assessment Methodology

Post-play surveys were completed by 34 play testers between March 30th, 2017, and April 22nd, 2017. Respondents were English-speaking teenagers and adults with access to a Windows 10 computer and internet connection or with access to the Worcester Game Pile Demo Night event. Respondents' geographical locations varied widely, with respondents completing surveys from the United States, Canada, Japan, and the United Arab Emirates.

Surveys took approximately 5-10 minutes to complete and were administered through Qualtrics.

Survey distribution channels:

- Personal Twitter
- Personal Facebook
- Personal email
- WPI IMGD email to the IMGD Graduates, IMGD Undergraduate Majors, and IMGD Undergraduate Minors listserves
- r/glitch_art subreddit
- r/samplesize subreddit
- Worcester Game Pile Demo Night, April 13th, 2017, in Worcester, MA, USA

The survey was updated once, on April 8th, 2017, to change the link and download instructions from those for v0.1.0 to those for v0.1.1. At this time a typo was fixed for the question "Did you play Occlusion more than once?" The original question read "Did you plan Occlusion more than once?" Fixing this typo does not invalidate the survey results because the meaning of the original question was clear from context.

Post-Play Survey Questions and Results

Although 34 respondents total completed the post-play survey for Occlusion, no question was required to be answered to submit the survey. As a result some questions have fewer than 34 responses.

Note: Text feedback has been reproduced exactly here without effort to correct language mistakes.

For approximately how long did you play Occlusion? *(mutually exclusive)*

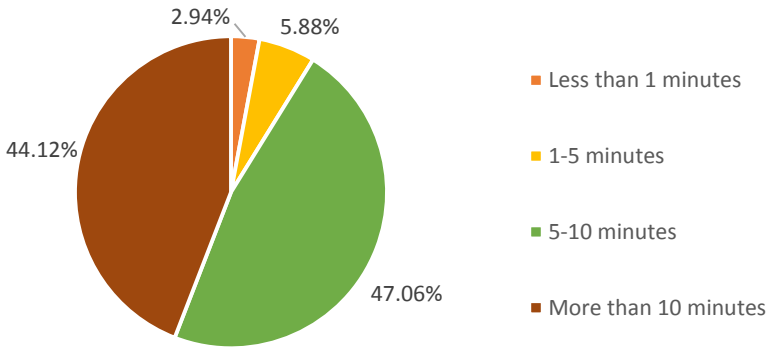

Figure 38: Percentages of 34 respondents for "For approximately how long did you play Occlusion?"

Answer	%	Count
Less than 1 minutes	2.94%	1
1-5 minutes	5.88%	2
5-10 minutes	47.06%	16
More than 10 minutes	44.12%	15
Total	100%	34

Did you play with sound? *(mutually exclusive)*

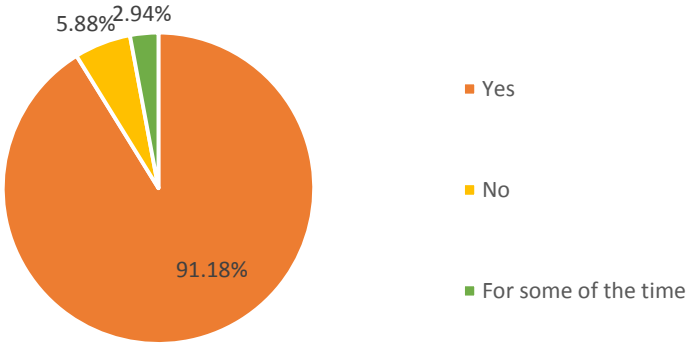

Figure 39: Percentages of 34 respondents for "Did you play with sound?"

Answer	%	Count
Yes	91.18%	31
No	5.88%	2
For some of the time	2.94%	1
Total	100%	34

Would you say that you "completed" the game? *(mutually exclusive)*

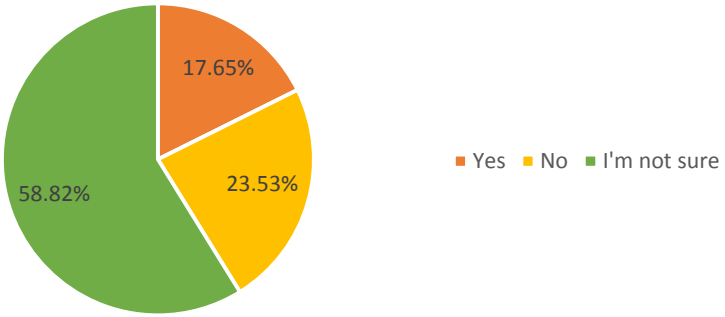

Figure 40: Percentages of 34 respondents for "Would you say that you "completed" the game?"

Answer	%	Count
Yes	17.65%	6
No	23.53%	8
I'm not sure	58.82%	20
Total	100%	34

Why? *(text entry; selected responses)*

- "because the level went crazy" (Yes)
- "During my first playthrough, the mechanism by which I felt as though I was progressing (the opening door) stopped opening and my controls were taken away. This breaks with normal game tradition of working towards a resolution and feeling of completion, but final narrative line that was spoken was "I'm not getting out of here either," which did add some sense of finality to the experience for me." (I'm not sure)
- "Finished one full cycle." (Yes)
- "There was still more narration playing" (No)
- "I played to the point where my movement speed was drastically decreased. The door was opening to the next level, but I felt I could end my session there." (No)
- "Because I started seeing repeating patterns" (Yes)
- "There was another room beyond the door, and I still felt compelled to enter that room. Like maybe everything would return to normal if I could keep going." (I'm not sure)
- "When I stopped playing, new sounds and voices were still manifesting. I was not sure if the corridors were going to repeat infinitely, and I was becoming increasingly uncomfortable." (No)

Who is the person communicating to you throughout the game? *(not mutually exclusive)*

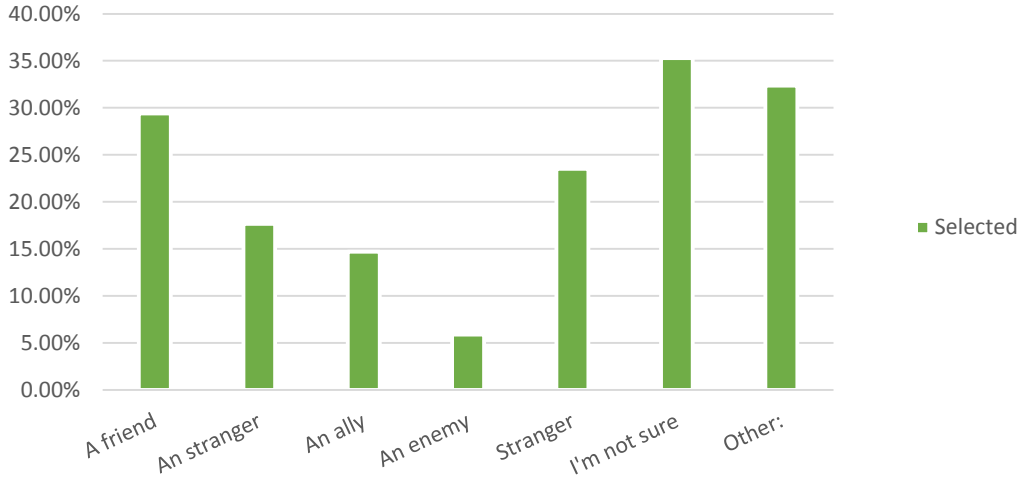

Figure 41: Percentages of 34 respondents for "Who is the person communicating to you throughout the game?"

Answer	%	Count
A friend	29.41%	10
An stranger	17.65%	6
An ally	14.71%	5
An enemy	5.88%	2
Stranger	23.53%	8
I'm not sure	35.29%	12
Other:	32.35%	11
Total	100%	34

Other: *(text entry, selected responses)*

- "Myself"
- "It seemed like all of the above at different times."
- "fellow traveler, also lost"
- "Partner/Lover"

During my time playing Occlusion, I felt: *(mutually exclusive)*

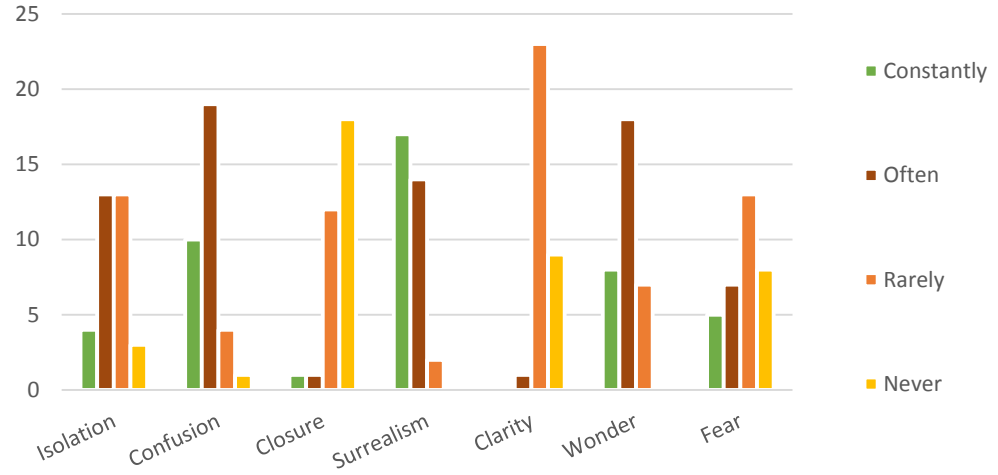

Figure 42: Number of total respondents per choice for "During my time playing Occlusion, I felt:"(percentages could not be used because the total respondents for each choice differed).

Question	Constantly	Count	Often	Count	Rarely	Count	Never	Count	Total
Isolation	12.12%	4	39.39%	13	39.39%	13	9.09%	3	33
Confusion	29.41%	10	55.88%	19	11.76%	4	2.94%	1	34
Closure	3.13%	1	3.13%	1	37.50%	12	56.25%	18	32
Surrealism	51.52%	17	42.42%	14	6.06%	2	0.00%	0	33
Clarity	0.00%	0	3.03%	1	69.70%	23	27.27%	9	33
Wonder	24.24%	8	54.55%	18	21.21%	7	0.00%	0	33
Fear	15.15%	5	21.21%	7	39.39%	13	24.24%	8	33

The aspects of Occlusion that most stood out to me where [sic]: *(not mutually exclusive)*

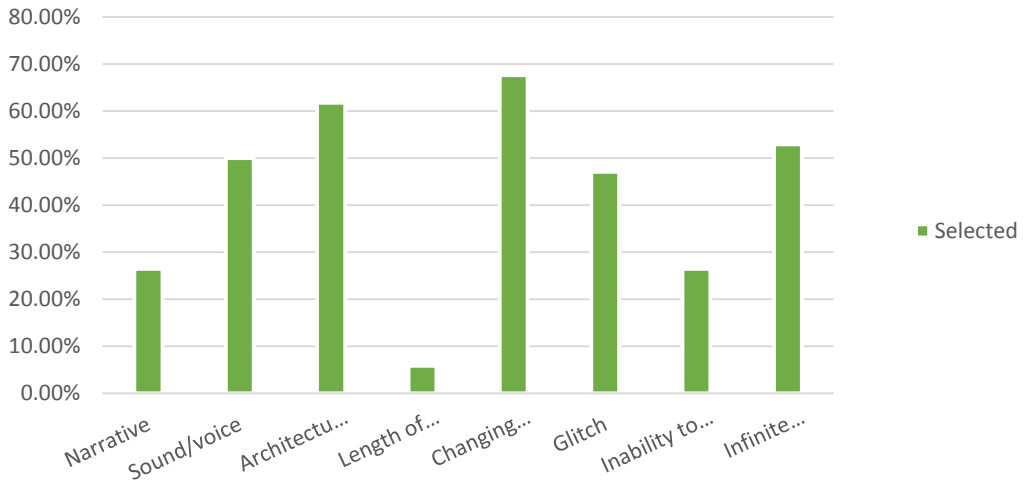

Figure 43: Percentages of 34 respondents for "The aspects of Occlusion that most stood out to me where" [sic]

Answer	%	Count
Narrative	26.47%	9
Sound/voice	50.00%	17
Architecture and space	61.76%	21
Length of the experience	5.88%	2
Changing appearances	67.65%	23
Glitch	47.06%	16
Inability to turn back	26.47%	9
Infinite repeating geometry	52.94%	18
Total	100%	34

What was your interpretation of the narrative of Occlusion? *(text entry, selected responses)*

- "After playing the game twice, I had a different interpretation of the narrative for each playthrough….It gave me the vague impression that the person speaking to me was either a relative or even more likely a therapist/psychologist/social worker who engaged with me on a more professional level. The final line and the never opening door made me feel as though I was now stuck deep inside something irreversible..."
- "With the amount of verbal communication about memory and referencing the past, and the sense that, for me, the person speaking was an internal voice, it seemed that this was a narrative about the layered nuances of memory, identity, messiness, and disruption. This was probably underscored by my linear trajectory through space."
- "An inward journey into the mind, maybe an exploration of a specific memory."
- "It seemed like the person was slowly slipping away from reality, and the "other" people were intrusive thoughts as they subtly go mad."
- "I felt like it was about being trapped in one's own mind, endlessly reliving the same experiences but never quite in the same way... And never really being able to escape. You can't escape your own mind."
- "Seemed like it was leading my experience of taking a prescription drug."
- "I think the narrative was the struggle of caring for someone with mental illness that is incurable, and slowly drags down the people trying to help until they also feel insane."

I felt that my experience was: *(mutually exclusive)*

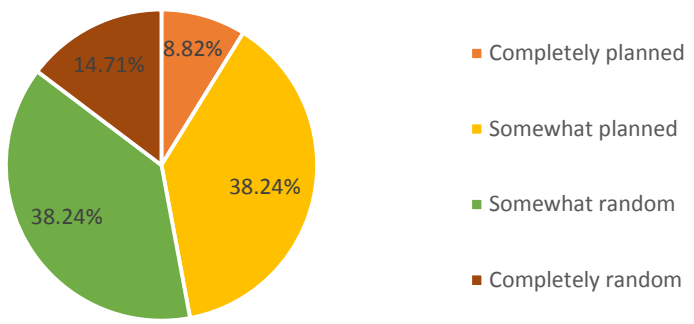

Figure 44: Percentages of 34 respondents for "I felt that my experience was:"

Answer	%	Count
Completely planned	8.82%	3
Somewhat planned	38.24%	13
Somewhat random	38.24%	13
Completely random	14.71%	5
Total	100%	34

My experience made me think of: *(not mutually exclusive)*

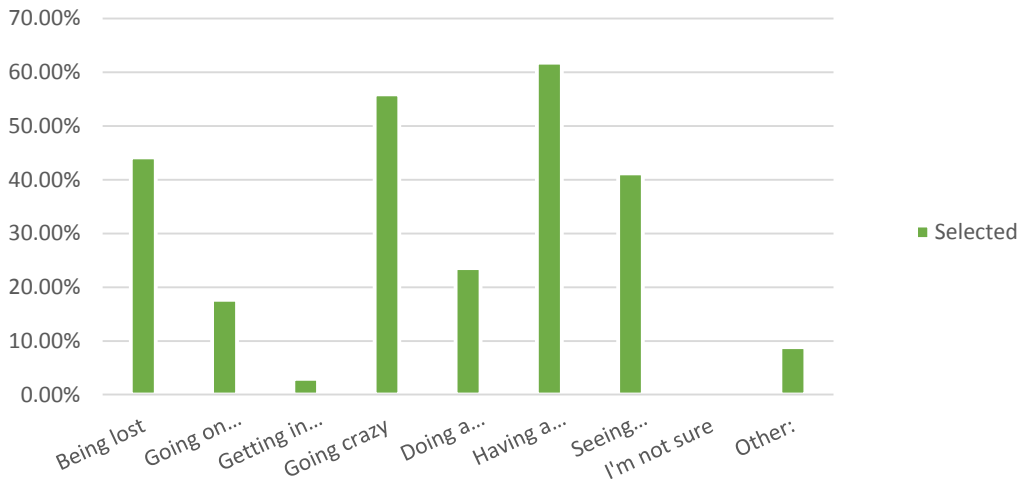

Figure 45: Percentages of 34 respondents for "My experience made me think of:"

Answer	%	Count
Being lost	44.12%	15
Going on an adventure	17.65%	6
Getting in a fight	2.94%	1
Going crazy	55.88%	19
Doing a mundane task	23.53%	8
Having a dream	61.76%	21
Seeing things that aren't there	41.18%	14
I'm not sure	0.00%	0
Other:	8.82%	3
Total	100%	34

Other: *(text entry, selected responses)*

- "Reminded me of Silent Hill: The Room"
- "Fever dreams. The repetition and confusion. Yet drive to continue on."

Did you play Occlusion more than once? *(mutually exclusive)*

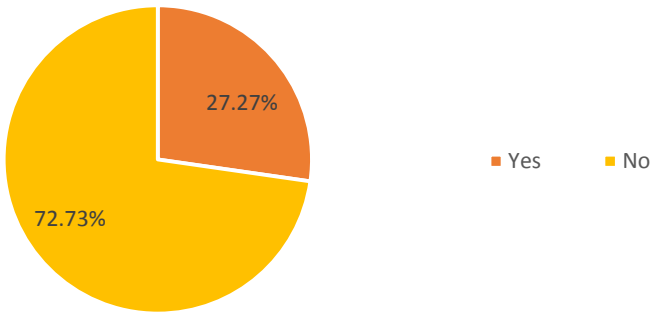

Figure 46: Percentages from 33 respondents for "Did you play Occlusion more than once?"

Answer	%	Count
Yes	27.27%	9
No	72.73%	24
Total	100%	33

If so, how did playing the experience multiple times change your perception of the game? *(not mutually exclusive)*

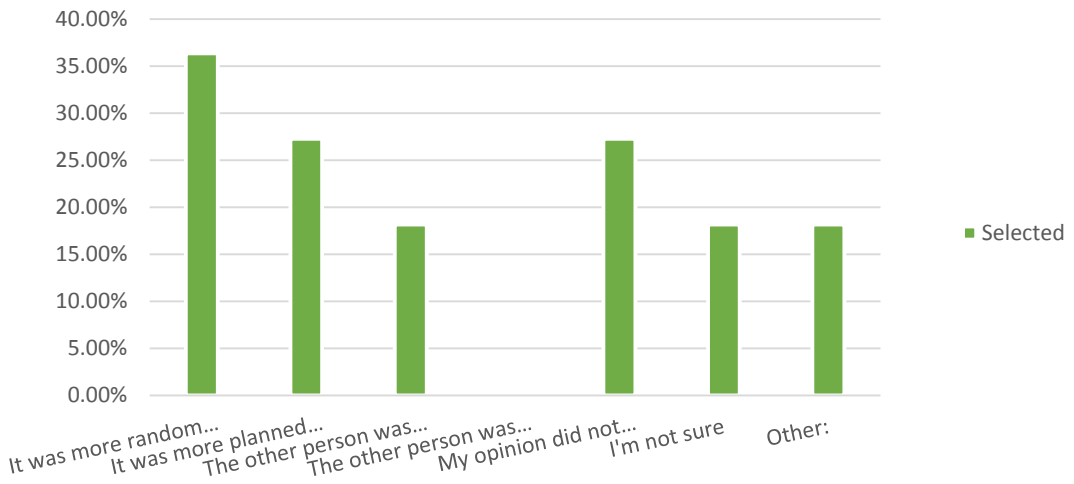

Figure 47: Percentages of 11 respondents for "If so, how did playing the experience multiple times change your perception of the game?"

Answer	%	Count
It was more random than I originally thought	36.36%	4
It was more planned than I originally thought	27.27%	3
The other person was more sympathetic than I originally thought	18.18%	2
The other person was less sympathetic than I originally thought	0.00%	0
My opinion did not change	27.27%	3
I'm not sure	18.18%	2
Other:	18.18%	2
Total	100%	11

Other: *(text entry)*

- "I did not play it more than once."
- "Wanted to keep making more art"

Please list any bugs or (unintentional) glitches you experienced during play: *(text entry, selected responses)*

- "The whole game is a glitch!!"
- "Not sure if the fact I was stuck is planned or not." *(Note: It was not.)*
- "I'm???? not sure???????"

Please list any additional comments you have on Occlusion: *(text entry, selected responses)*

- "If I correctly understand the underlying design of the game, the player will experience somewhat randomized elements, from object presence/position, narrative lines spoken in most rooms, and visual elements associated with the rooms such as shaders/textures etc. This concept itself is

extremely fascinating because although it runs the risk of the ""narrative"" of the game being out of the control of the creator, it also creates the opportunity for the narrative to be something original to an individual player."

- "I felt, when I played Occlusion, that because only a few aspects of the experience were not subject to procedural randomization, the game relied more on my own memories and life experience to draw connections between pieces of the game to form a narrative."
- "Don't let the player jump/work on the collisions? Some objects can be moved through but others can not, which often caused getting stuck. Dialogue is really quiet and hard to parse?"
- "I love the random model changes. Especially the animated ones. They made me very uncomfortable."
- "This is cool, reminds me of PT. I don't know if I haven't figured out but I wish I could somehow interact with the objects. I would love to know if there are multiple interpretations for the game or if there is a particular one that you wanted people to experience."
- "This is meditate and beautiful in an off putting way. I feel like I want to know this person, the voice, better, but I know that it won't happen. This why the game feels isolating. There is someone intimately there, but you are also alone."
- "The repeating hallway concept is the same as PT, but executed less well. In PT, each loop adds clues towards solving a puzzle. Here, it just felt like a hike to the end(?). No real incentive to look around and spot the differences."
- "I often watch horror movies to experience extreme emotions in a controlled environment. I was amazed by how effectively this relatively short interaction was able to affect my emotions. Like a rabbit whole into chaos."

Finally, comments and reactions were recorded from play testers where possible (this was not anonymized). Selected verbal play tester feedback:

- "I'm also waiting for Slenderman, or the chick from P.T. to eat my face."*
- Player waiting for the 'jump scare' throughout play
- Player afraid of glitches; had a difficult time finishing the game
- Regarding the appearance of text materials, "I was trying to ascribe meaning to them" more so than other textures
- The "layering" effect of the experience stood out but that wasn't an option on the survey
- Voice over dialogue stimulated the desire to ascribe meaning, to fit what was being said in with the environment based on specific images
- Player referencing an issue in "the purple room" as if it was a static or designed room

*From a play tester who did not complete a survey

Assessment Results Statistical Analysis

Two types of statistical analyses are performed on post-play survey responses, depending on the type of question being posted:

1. For questions with limited, exhaustive, and mutually-exclusive options, the Chi-Square Goodness of Fit test is run with the CHISQ.TEST function in Microsoft Excel. This test assesses whether the null hypothesis can be rejected with the given confidence interval where the null hypothesis is

that observed data differs significantly from an even distribution across all choices for a given question.

2. For questions with limited but non-exhaustive and not mutually-exclusive options, Cochran's Q Test is run manually and with the CHISQ.DIST.RT function in Microsoft Excel. This multiple dichotomy test understands checkbox input (checked or unchecked) as true or false to assess whether the null hypothesis can be rejected given the confidence interval where the null hypothesis is that observed data differs significantly from a dataset in which each checkbox has an equal probability of being checked or unchecked. In the case where observed data for a question is found to be statistically significant, a follow-up pairwise analysis is run using the Marascuilo Procedure manually in Microsoft Excel to identify which differences between choices were responsible for the rejection of the null hypothesis.

For all types of analyses the confidence interval (alpha value) of .05 is used such that any p-value produced by statistical analysis less than .05 indicates the null hypothesis can be rejected and therefore it can be said that those survey results differ significantly from an expected distribution.

The rejection of the null hypothesis does not imply causation between experience design and respondents' experiences. See Interpretation of Results for more information.

Data were anonymized during analysis.

Post-play survey questions statistical analysis results:

Question	Test type	Majority Answer(s)	p-value	Interpretation
Would you say that you "completed" the game?	Chi-Squared Goodness of Fit	"I'm not sure" 58.82% (20) of 34 respondents	0.006353029	Significant
During my time playing Occlusion, I felt: Isolation	Chi-Squared Goodness of Fit	"Often" or "Rarely" 78.788% (26) of 33 respondents	0.011725876	Significant
During my time playing Occlusion, I felt: Confusion	Chi-Squared Goodness of Fit	"Constantly" or "Often" 85.29% (29) of 34 respondents	5.82756E-05	Significant
During my time playing Occlusion, I felt: Closure	Chi-Squared Goodness of Fit	"Rarely" or "Never" 93.75% (30) of 32 respondents	6.64237E-06	Significant
During my time playing Occlusion, I felt: Surrealism	Chi-Squared Goodness of Fit	"Constantly" or "Often" 93.94% (31) of 33 respondents	8.36215E-06	Significant
During my time playing Occlusion, I felt: Clarity	Chi-Squared Goodness of Fit	"Rarely" or "Never" 96.97% (32) of 33 respondents	6.34849E-09	Significant
During my time playing Occlusion, I felt: Wonder	Chi-Squared Goodness of Fit	"Constantly" or "Often" 78.79% (26) of 33 respondents	0.000172215	Significant
During my time playing Occlusion, I felt: Fear	Chi-Squared Goodness of Fit	"Rarely" 39.39% (13) of 33 respondents	0.239451121	Not significant
The aspects of Occlusion that most stood out to me where [sic]:	Cochran's Q Test with Marascuilo Procedure	"Architecture and space" and "Changing appearances" 61.76% (21) and 67.65% (23) of 34 respondents, respectively	4.67204E-07	Borderline*
I felt that my experience was:	Chi-Squared Goodness of Fit	"Somewhat planned" or "Somewhat random" 76.48% (26) of 34 respondents	0.020675846	Significant
My experience made me think of:	Cochran's Q Test with Marascuilo Procedure	"Going crazy" or "Having a dream" 55.88% (19) and 61.76% (21) of 34 respondents, respectively	1.11435E-12	Significant*

*Marasculio Procedure results

The aspects of Occlusion that most stood out to me where [sic]: Although the p-value of this test indicates strong significance, the Marascuilo Procedure reveals that the only option producing a significant difference with a paired choice is "Length of the Experience". This suggests without that single option the test may not have been significant. The test should be re-run with more specific and exhaustive options.

Significant differences:

- "Sound/voice" over "Length of the experience"
- "Architecture and space" over "Length of the experience"
- "Changing appearances" over "Length of the experience"
- "Glitch" over "Length of the experience"
- "Infinite repeating geometry" over "Length of the experience"

My experience made me think of: Although the inclusion of option "Other:" (with text entry) may have had a confounding effect on results as it may have been chosen less because it required more effort, strongly statistically significant differences were still identified between options such that this effect can be considered to soften but not invalidate results.

Significant different:

- "Being lost" over "Getting in a fight"
- "Being lost" over "I'm not sure"
- "Having a dream" over "Going on an adventure"
- "Having a dream" over "Getting in a fight"
- "Having a dream" over "I'm not sure"
- "Having a dream" over "Other"
- "Seeing things that aren't there" over "Getting in a fight"
- "Seeing things that aren't there" over "I'm not sure"
- "Going crazy" over "Getting in a fight"
- "Going crazy" over "I'm not sure"

Interpretation of Results

Statistical analysis of selected survey responses provides a strong baseline by which to assess all survey results against experience goals. In regards to self-reported emotional response, respondents significantly indicated frequent feelings of confusion, surrealism, and wonder. Respondents indicated they did not frequently feel clarity or closure, and respondents felt a medium frequency of isolation, indicating the experience was neither very isolating nor not isolating at all. These results, taken with the result that a significant portion of players were unsure whether or not they even "completed" the experience, strongly support the experience goals of disorientation, curiosity and wonder, and anti-catharsis. The experience goal of dissociation and fugue is partially supported by responses on isolation and clarity. It is believed that the results for isolation trended moderately due to the voice narration being neither frequently antagonistic nor friendly, and acting for some players like a companion.

In regards to self-reported experience interpretation, respondents identified elements of architecture and space as well as changing appearances as the most salient design features. Most players felt that their

experience was neither fully random nor fully planned, which was accurate and shows that most players understood the operation of the game and the randomness of their experience. However, 3 of 34 respondents (8.82%) indicated they thought their experience was "completely planned"; this shows a rare but interesting effect of apophenia in which players thought that their very chaotic, random experience was in fact intentionally designed.

Players also interpreted the game experience as similar to going crazy, having a dream, being lost, and seeing things that weren't there much more than they likened it to getting in a fight or going on an adventure. Zero respondents selected "I don't know", indicating that although not all comparisons between experience characterizations were found to be significant, play testers felt comfortable performing at least perfunctory interpretation. This indicates the experience was not too obtuse to play testers. Interpretation response analysis supports the experience goals of dissociation and fugue the most, but it also supports the experience goal of apophenia with the high, significant portion of respondents likening the experience to "seeing things that aren't there". This, and the experience of dissociation and wonder, were likely heightened for many players by the knowledge that their experience had randomized components. Finally, the fact that players identified architecture and space as well as changing appearances at the highest rate of any salient design feature indicates that these two somewhat contradictory design choices were the most influential to the play experience. The interpretation offered here is that the procedural remixing mechanic was unavoidably central to the experience while the constantly repetition of the interior space every iteration as the only unchanging element situated architecture at the forefront of the experience for most players as well. In this way, the design decision to use repeating architecture and familiar space to scaffold the experience was successful, while the decision to use a narrative component to add coherence did not necessarily have as strong an effect.

Looking at the data that was not statistically analyzed, 91.18% of players played with sound and 91.18% of players played the game for at least 5 minutes, the estimated minimum time needed to reach the 12th iteration. Therefore it is unlikely that the lack of narration or incomplete play sessions skewed survey results. Only 27.27% (9) of 34 players reported playing multiple times, although 11 players responded to the question asking how playing a second time changed their interpretations (with at least one respondent misunderstanding the question). Because only 10 respondents actually characterized how subsequent playthroughs affected their experience, statistical analysis could not be run; however, there seems to be no obvious trend in the available data. It appears that only one playthrough was needed to interpret the experience and that the experience of procedural remixing was presented thoroughly enough in repeating iterations that players felt neither the need nor the desire to replay the game, even knowing their experience could be different (as most players identified a degree of randomness in the experience).

A great deal of freeform text and verbal feedback was collected from respondents. As a high-level approach to understanding this data, word counts from all freeform text fields and recorded verbal feedback were made, omitting comments on technical issues and bugs. The considered word groups across 89 recorded entries were:

1. Crazy, insane, and related terms: **24 total mentions**
2. Stuck, unfinished, caught, and related terms: **27 total mentions**
3. Drugs, Psychedelic, and related terms: **1 mention**
4. Dream and related terms: **5 total mentions**
5. Fear, horror, scared, and related terms: **7 total mentions**
6. Closure and related terms when used to indicate catharsis: **9 total mentions**
7. Memory and related terms: **5 total mentions**

Additionally, a few respondents likened the experience to *P.T.* or *LSD: Dream Emulator* but these results are disregarded because some respondents had knowledge of the project's critical context.

Some players did feel that their experience was similar to reliving a memory, experiencing a dream ("fever dream" appeared twice), or taking a drug. However, the vast majority of text responses discussed themes of insanity and themes of feeling unfinished, stuck, or caught, or a feeling of endlessness. This is a strong indication that the dissociation and fugue and anti-catharsis experience goals were strongly experienced by play testers who left text or verbal feedback, and that the interpretation of *Occlusion* as similar in theme to works discussed in the Critical Context –drugs, dreams, and horror – is a less influential effect on players. However, players who identified themes of horror were often adamant about the effect, and that may have been produced by certain unusual iterations in those play sessions.

Other feedback discussed the effect of apophenia, with one player "seeing repeating patterns" and another play tester claiming that seeing text (font) materials and hearing certain voice over lines heightened the effect of wanting to ascribe meaning to the objects in the scene in relation to the narration. Play testers occasionally discussed a room such as "the purple room" as if it was discrete and designed. And many play testers speculated on the meaning of *Occlusion*, interpreting it in many ways ranging from the "experience of taking a prescription drug" to "being trapped in one's own mind", "the struggle of caring for someone with a mental illness", "the layered nuances of memory, identity, messiness, and disruption", or even, not particularly complimentary, "a commentary on tedium, relationships, and perspective." Experiences of apophenia, dissociation and fugue, and anti-catharsis show up very strongly in these comments and show that all of the original experience goals of *Occlusion* were represented in play tester feedback, though to varying degrees.

The best-conveyed experience goals of *Occlusion* were anti-catharsis, apophenia and dissociation and fugue.

Curiosity and wonder was an experience goal that was only partially supported by the post-play survey. Respondents significantly identified wonder as one of their experiences, but no questions pertained to curiosity or the desire for discovery, and few verbal or text comments mentioned curiosity.

Disorientation was also partially supported by survey responses pertaining to confusion, although because players strongly identified architecture and space (and by extension their rhythmic consistency) as major aspects of the game, it is more accurate to say players had a difficult time interpreting or predicting the game experience rather than that they were disoriented by it.

Finally, interpretations of the narrative of *Occlusion* were wide-ranging and creative in many instances. It was never an experience goal to present a lucid narrative, and *Occlusion* did not. Instead, *Occlusion* provided a set of experiences that was open to interpretation, and although the narrative was formed around the concept of a *Folie à Deux* this is not the only valid interpretation of the game. The designer particularly appreciates interpretations in which the player and the narrator are the same or in which the player is a caretaker for the narrator.

Maintenance

Occlusion uses major.minor.dot versioning designation and was originally released as a minor-only release to reflect the fact that it was a beta product.

Release and maintenance schedule:

Release	Date	Contents
0.1.0	March 30, 2017	Original release
0.1.1	April 8, 2017	Critical issues Low-priority issues with known fixes
0.1.2*	Late May, 2017	High-priority issues Issues requiring research to address Regular maintenance activities
0.2.0*	TBD	Additional animated materials and custom meshes and materials Additional ambient tracks Professional voice acting file implementation Lengthening of the experience from 12 to 16 or 18 iterations Additional changes under consideration

*Future releases

Additional changed under consideration for v0.2.0 include:

- Linux and/or Mac support
- Basic transform animations for meshes in later iterations
- Sound emissions from meshes in later iterations
- Subtitle functionality in which subtitle text attributes are procedurally remixed
- Blendables (post-processing materials) support
- Use of “naturally” corrupted textures, meshes, and audio files

Release v0.2.0 will be the final planned release for *Occlusion* after which the product will be sunsetted until any eventual re-release in a collection (see Future Work and Distribution).

Maintenance activities for *Occlusion* are tracked using a Microsoft Excel spreadsheet which contains an item number, description, type, source, resolution steps for documentation, and resolution and certification dates. Certifications are made through in-engine smoke testing where possible, although certain issues such as lighting issues require testing with an experimental build.

Maintenance tracking for release v0.1.1:

Code	Issue	Type	Source	Fix Date	Cert Date
v0.1.1-01	Hallway chair, bedroom largedeco, and hallway book hover	Bug	Smoke testing	4/7/2017	4/7/2017
v0.1.1-02	Architecture collision not high enough to prevent escape	Bug	Play test	4/7/2017	4/7/2017
v0.1.1-03	Some large models in later iterations may block progress	Bug	Play test	4/7/2017	4/7/2017
v0.1.1-04	Directional light in kitchen not rendering after iteration 1	Bug	Smoke testing	4/7/2017	4/7/2017
v0.1.1-05	Lighting in general very dim in iterations above 4	Enhancement	Smoke testing	4/7/2017	4/7/2017
v0.1.1-06	Player character collision wider than expected	Enhancement	Play test	4/7/2017	4/7/2017
v0.1.1-07	Slowdown effect comes very late in play	Enhancement	Smoke testing	4/7/2017	4/7/2017
v0.1.1-08	Object z placement does not variate	Enhancement	Known issue	4/7/2017	4/7/2017
v0.1.1-09	Door leading to iteration 12 does not close behind the player	Bug	Play test	4/7/2017	4/7/2017
v0.1.1-10	Point light positioning in hallway and bedroom is off	Enhancement	Smoke testing	4/7/2017	4/7/2017
v0.1.1-11	Light color does not remix	Bug	Documentation	4/7/2017	4/7/2017
v0.1.1-12	Bad pin for y-location script of last iteration on Transform Remix	Bug	Documentation	4/7/2017	4/7/2017
v0.1.1-13	Game Content folder has many unused assets	Enhancement	Known issue	4/7/2017	4/7/2017
v0.1.1-14	Some narration timing starts too soon and ends too soon	Enhancement	Known issue	4/7/2017	4/7/2017
v0.1.1-15	No way to restart game	Enhancement	Known issue	4/7/2017	4/7/2017
v0.1.1-16	Post-processing bug reintroduced due to copying project	Bug	Documentation	4/7/2017	4/7/2017
v0.1.1-17	Narration audio cues trigger multiple times	Bug	Play test	4/7/2017	4/7/2017
v0.1.1-18	Narration in iteration 12 sometimes plays 12+ iteration cues	Bug	Smoke testing	4/7/2017	4/7/2017

Note: replication steps have been removed and contents have been shortened for ease of replication in this format.

Future Work and Distribution

The immediate future of *Occlusion* is defined in Maintenance: *Occlusion* will continue to be updated and supported according to the release schedule, with a final update in summer 2017 to add assets and more robust functionality. During this time it will be distributed informally through social media and word of mouth. This final release will also compress *Occlusion* to under 2GB, allowing distribution through *itch.io*, which will be free. This is the only planned official distribution channel for *Occlusion*.

After this final update, *Occlusion* will be put on a maintenance-only schedule.

Occlusion will be the first work in a series of similar digital artworks that explore concepts originally outside of the scope of the project. Although these other works are in the earliest stages of conceptualization, aspects of the continued project may include:

- Experience centered on explicit deconstruction of an environment, leveraging the repeating spatial and architectural qualities of *Occlusion* to provide scaffolding and rhythm for such deconstruction imagery
- Conversely, experience centered on an explicit construction of an environment using similar iterative construction
- Experience focusing exclusively on lighting and post-processing effects, a robust toolset within UE4 which supports Blendables (materials that can overlay the screen via post-processing for a wide variety of screen effects)
- Digital toy or simulation experience in which the bounds of the generative space are exposed to the user throughout the experience and may be changed directly or indirectly through in-game actions
- Experience centered around procedural remixing of architecture or game space to deconstruct directionality and navigation, such as bent or flipped environments or environments that resist directional organization entirely

In this way, *Occlusion* is only a starting point for a richer, broader set of work that will draw on this critical context to create experiences that discuss aspects of glitch, proceduralism, and collage in a way that *Occlusion* could not. Fittingly, the overarching theme of this series will variation.

Conclusion

Experiment, walking-sim, art or toy, *Occlusion* presents a short but dynamic game-like experience that draws inspiration from material as diverse as Glitch Art, Internet Art, procedural generation and GenArt, Surrealist Art, experimental architecture, and traditional collage and décollage.

As this thesis shows, these disciplines are deeply related not just aesthetically but though their process and critical perspectives as well. Glitch Art, Surrealism, and décollage practice all require the removal or effacement of visual material to expose what lies beneath – the material substrate, the digital underlying the simulated or the construction underlying the image. In this way these practices are strongly aligned with the critical perspective of Materiality. Any critical analysis of Glitch Art and related art practices that focuses on exposure and destruction must necessarily include a discussion of Materiality or is incomplete. Art practices which layer or build material – such as architecture, Surrealist Art, and collage – have in common with their destructive counterparts a clear ethic of recombination, recontextualization and creative juxtaposition. This action may be humorous, frightening, disorganized or abstract; it may be designed to convey specific meaning or it may be expressive only, requiring a human agent to interpret it as meaningful.

Procedural remixing, a discipline related to procedural generation but which uses premade assets combined randomly according to defined parameters, is a recombinant art practice like collage that produces unexpected and often meaningless images which humans may then – or may not – ascribe meaning to. One perspective with which to understand this work is through queer theory and the practice of disidentification, a way to consume and re-represent media without validating or contradicting it but rather decontextualizing it and re-ascribing meaning to it – reclaiming it by building it into a new context entirely, like an image in a collage or an element breaking the illusion of reality in Glitch Art or Surrealist Art.

Occlusion builds on these themes and many others. It represents a full development lifecycle, from ideation to release and assessment, of a software product meant to evoke very specific experience goals. These experience goals – disorientation, dissociation and fugue, apophenia, curiosity and wonder, and anti-catharsis – were achieved by the experience and expounded on by players during assessment.

However, the project was not without setbacks. There were Project Management and scheduling issues, particularly due to the fact that *Occlusion* was developed with a team of one and scheduling conflicts – such as time taken to speak and present at GDC, SWPCA, PAX East and QGCon during the final leg of the project – halted progress completely and were not accounted for in the original project schedule. Unreal Engine 4 development is sensitive to file maintenance and organization issues especially during packaging, and many hours were spent resolving these issues so that a build could be exported for testing. When the build was completed and assessment began, some critical game-stopping bugs were still present which necessitated a dot patch and re-release within the first 10 days, further pushing back the project schedule. And when assessment results were collected it became clear that some questions were not formulated well for statistical analysis and none were eligible for more robust parametric analysis.

In retrospect these issues could have been prevented through more careful schedule planning early in the project. If the possibility of travel had been anticipated and blocked out, it would have been easier to absorb time lost during packaging troubleshooting and it's likely the original v0.1.0 build would have shipped with fewer major issues. Another major process improvement would have been to produce an earlier second digital prototype between the first gray box prototype and the first iterations of the release version. This would have brought up design issues such as narration timing, experience length, and skysphere design much earlier in the process and would also have required resolving packaging blockers

earlier for a project folder with far fewer assets to manage. Finally, the post-play survey had some flaws which could have been addressed before assessment. Specifically, questions subject to statistical analysis should have been formulated with exhaustive, mutually exclusive options such as those of the Likert scale; “I don’t know” and “Other” options should have been separated into follow-up questions, and matrices of multiple dichotomy questions should have had more balanced, diverse options to avoid results being skewed by a single outlier. It also would have been advantageous to include questions specific to apophenia and curiosity, which were not asked about directly in the survey.

Even still, *Occlusion* was very successful. The project scope was well-formed and the schedule was flexible enough to accommodate setbacks without serious failure. Assessment produced key results found to statistically significantly support experience goals, in particular the experiences of dissociation and fugue, apophenia, and anti-catharsis. Other experience goals – disorientation and curiosity and wonder – were partially supported both by statistical analysis and anecdotal evidence collection. Survey respondents were enthusiastic and insightful and offered a range of thoughtful interpretations for the experience from memory to intoxication to madness. A particular marked success of this project was the completion and inclusion of four extremely insightful and informative interviews with industry professionals and academics which enrich the material presented here as well as expound on a number of topics concerning art making, game making, and the combination thereof. Another successful aspect of the project was the inclusion of the exhaustive and specific Development Overview and Appendix A: Design Specification sections, intended to be sufficient to reproduce the project independently. This documentation was hugely important during development when it was first written and hopefully may be helpful to future students or professionals looking for development methodologies to produce work similar to *Occlusion*.

The final measure of success of *Occlusion* is that I, the artist, like it. It is an earnest representation of what I set out to make nearly two years ago. Many play testers have speculated about what *Occlusion* means, or have asked me outright. It is a game about change. *Folie à Deux*, madness, memory, childhood, family, relationships, rhythm, repetition, mutability, stability, stasis, unpredictability, recontextualization, erasure, destruction, effacement, endlessness, ineffectiveness, powerlessness – they are all metaphors for change. They are all faces of the experience of growing in which one, as if in a fugue state, marches forward through time and can never turn back, forging forward into the unknown and unknowable. This is for me an experience so essential and so strange I felt it was only expressible in this way.

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Appendix A: Design Specification

Project Setup

Occlusion will be set up as a First Person Shooter project using Blueprints, Starter Content, and scalable quality settings. The First Person Blueprints will be modified as necessary, and all prop meshes and volumetric fog will be removed from the scene to be replaced with custom assets.

Versioning control will use the major.minor.dot versioning notation. The first version of the prototype for distribution will be 0.1.0, so all preceding test/unreleased versions will be formulated 0.0.dot.

Only one level, the OcclusionDefaultMap, will be used. The default FirstPersonCharacter will be used but modified later.

Architectural Design

Interior Modeling

Interior space is modeled in 3ds Max from extruded splines converted to meshes. Proportions are somewhat exaggerated, with rooms, doors, and windows oversized for effect. The following sizing standards are used:

Feature	Width	Height
Wall	16cm	390cm*
Baseboard	2cm	8cm-10cm oblique
Molding	2-4cm oblique	8cm
Widow	110cm	130cm
Wall topper	As needed	130cm*
Wall footer	As needed	130cm
Door opening	144cm	260cm
Hallway	264cm	320cm

*These measurements allow extra space for ad-hoc adjustments for ceiling height in the engine.

The following meshes will be exported:

- Walls (combination of walls, headers and footers)
- Baseboards (including door molding)
- Ceiling
- Floor
- Windowframe1
- Windowframe2
- Windowframe3
- Windowframe4
- Windowframe5

Interior space overhead wireframe:

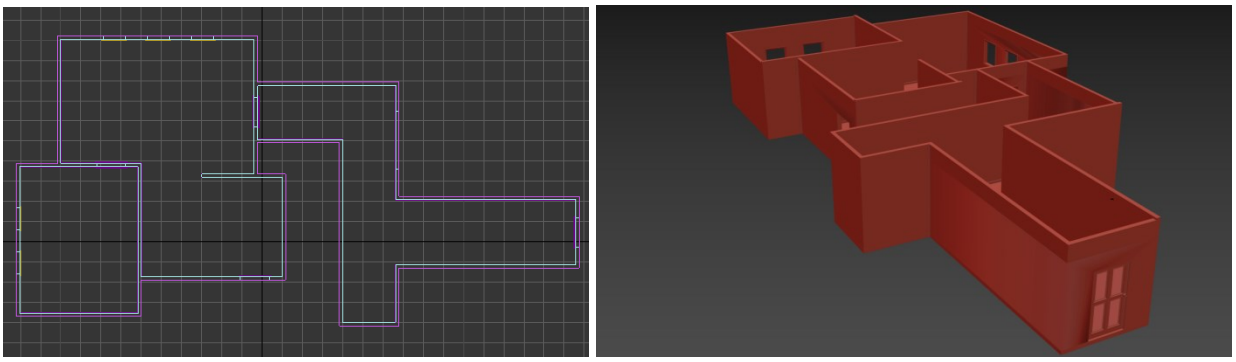

Figure 1A: Views of the interior space design.

The model does not need to be positioned or rotated precisely as that may be done in-engine.

UVs will be mapped in 3ds Max before export but collision will be added in UE4 (floors and walls only). During UV unwrapping, apply the default black and white grid material to all meshes so that their UV scales can be set relative to one another since there is no automated process for this.

Export from 3ds Max with Smoothing Groups and using inches (default in 3ds Max) to centimeters (default in UE4) conversion.

Import to UE4 without collision using Mikk TSpace for normal generation and set to computing both normals and tangents to avoid degenerate tangents base error. Collision will be generated using static meshes merged using Merge Actors.

Doors

Doors (PivotDoor) and doorknobs (DoorHandle) will be modeled in 3ds Max and imported into Unreal Engine 4 using the method architecture meshes except for import, for which Auto Generate Collision will be set to true.

When implementing doors into UE4, place both the PivorDoor and the DoorHandle models as children of a static mesh marker that is set to Hidden in Game/NoCollision. Position this marker at xy point around which the door should pivot, and instead of moving and rotating the door or doorknob, manipulate this parent mesh. For doors that will not open this is a convenience that allows the door and doorknob to easy stay together, but for doors that will open and close this is necessary for proper animation.

Repeating Geometry

The entire interior space of the experience, including all architecture, blocking volumes, doors, windows, and props, as well as all triggers, post-processing volumes, and lighting elements, will be grouped as a Blueprint for duplication.

In order to give the illusion that the player is walking through an infinitely repeating interior, one instance of this Blueprint will be spawned on the current instance's Marker mesh at 90 degrees along the y-axis. This Marker is simply a primitive static mesh set to Hidden in Game/NoCollision that will be placed in-engine at the location necessary for the next subsequent Blueprint to line up with the current Blueprint.

With this a second, larger trigger box, the fourth-to-last instance (if it exists) will be destroyed. See Scripts: Endless Geometry for more information. Only up to four instances of the Blueprint will ever exist simultaneously during runtime, making a closed loop.

Do NOT create the Blueprint with any child elements as child element transforms will change when added to the Blueprint. Arrange parents and children later within the Blueprint editor.

Prop Design

The following content will be downloaded:

Package Name	Author	License	Cost	Source
Open World Demo Collection	Epic	UE4	Free	Unreal Marketplace
PolyPixel Freebie Pack	PolyPixel	Free	Free	Unreal Marketplace
Modern House Interior Props	It's Chill Bro Studio	Purchased	$25	Unity Asset Store
Next Gen Chair	Vertex Studio	Free	Free	Unity Asset Store
Books Pack	Vertex Studio	Free	Free	Unity Asset Store
Big Furniture Pack	Vertex Studio	Purchased	$10	Unity Asset Store
Classic Picture Frame	Vertex Studio	Free	Free	Unity Asset Store
Kitchen Props Free	Jake Sullivan	Free	Free	Unity Asset Store
Road Blocker	Rakshi Games	Free	Free	Unity Asset Store
Barricade	Rakshi Games	Free	Free	Unity Asset Store
Shelf	Rakshi Games	Free	Free	Unity Asset Store
Piano	Miroslav Uhlíř	Free	Free	Unity Asset Store
PBR Cone Pack	USC	Free	Free	Unity Asset Store
Record player	VIS Games	Free	Free	Unity Asset Store

Assets from the Unreal Marketplace or Unreal Forums will be imported directly in Unreal. However, all other content is purchased from the Unity Asset store and requires a special procedure to import into Unreal Engine.

1. Download, install, and license Unity
2. From Unity Asset Store>Downloads, Select "Open in Unity"
3. From Unity, download and import the package; download location is C:\Users\<User>\Documents\<Unity Project Name>\Assets
4. Open the .FBX files in 3ds Max and:
    a. Import with Smoothing Groups
    b. Adjust the scale of the model
    c. Adjust the origin of the models. The origin must be located at the "base point" of the object to enable remixing without significant clipping. The base point is along the plane(s) of the object that would sit against a surface (bottom plane for most items, top plan for ceiling decoration, back plane for wall decoration, in z-up configuration).
    d. Adjust the rotation of the items so they are aligned facing front (in z-up configuration)
    e. Export selected with Smoothing Groups
5. Import files into Unreal Engine
    a. For .FBX files, use Import from Content Browser or drag-and-drop.
    b. Use these settings:

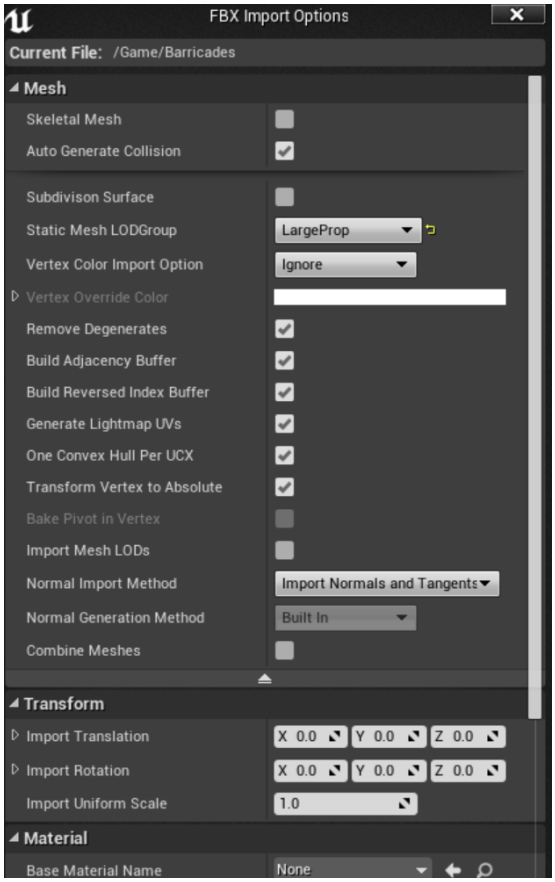

Figure 2A: .FBX import settings. In this example Combine Meshes is deselected, so meshes with multiple parts will need to be combined using Merge Actors within the engine. This will also bring in the material but it will be empty.

   c. Check integrity of model
6. Delete Unity project and assets to save room on the storage device

In addition to these "standard" assets, two other types of assets will be created in 3ds Max:

- glitchv1 meshes: meshes glitched from Unity Store assets to be broken but recognizable
- glitchv2 meshes: meshes glitched from Unity Store assets to be barely or not recognizable

These meshes are manually glitched within 3ds Max using procedural mesh modification tools such as Tessellate, Twist, Shell and Optimize, and/or Noise, often duplicated and layers onto one another.

The import process for these meshes are identical to standard meshes.

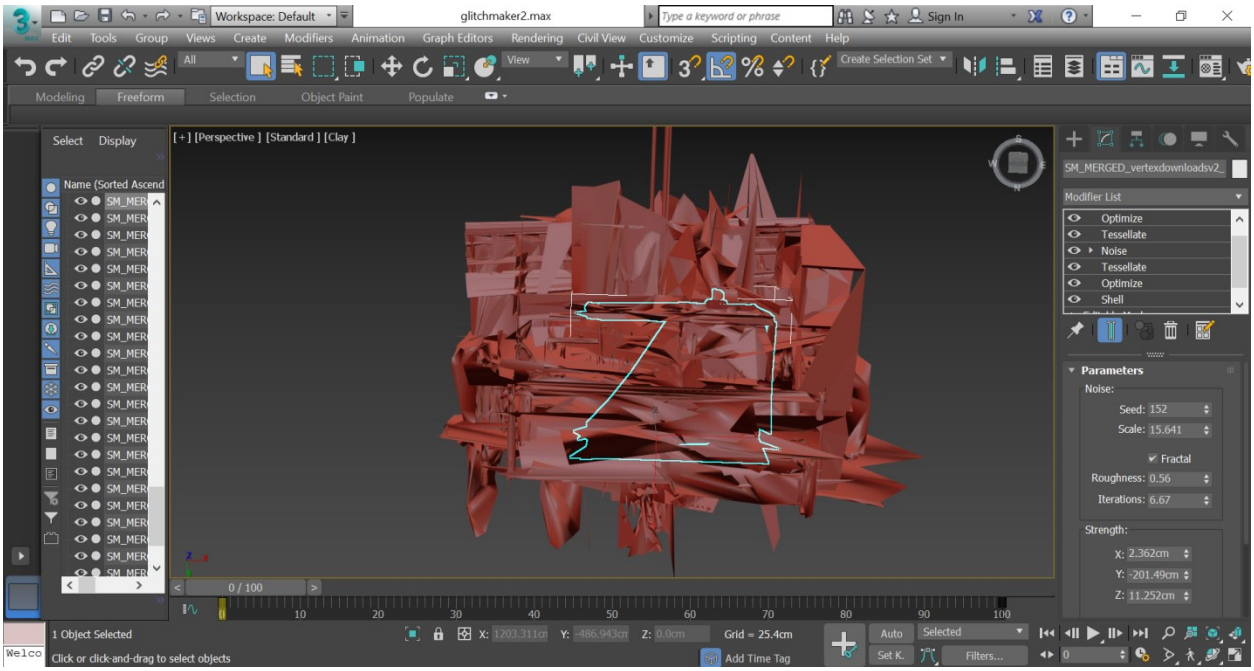

Figure 3A: The glitchmaker2.max 3ds Max scene used to produce glitched meshes, v1 and v2. All meshes are kept at (0,0,0) in proper rotation and editing meshes is handled by toggling object visibility.

Materials Design

Materials will be collected or created as needed from downloaded content and seed content in Unreal Engine. Because all imported or seeded meshes have correct UV mapping, no material scaling is required.

If downloaded textures are in .tiff format, which is unsupported by Unreal, they may be batch converted to .tga or another supported format using Photoshop Actions.

There will be five sources of materials for *Occlusion*:

1. Materials "seeded" i.e. available in-engine as starter content or engine content
2. Materials imported from Epic Marketplace packages (Open World Demo Collection and PolyPixel Freebie Pack)
3. Materials created manually from diffuse and/or normal and specular textures imported separately from their Unity Store meshes
4. Materials created using Image Glitch Tool by Georg Fischer to modify existing textures and original artwork
5. Materials created as variations on existing textures; variations are created by hand in-engine by modifying material animation parameters, color parameters, and/or referenced textures

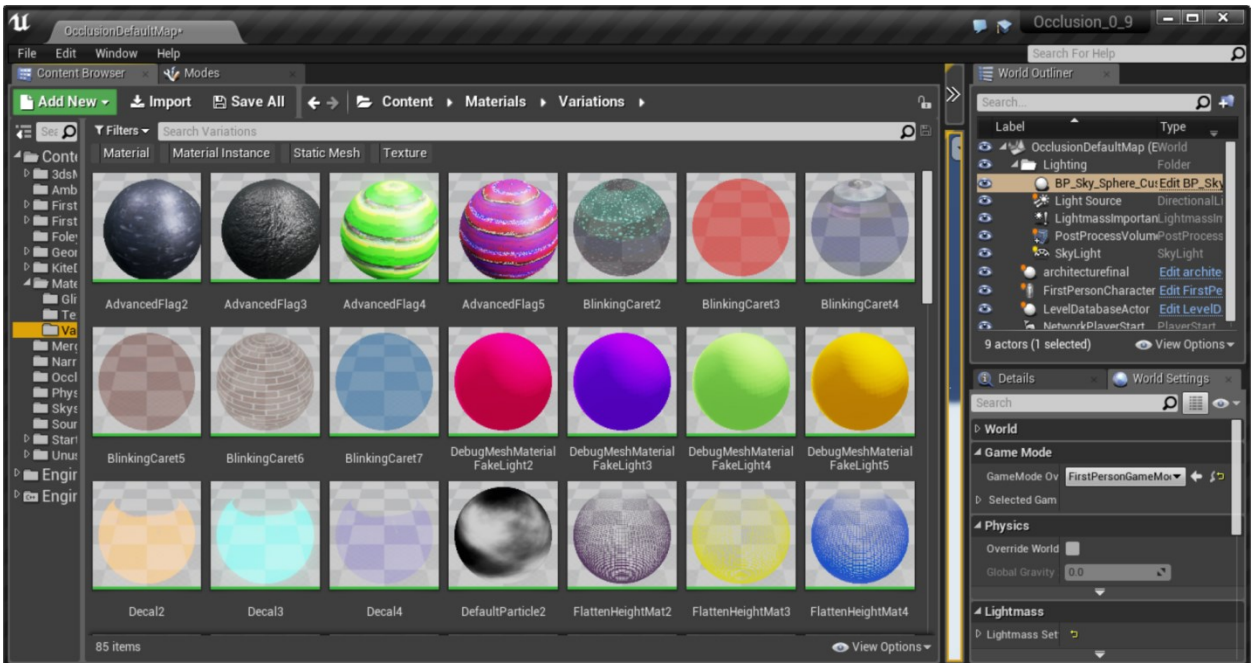

Figure 4A: Variation Materials in UE4 created from modifying existing materials; e.g. the BlinkingCaret material is seeded in UE4 but variations here have been made to blink different textures and colors and at different speeds.

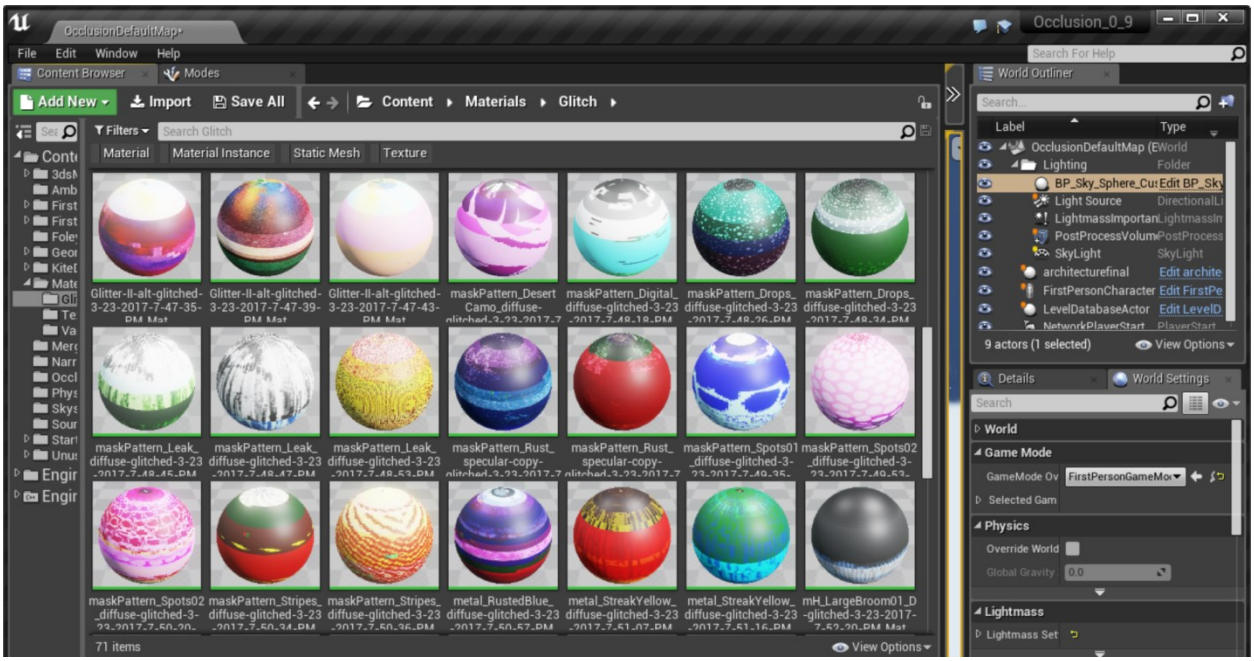

Figure 5A: Glitch materials in UE4 created from textures corrupted using Image Glitch Tool by Georg Fischer

Lighting Design

Use the default Lightmass Importance Volume and scale/fit to the anticipated size of the scene (an area covering the potential volume of four connected Blueprints). Use a copy of the default Skysphere Blueprint called BP_Sky_Sphere_Custom, the default Skylight, and the default Light Source to provide global illumination.

Five lights will be placed within the Blueprint to illuminate the interior and will be subject to remixing:

1. LightComponent0: Point light in hallway corner
2. LightComponent01: Point light in living room corner
3. LightComponent02: Point light in bedroom
4. LightComponent03: Point light in hallway near entry to living room
5. LightComponent04: Point light in the kitchen

Lights will use default color and manually set intensity, and their attenuation radii will be set to prevent the overlapping of three or more radii, which is the limit UE4 allows.

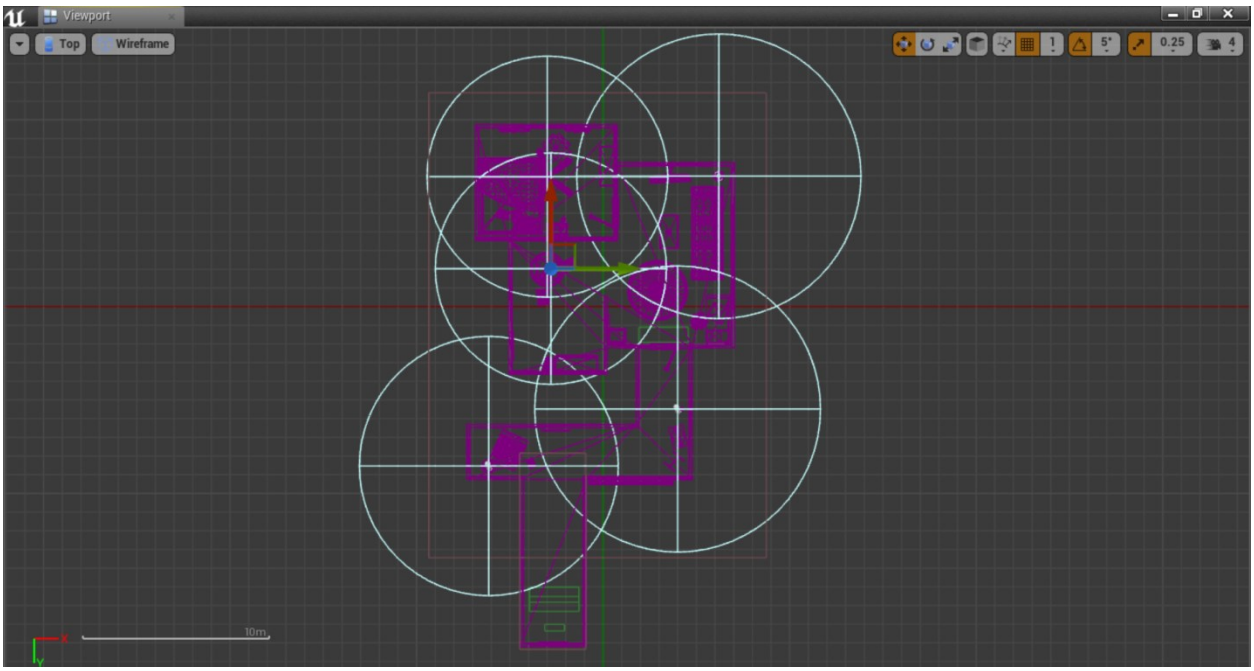

Figure 6A: Interior space lighting elements attenuation radii.

Lighting fixtures will be made to not cast shadows except for the bedroom and kitchen lighting fixtures.

Post Processing Volume

Use the default Post Processing Volume in the default level OcclusionDefaultMap, which is unbounded. This will be disregarded during architecture Blueprint generation after the first iteration, but it is needed for iteration 1.

In the architecture Blueprint two post processing volumes will be added: PostProcessRooms and PostProcessHallway. Two volumes are required to cover the whole architectural footprint without the

chance of clipping into another iteration's blueprint because post processing volumes can only be defined with primitive shapes (here, a cube is used).

To define a post processing volume with bounds within a Blueprint, make it a child of a primitive static mesh set to be Hidden in Game/OverlapAllDynamic. Ensure Use Attach Parent Bounds on the post processing volume is set to true.

Audio Design

Audio files will be produced in and exported from Audacity in16-bit .wav format, the only accepted audio format for import into UE4.

Foley-style sound effects and some ambient tracks will be acquired from Freesound.org and will all be licensed with the CC0 license.

Ambient music tracks will be acquired from Monplaisir, a French experimental electronica/noise group who provide their music through Free Music Archive under the CC0 license.

Narration tracks will be original recordings, and for v0.1.0 these will be placeholder recordings by Allison Stout made with personal recording equipment.

Pitch, volume, and speed modulation as well as the application of filters (high pass and low pass filters predominantly) will be performed in Audacity before export. Volume control may also be performed in-engine as needed at the Sound Cue level.

Sound Cues will be built to contain all sound files, where a single Sound Cue is used to contain all the possible sound file candidates for a single audio event. See Scripts for more information.

Interaction and Viewport

Player Controls

The default FirstPersonCharacter Blueprint will be modified in the following ways:

- Disable shoot projectile functionality (Event Graph)
- Add Quit Game from escape key press (Event Graph)
- Add Load Level from delete key press (Event Graph) – this affects a restart
- Reduce player character CollisionCapsule xy dimensions from 1 to .7
- Reduce Max Walk Speed from 600 to 350 (CharacterMovement component)*

*Reduction in walking speed will slow the pace of exploration and emphasis observation while also mostly preventing players from triggering the next voice line as the current one is finishing.

Jump functionality will be preserved to allow players to clear obstacles that may remix into their path later in play.

Finally, control sensitivity will be reduced by 10% from default (from +/- 1.0 to +/- .9) in Project Settings>Engine>Input.

Camera

FirstPersonCharacter Blueprint's FirstPersonCamera component will be modified in the following ways:

- Camera height changed from 64cm to 100cm*
- Field of view changed to 75deg from 90deg
- Hide in game: gun mesh (lower gun model used as VR model already set to Hide in Game)
- Hide in game: skeletal mesh
- CapsuleComponent xy scale will be reduced from 1 to .8 to allow clearance of some obstacles

FirstPersonHud Blueprint will be modified in the following ways:

- Removal of crosshair texture

*This is calculated from the capsule center which is 96cm above the floor, making true camera height from floor 196cm.

Change these settings in the Blueprint, NOT the instance details, for them to take effect.

Set Dressing

The interior space of *Occlusion* is decorated with ordinary static meshes and materials to give a very ordinary domestic interior feel. The "original" appearance of the interior space is only seen in iterations 1 and 12.

Set dressing is performed with remixing in mind so that large objects are kept as far from the player's critical movement path as possible to prevent blockage and there are enough varied types of static meshes (at least two of each member of the static mesh instance arrays) to provide a great deal of variety.

Architectural details such as air vents, light switches, power outlets, and a rug are placed in the space to further flesh out the interior realism for the first and "last" iterations.

Additionally, extra markers are placed in the interior to allow static meshes to remix into spaces that are not occupied in the "original" interior layout for extra variety. Because the project will not build if a static mesh object is lacking a static mesh component, these static meshes have static mesh components but use the invisible Opacity Material and are small enough to not cause collision issues.

Extra markers include two largedecotag markers in the living room area and one ceilingdecotag marker in the hallway area.

Figure 7A: Interior of the architecture Blueprint architecturefinal which is the appearance of the interior of iterations 1 and 12. Although architecturefinalrepeatable is identical before remixing, the player would never see the "original" set dressing of that Blueprint on iterations other than 1 and 12.

Scripts

Scripting Setup

Interior (architectural) geometry and all contained props, triggers, and other elements contained within the architectural Blueprint will repeat to create the illusion of endless geometry. The "end" of Occlusion, occurring at iteration 12, must be unique and appear identically to iteration 1, which in turn also has unique requirements such as having a door that never opens (as it would open to reveal no architecture behind the player).

Therefore the architecture Blueprint will actually be saved as two separate Blueprints, identical except for the scripts each contains:

- architecturefinalrepeatable
    - Used for all iterations other than 1 and 12
    - Contains all scripts
- architecturefinal
    - Used only for iterations 1 and 12
    - Contains ONLY IterationCounter, Blueprint spawning and destroying, door animation and sound effects, ambient sound, and narration scripts

To handle the large number of remix procedures that must be executed when a Blueprint is spawned, the architecture Blueprints will use an initialization behavior comprised of an Event BeginPlay function and a sequence function:

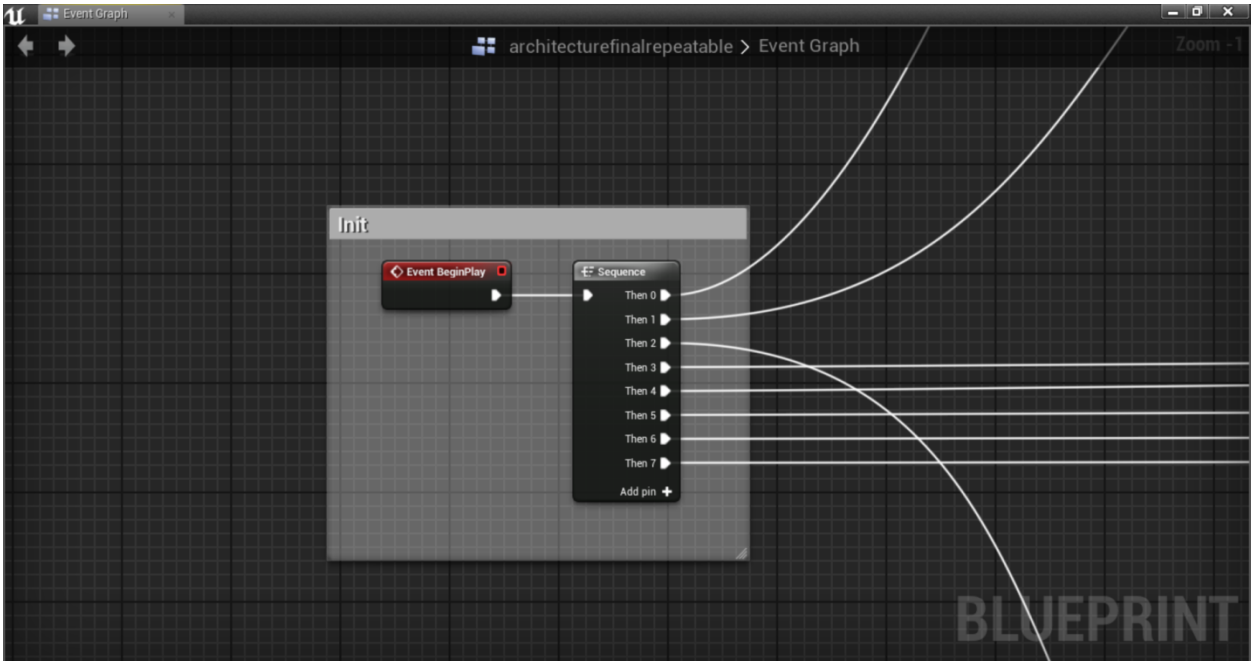

Figure 8A: Architecture Blueprint initialization from architecturefinalrepeatable. architecturefinal also uses this format but has only one connected pin on the sequence function, for ambient sound.

This sequence will perform the following procedures, in order:

0. Define arrays for static mesh instances and lighting elements and create and modify arrays based on IterationCounter value for potential materials and meshes to be used in remixing
1. IterationCounter
2. Mesh remixing
3. Material remixing
4. Ambient sound remixing
5. Transform remixing
6. Lighting remixing
7. Post processing remixing

In addition to these processes, the following processes will also be triggered in the architecture Blueprints:

- Door open: On Event Tick
- Door close: OnComponentBeginOverlap with player
- Blueprint spawning: OnComponentBeginOverlap with player
- Blueprint destruction: OnComponentBeginOverlap with marker
- Narration: OnComponentBeginOverlap with player
- Skysphere remixing: OnComponentBeginOverlap with player

To support these processes, triggers and arrays will be defined where necessary. Triggers and arrays are documented in the sections dedicated to the functionality they impact, below.

Remixing is performed depending on the current IterationCounter value. Rather than change the procedural bounds each iteration, bounds are only changed at certain key iterations so that, for example,

iterations 2-4 use the same bounds, 5-6 use the same bounds, etc. What they key iterations are will depend on the element being remixed.

To perform remixing by iteration, the Branch node is used:

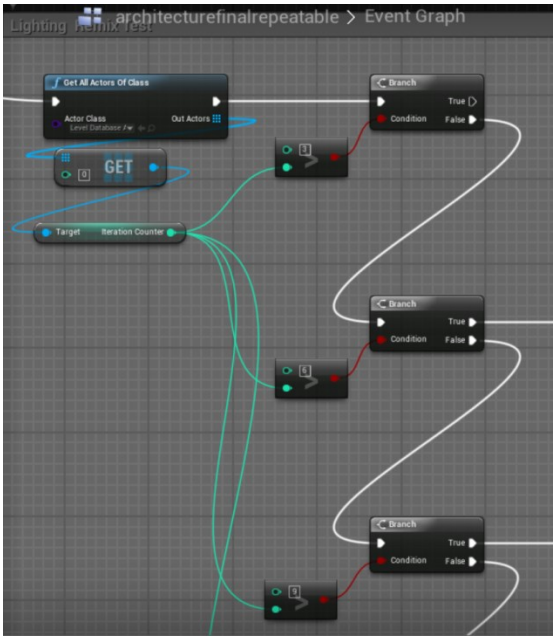

Figure 9A: Example branching structure using the Branch node to perform remixing by iteration (from the lighting remixing procedure). In this example, no remixing is performed before iteration 3; for iterations 3-5 one type of behavior is performed, for iterations 6-8 another type of behavior is performed, and so on. This requires accessing the IterationCounter from the LevelDatabaseActor, explained in further detail in Iteration Counter below.

Iteration Counter

In order for all remixing scripts to fire correctly, a universal iteration counter must be added. Add a new Actor Blueprint called LevelDatabaseActor and place in the level, not in the architectural Blueprint. To this, add a new integer variable IterationCounter and make it public by clicking the eye on the right of the label in the Blueprint editor. Its Default Value should be 0.

This variable can be called and set from the architecture Blueprint with the following script:

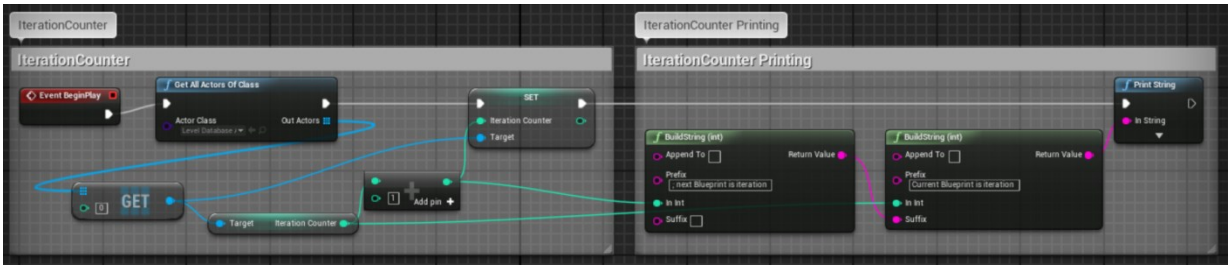

Figure 10A: The IterationCounter automatically counts up one every time it is called (every time a new architecture Blueprint is triggered). This script also includes a Print String function for debugging.

Note: The IterationCounter will count up one when it is initially called, meaning the first architecture Blueprint will be iteration 1, NOT iteration 0. Even though the IterationCounter value is increased on

trigger in the current Blueprint, the number actually represents the iteration number of the NEXT Blueprint (the one just generated).

Repeating Geometry

This function will be executed by Livingroomtrigger. It has two parts:

1. Spawn Next Blueprint

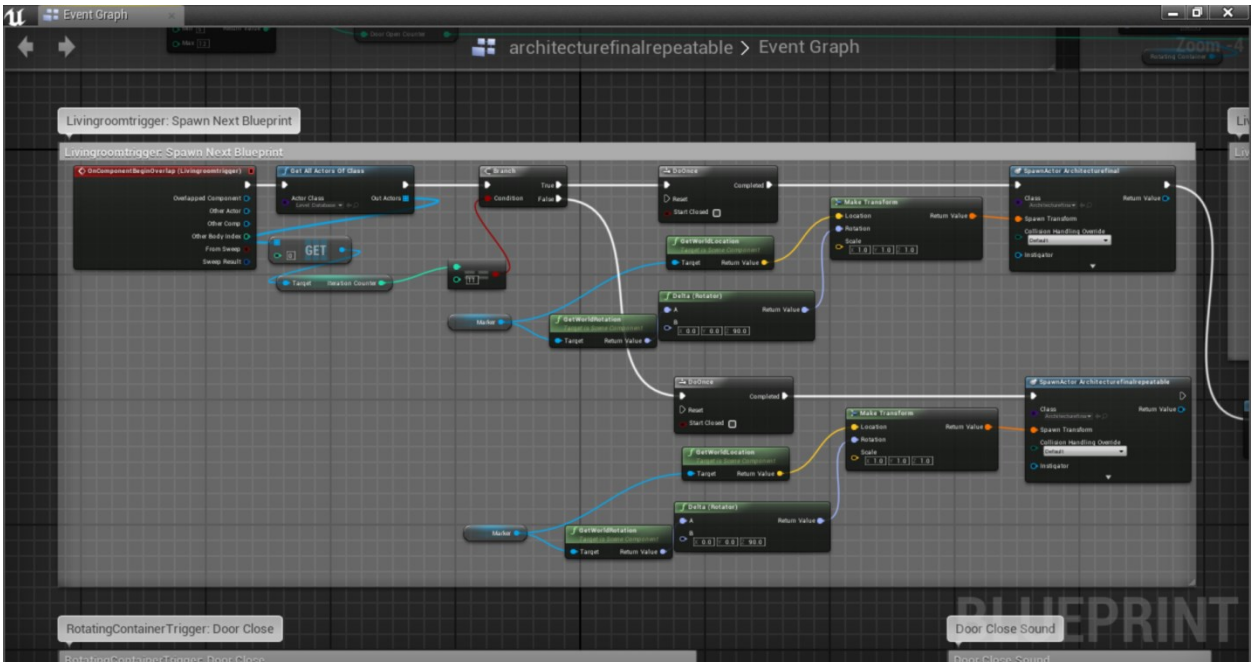

Figure 11A: Spawn Next Blueprint script in Livingroomtrigger in architecture Blueprint. This script branches depending on the iteration so that the architecurefinal Blueprint is used for iteratons 1 and 12 and the architecturefinalrepeatable Blueprint is used for all other iterations. Off-screen is a Print String function for debugging.

Note: Use world locations, not relative locations.

2. Destroy Previous Blueprint (if it exists):

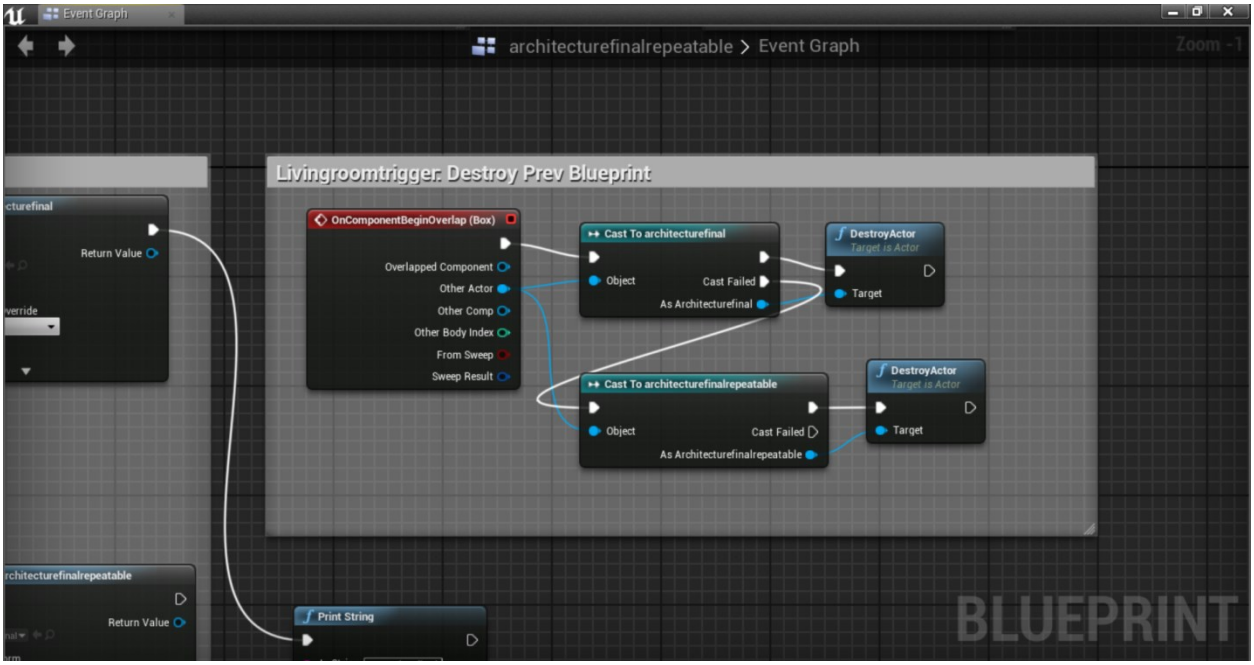

Figure 12A: Destroy Prev Blueprint destroys the oldest architecture Blueprint after four have been created, allow the architecture to endlessly spiral into itself. The Box is a primitive static mesh that is Hidden in Game used to overlap and destroy the previous Blueprint.

Note: All triggers must be set to Custom collision as described in Doors, above, to avoid triggering upon spawn and creating an infinite loop.

Doors

All doors will be static except for the door between architecture Blueprints which will open automatically on a timer and close automatically on trigger (except for iteration 1's architecturefinal Blueprint which will never open the door). After this it will not be possible to reopen the door. For this to work it must open at an angle towards player approach and be part of the Blueprint it precedes.

In the architecture Blueprint, the trigger will be created and the door meshes will be created and added to an empty RotatingContainter parent so they can be yawed simultaneously. This is the container that will be affected by animation. The starting position of this container determines the necessary starting and ending values for the timeline (yaw animation).

The collision box used to trigger the door animation must have the following collision settings in the Blueprint, for use within architecture Blueprint:

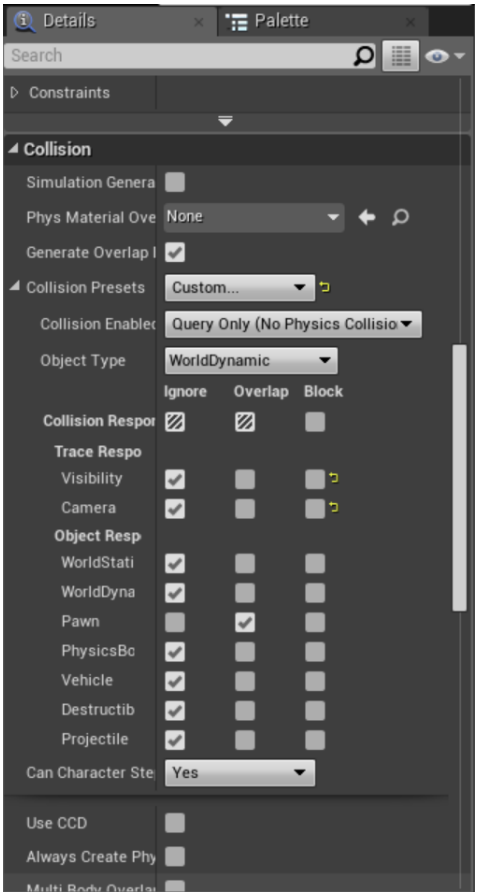

Figure 13A: Custom collision for door animation collision box that allows the door Blueprint to be included within an architecture Blueprint and still fire correctly (otherwise the trigger will fire on spawn, since it is overlapped by its own Blueprint).

Doors will have two animations: opening and closing.

Door open, with sound effect:

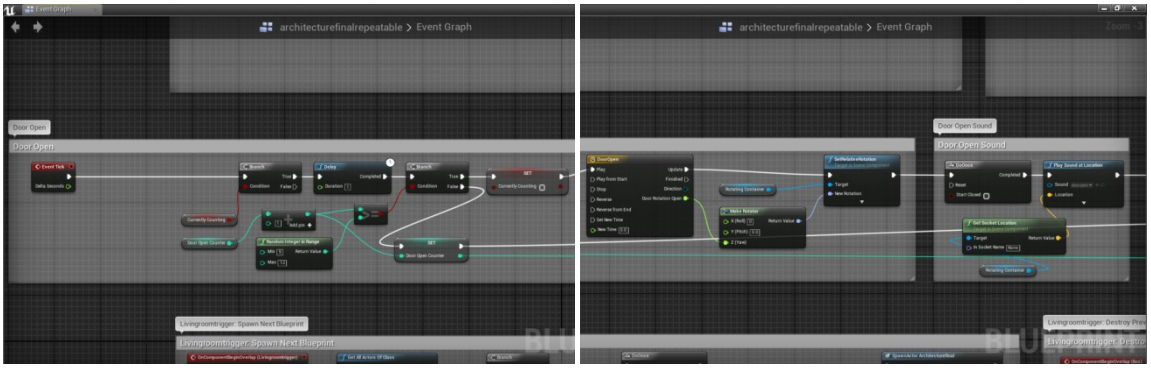

Figure 14A: The script to automatically open the next Blueprint's door based on a bounded random second elapse. An event counter checks if CurrentlyCounting=true, if so it counts one second, checks if DoorOpenCounter is greater than or equal to a set second value (randomly generated, with bounds), if so it opens the door. Off-screen is a Print String function for debugging. Bounds may be adjusted during testing. Bounds used for 0.1.1 are 8-13 seconds.

Note: this requires the creation of two new variables:

- *A new public Boolean variable, CurrentlyCounting (Default=true), in Blueprint*
- *A new public integer variable, DoorOpenCounter (Default=0), in Blueprint*

Door close, with sound effect:

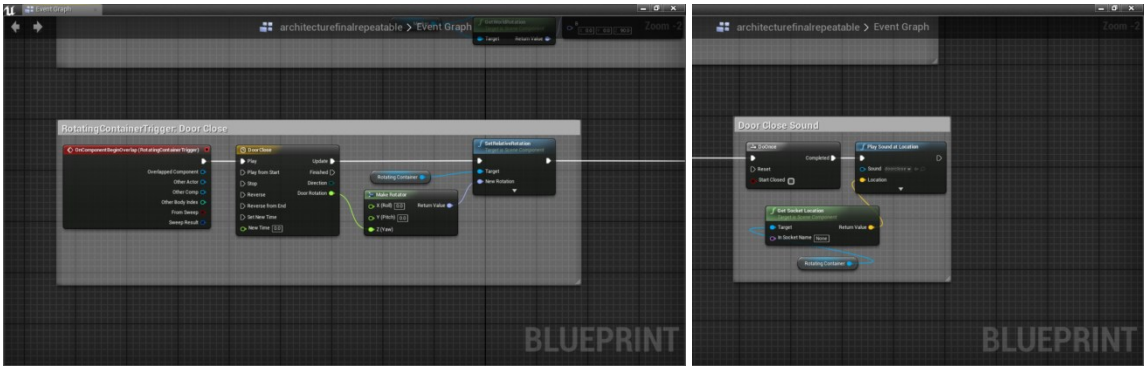

Figure 15A: The script to close the door behind the player on trigger. DoorAnim is a timeline defining a smooth curve from 0 to 1 (values 0 to -115, for -115 degree yaw). This curve is smoothed using automatic cubic interpolation.

Use SetRelativeRotation, NOT SetWorldRotation, to modify the position of the Rotating Container. This is so that the rotation will work correctly from within spawned Blueprints.

Making the animation for closure only 1 second long and set the trigger box at an appropriate distance ensures a player can never back out through the door as it is closing.

Both of these behaviors require the creation of Timelines to control the animation smoothly. These Timelines

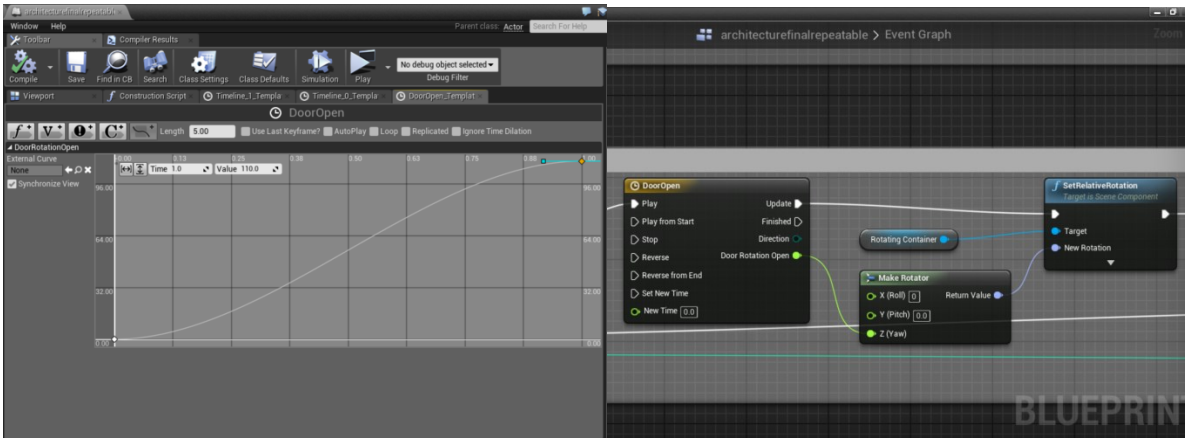

Figure 16A: The DoorOpen Timeline graph and Timeline Node, which smoothly increases the Door Rotation Open value from 0 to 110 (the door was open -110 degrees yaw) using Auto curve over the course of 1 second and exports that number to the yaw (z) value of a Make Rotator node which is then used to SetRelativeRotation for the parent container of the door and doorknob.

Ensure for architecturefinal, the door does not open on iterations 1 or 2 and that it closes on iteration 12 but NOT on iterations 1 or 2. This will prevent unexpected behavior where the door opens or recloses behind the player on the first iteration.

Static Mesh Remixing

All prop static meshes in architecturefinalrepeatable are eligible for mesh remixing except for those considered part of the architecture geometry: light switches, the rug, window panes, wall vents, and electrical outlets.

No Material remixing will occur in architecturefinal.

Static mesh remixing will be handled by first defining the following arrays of static mesh instances:

- largefurntag: large standalone items that may support decorative props
- smallfurntag: small standalone items that may support decorative props
- largedecotag: large decorative items that may be on the floor or on furniture
- smalldecotag: small decorative items that may be on the floor or on furniture
- ceilingdecotag: decorative items that hang from the ceiling
- walldecotag: decorative items affixed to a wall

…and then defining arrays of possible static mesh substitutes for remixing:

- largefurn
- smallfurn
- largedeco
- smalldeco
- ceilingdeco
- walldeco

*these arrays contain approximately 10%-20% null entries to provide more variety in the interior space: some items may not show up at all for any given iteration.

These static mesh substitute lists will be defined in aggregate by iteration, meaning that in iterations 5, 7, and 10 more items will be added to each array to increase the breadth and extremity of possibilities. These arrays are manually built within the Blueprint using the Make Array and Append Array nodes because static meshes arrays do not support Get All By Class or Get All By Tag functions.

General array member descriptions by iteration:

- Iterations 2,3,4: standard interior meshes
    - *Note: this is actually unused until iteration 4, see below*
- Iterations 5,6: unusual interior meshes such as exterior objects, rocks, and plants
- Iterations 7,8: glitchv1 items
- Iterations after 10 (excluding 12): glitchv2 items

Because arrays are formulated as aggregates, arrays for iterations contain all array members from previous iterations for that array and iterations after 10 contain all possibilities defined for that static mesh type.

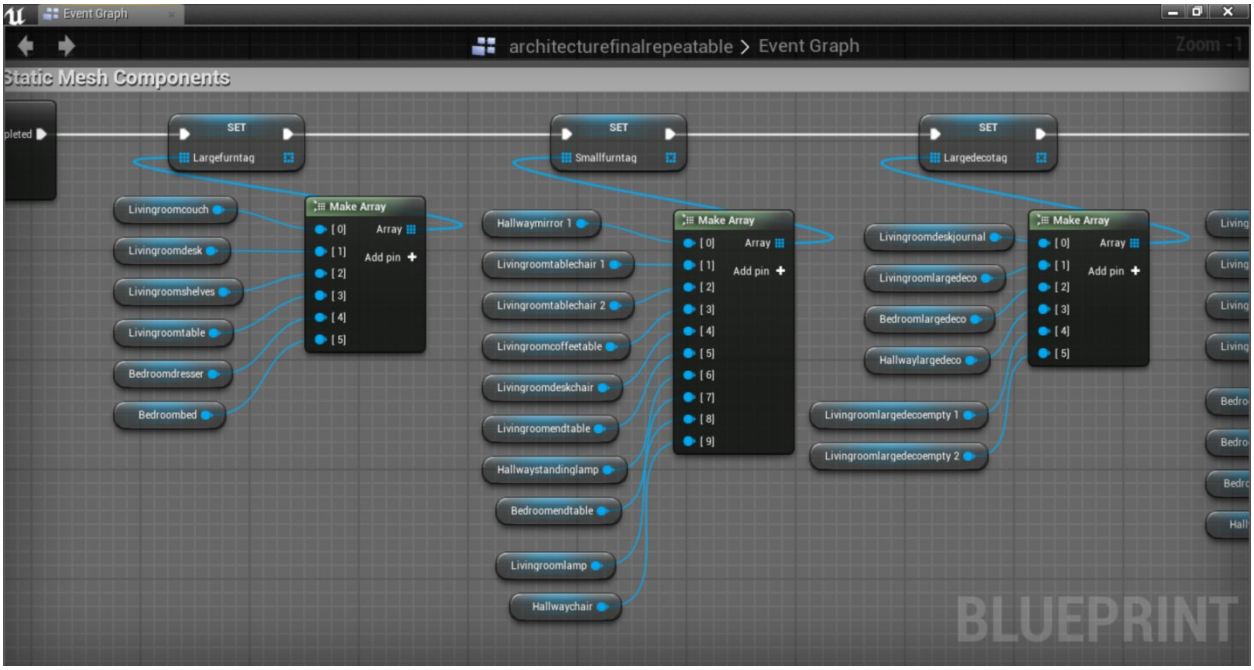

Figure 17A: Partial view of defining static mesh instance arrays, which is only done once and never changed by iteration.

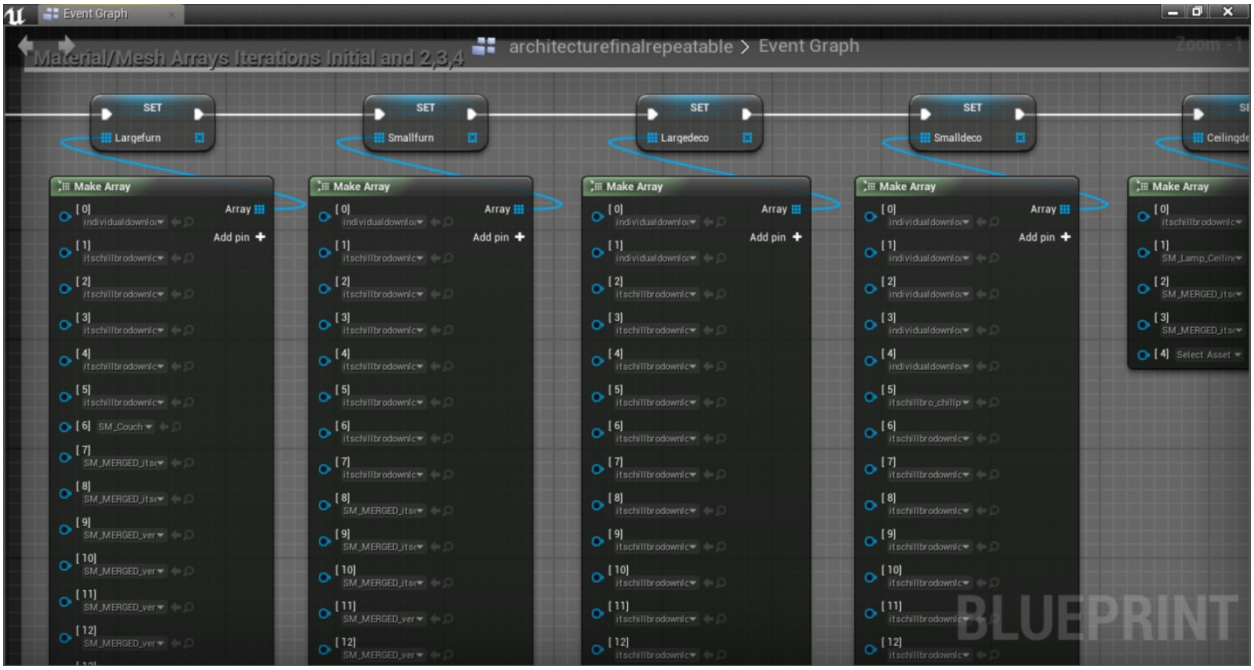

Figure 18A: Partial view of defining static mesh arrays (arrays of possible remix meshes), which is only done in aggregate by iteration stepwise, adding array members on iterations 5, 7, and 10. Arrays are long and must be created manually.

Once arrays have been defined, the mesh remixing script is executed. This script remixes meshes by their "tag" array with items drawn from the non-tag arrays.

Static mesh remixing behavior by iteration:

- Iterations 2,3: no remixing

- Iterations 4,5,6: only decorative (“deco”) array members remix (not furniture array members)
- Iterations 7+: all array members remix

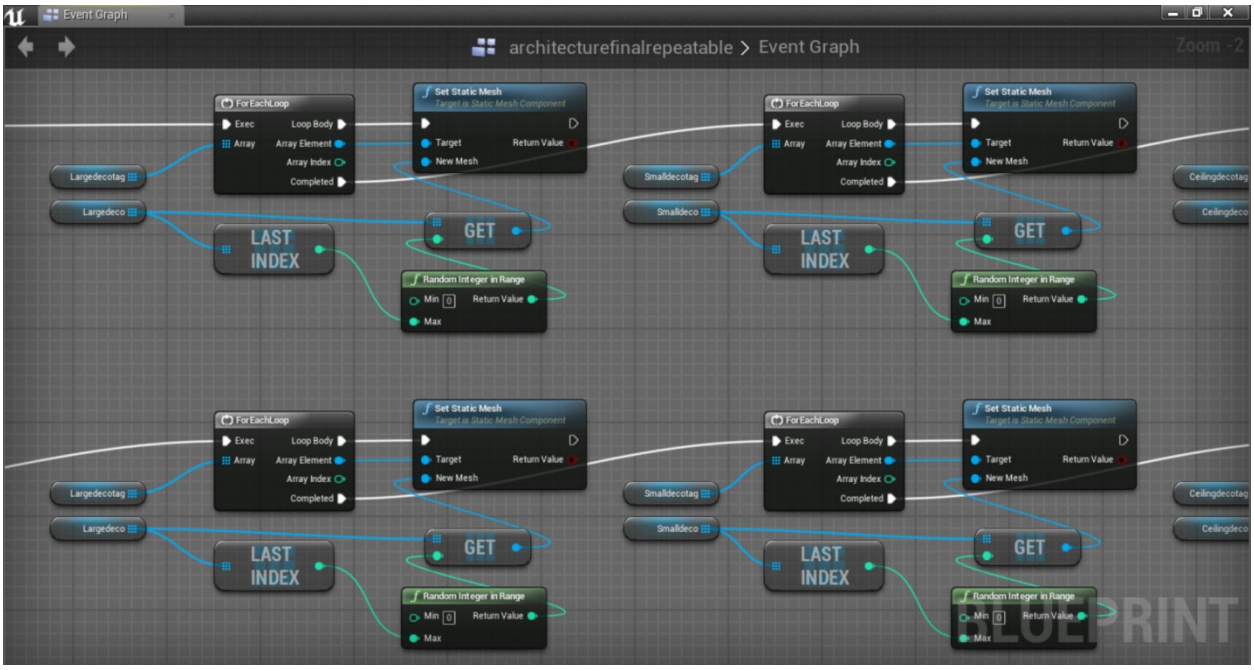

Figure 19A: Partial view of the mesh remixing script showing largedecotag and smalldecotag item remixing. This uses For Each Loop functionality which performs the scripted Loop Body behavior for each member of an array before executing the Completed pin.

Materials Remixing

All static meshes in architecturefinalrepeatable are eligible for Materials remixing. Depending on the static mesh only some Materials will be eligible to be chosen for that mesh each iteration.

No Material remixing will occur in architecturefinal.

Material remixing will be handled by first defining the following arrays of static mesh instances:

- Generalmaterialtag: for static mesh that can take any Material
- Opaqueonlytag: for static mesh that can take only opaque Materials
- Translucentonlytag: for static mesh instances that can take only translucent Materials

…and then defining arrays of possible Material substitutes for remixing:

- Material
- Material_Opaque
- Material_Translucent

These Material substitute lists will be defined in aggregate by iteration, meaning that in iterations 5, 7, and 10 more items will be added to each array to increase the breadth and extremity of possibilities. These

arrays are manually built within the Blueprint using the Make and Append Array nodes because Material arrays do not support Get All By Class or Get All By Tag functions.

General array member descriptions by iteration:

- Iterations 2,3,4: standard domestic interior Materials such as carpet and wood
- Iterations 5,6: nonstandard Materials such as outdoor materials or non-naturalistic materials
- Iterations 7,8: glitchv1 Materials and static Material variations
- Iterations after 10 (excluding 12): glitchv2 Materials and animated Material variations

Because arrays are formulated as aggregates, arrays for iterations contain all array members from previous iterations for that array and iterations after 10 contain all possibilities defined for that static mesh type.

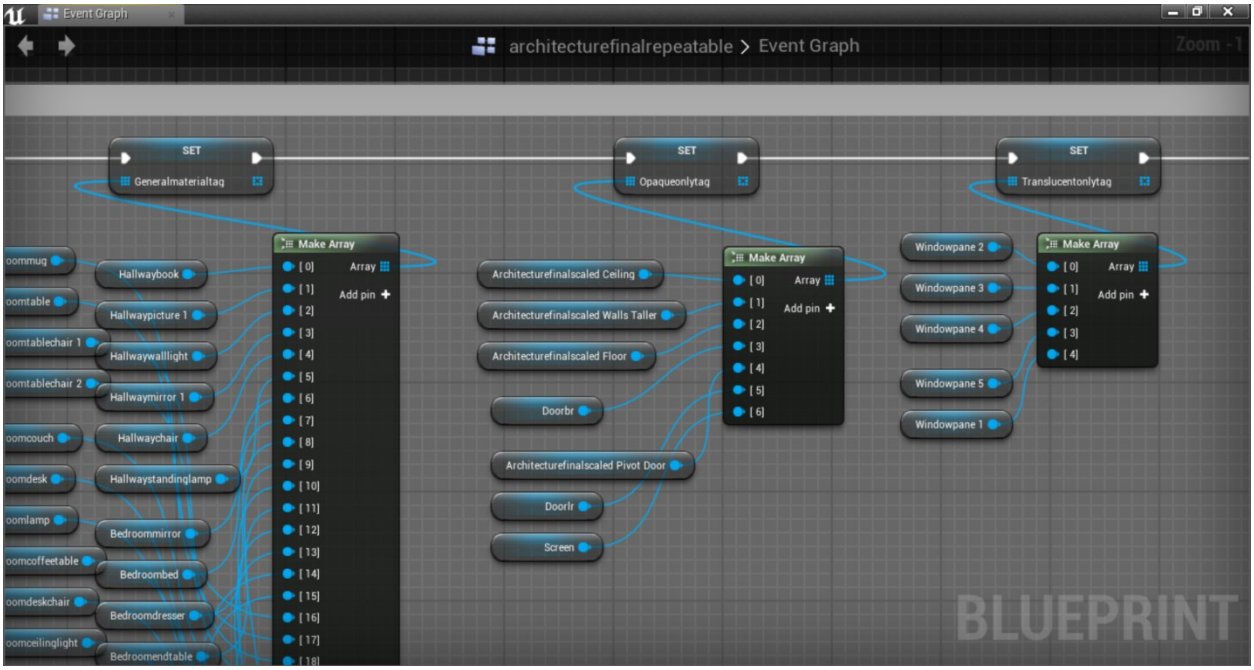

Figure 20A: Partial view of defining static mesh instance arrays, which is only done once and never changed by iteration.

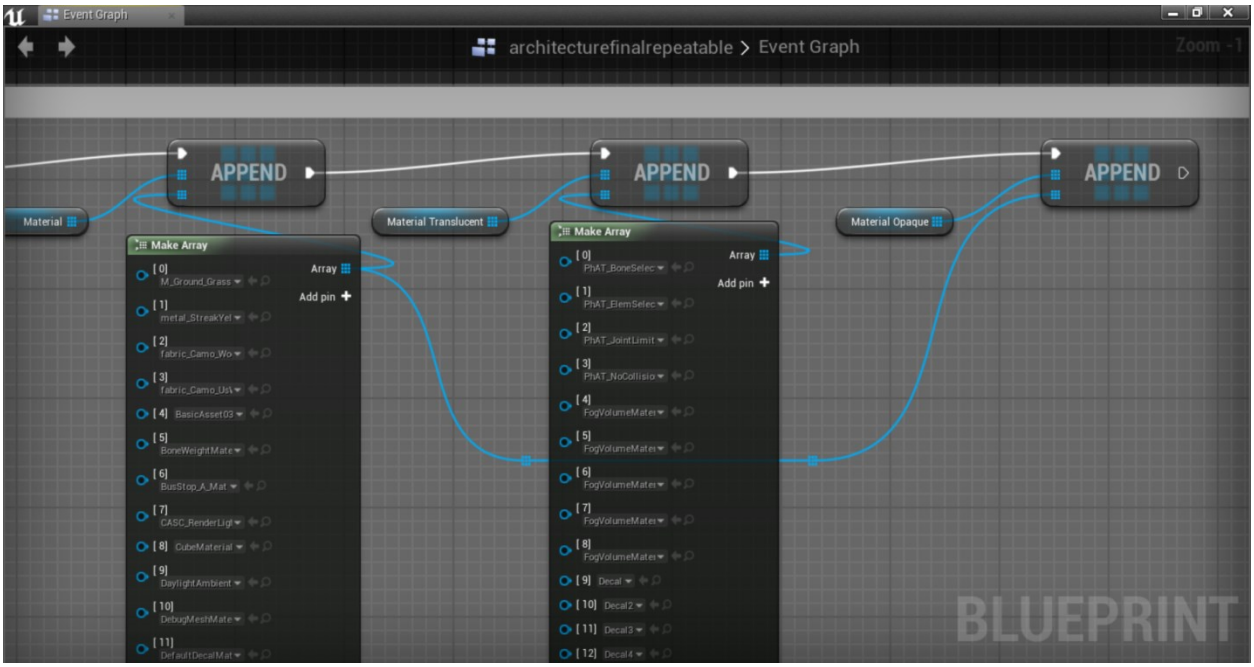

Figure 21A: Partial view of defining Material arrays (arrays of possible remix Materials), which is only done in aggregate by iteration stepwise, adding array members on iterations 5, 7, and 10. Arrays are long and must be created manually. In this example, translucent Materials have not yet been added to the Material array so that Material and Material_Opaque are the same.

Once arrays have been defined, the Material remixing script is executed. This script remixes Materials by their "tag" array with items drawn from the non-tag arrays.

Because static meshes may have multiple Elements each with their own Material, this script must address those multiple Elements. Elements may represent different parts of the mesh or LODs, and because these are set during asset creation development cannot easily change them for purchased assets.

Material remixing behavior by iteration is very simple: it remixes each member of a static mesh instance array's Materials for Elements 0-4 based on the Material array contents that that time. Elements 5+ are not supported.

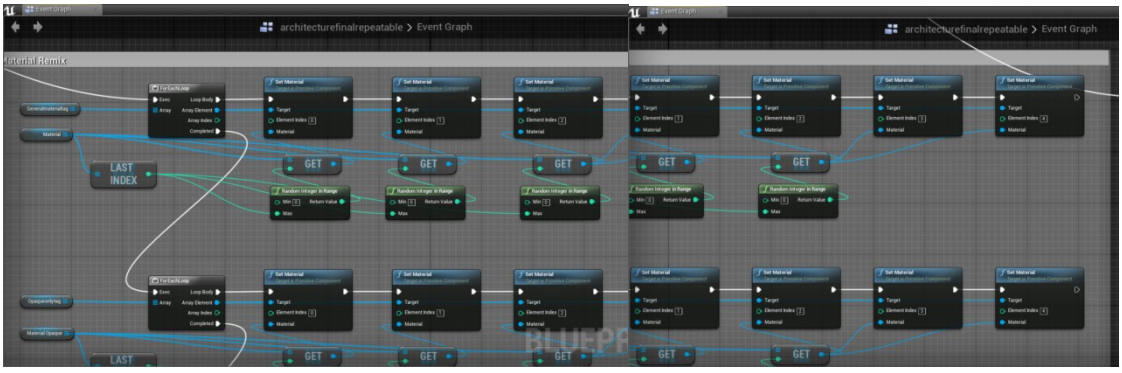

Figure 22A: Partial view of the Material remixing script showing Generalmaterialtag and Opaqueonlytag item remixing. This uses For Each Loop functionality which performs the scripted Loop Body behavior for each member of an array before executing the Completed pin.

Transform Remixing

The transforms of prop static meshes within the architecturefinalrepeatable Blueprint will be subject to procedural modification through a transform remixing script. This script with rotate, scale, and/or move eligible static meshes.

Transform remixing will be handled first by defining the following array of static mesh instances:

- canrotatetag: all static meshes that can be rotated (in general all non-architecture meshes)

..and then defining mathematical bounds for their rotation and scale based on the current value of the IterationCounter:

Attribute	Iteration 2-3	Iteration 4-6	Iteration 7-9	Iteration 10-11	Iteration 13+
rotation	no remixing	x: no remixing y: no remixing z: +/- 15 deg	x: no remixing y: no remixing z: +/- 45 deg	x: no remixing y: no remixing z: +/- 100 deg	x: no remixing y: no remixing z: +/- 180 deg
scale	no remixing	x: no remixing y: no remixing z: no remixing	x: no remixing y: no remixing z: * +/- .15	x: * +/- .2 y: * +/- .2 z: * +/- .3	x: * +/- .4 y: * +/- .4 z: * +/- .5
location	no remixing	x: no remixing y: no remixing z: no remixing	x: no remixing y: no remixing z: no remixing	x: +/- 50 y: +/- 50 z: no remixing	x: +/- 150 y: +/- 150 z: no remixing

All numbers within indicated bounds are generated using a Random Float Within Bounds node.

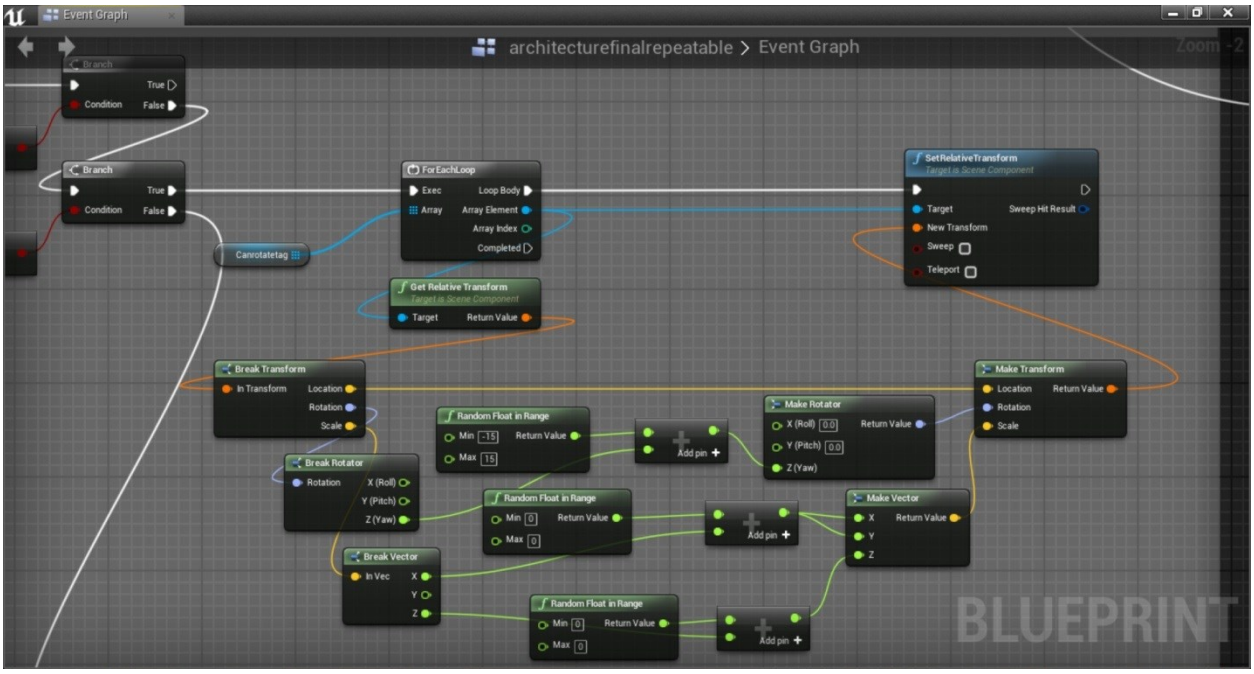

Figure 23A: The section of the transform remixing procedure. In which members of canrotatetag are subject to yaw rotation and scale. For Each Loop functionality is used to transform every member of the array.

Skysphere Remixing

Skysphere remixing occurs on trigger and remixes the following BP_Sky_Sphere_Custom attributes:

Attribute	Iteration 1-4	Iteration 5-7	Iteration 7-10	Iteration 11+
Sun Position*	no remixing	0, 30, or 60 degree rotation	0, 30, 60, or 90 degree rotation	0, 30, 60, 90, 120, 180, 270, 300, and 330 degree rotation
Cloud Speed	no remixing	random float 0-750	random float 0-1500	random float 0-3000
Cloud Opacity	no remixing	random float 0-50	random float 0-50	random float 0-100
Sky Material**	no remixing	from Sky_Material	from Sky_Material	from Sky_Material

*Sun Position defines time of day, just as with real life. Moving sun position instantly is jarring, so this must be handled via Timeline animations just like door opening behavior. Timelines are created for each present degree change for the value of the change and a time of 1 second. These Timelines use auto curve like the door animation Timelines.

**Sky Material remixing requires the definition of a material array called Material_Sky, which is defined once for all iterations and contains seeded Skysphere materials.

Lighting Remixing

To remix lighting within the interior architecture, an array of all lighting elements in the Blueprint is created which is then used to modify the following lighting attributes by iteration, step-wise:

Attribute	Iteration 2-3	Iteration 4-5	Iteration 6-8	Iteration 9-11	Iteration 13+
Lighting Intensity	no remixing	random float between 11000-26000	random float between 7000-32000	random float between 5000-40000	random float between 2000-48000
Indirect Lighting Intensity	no remixing	random float 1-3	random float 1-4	random float .5-6	random float .5-6
Light Color	no remixing	no remixing	no remixing	RGB values random float between 155-255	RBG values random float between 50-255

Attenuation radius is not used to prevent radii from overlapping. Light Color is used instead of Temperature to allow for a greater range of lighting color.

Post Processing Remixing

The post processing volume node is the largest Blueprint scripting node in Unreal Engine.

The two in-Blueprint post processing volumes, PostProcessRooms and PostProcessHallway, will have the following attributes remixed:

Attribute	Iteration 1-4	Iteration 5-7	Iteration 7-10	Iteration 11+
Saturation	no remixing	XYZW random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3

Contrast	no remixing	XYZW random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3
Gamma	no remixing	XYZW random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3
Gain	no remixing	XYZW random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3
Tint Shadow	no remixing	RGB random float 155-255, A=1	RGB random float 55-255, A=1	RGB random float 0-255, A=1
Film Contrast	no remixing	random float .4-.6	random float .3-.7	random float .2-.9
Film Crush Shadows	no remixing	random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3
Film Crush Highlights	no remixing	random float .15-.2	random float .13-.25	random float .1-.3
Film Dynamic Range	no remixing	random float 3.6-4.4	random float 3.4-4.6	random float 3-5
Fringe Intensity	no remixing	random float 0-.2	random float 0-.4	random float 0-.6
Bloom Intensity	no remixing	random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3
Grain Jitter	no remixing	random float 0-.25	random float 0-.4	random float 0-.6
Grain Intensity	no remixing	random float 0-.25	random float 0-.4	random float 0-.6
Indirect Lighting Color	no remixing	RGB random float 155-255, A=1	RGB random float 55-255, A=1	RGB random float 0-255, A=1
Indirect Lighting Intensity	no remixing	random float .9-1.1	XYZW random float .85-1.2	XYZW random float .8-1.3

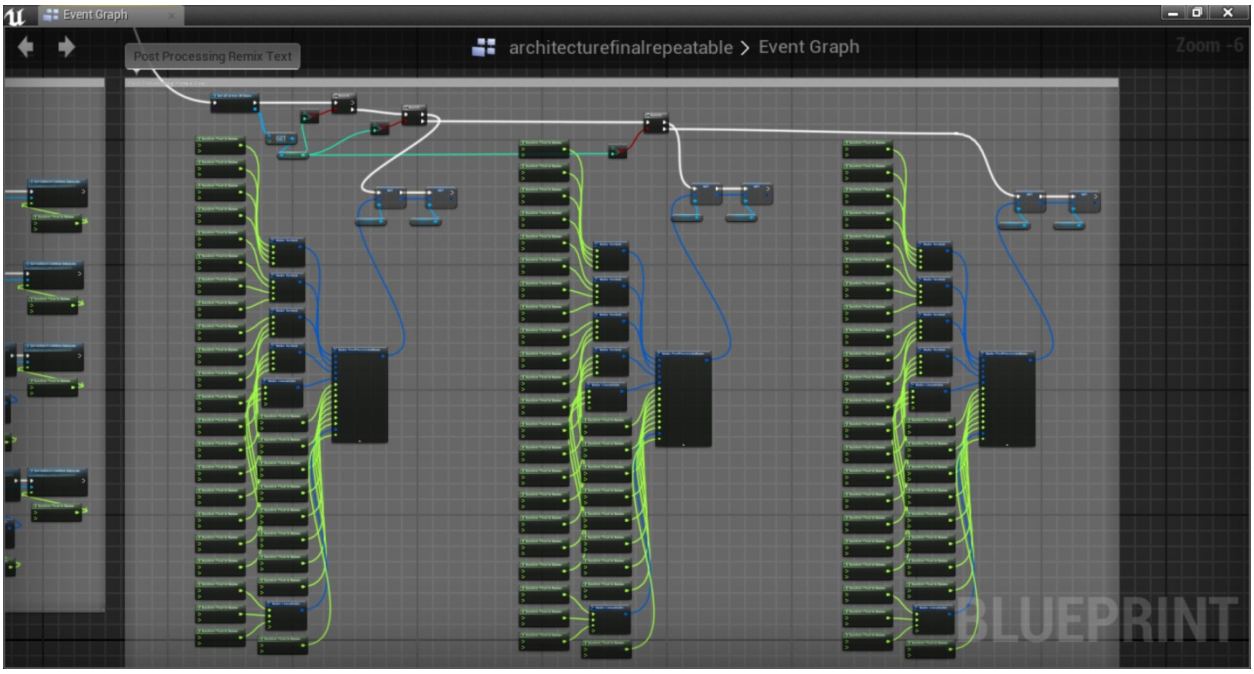

Figure 24A: The entire post processing remixing procedure. Post processing volumes in UE4 are the largest Blueprint scripting node in the engine, and this project only accesses a small subset of all available attributes.

Ambient Music Remixing

Create a Sound Cue for each iteration except for iterations 12 which will use the iteration 1 Sound Cue. Again, iteration 13 denotes iterations past 12.

Sound Cues:

- ambient2
- ambient3
- ambient4
- ambient5
- ambient6
- ambient7
- ambient8
- ambient9
- ambient10
- ambient11
- ambient13

Example:

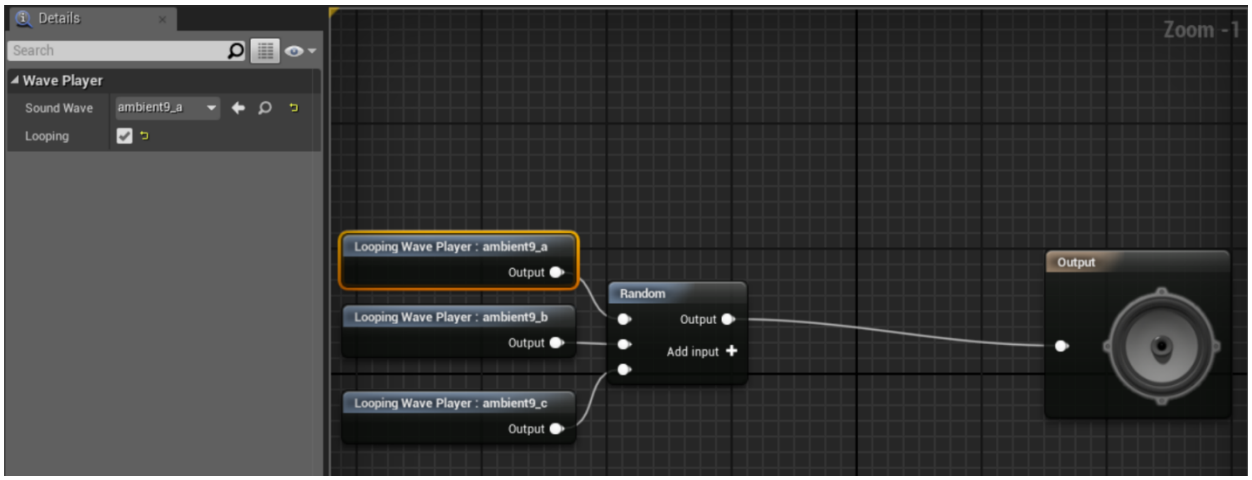

Figure 25A: The ambient2 Sound Cue. Note the looping functionality.

Add Audio component in the architecture Blueprint to play sound with attenuation (cone) to cover only that localized area:

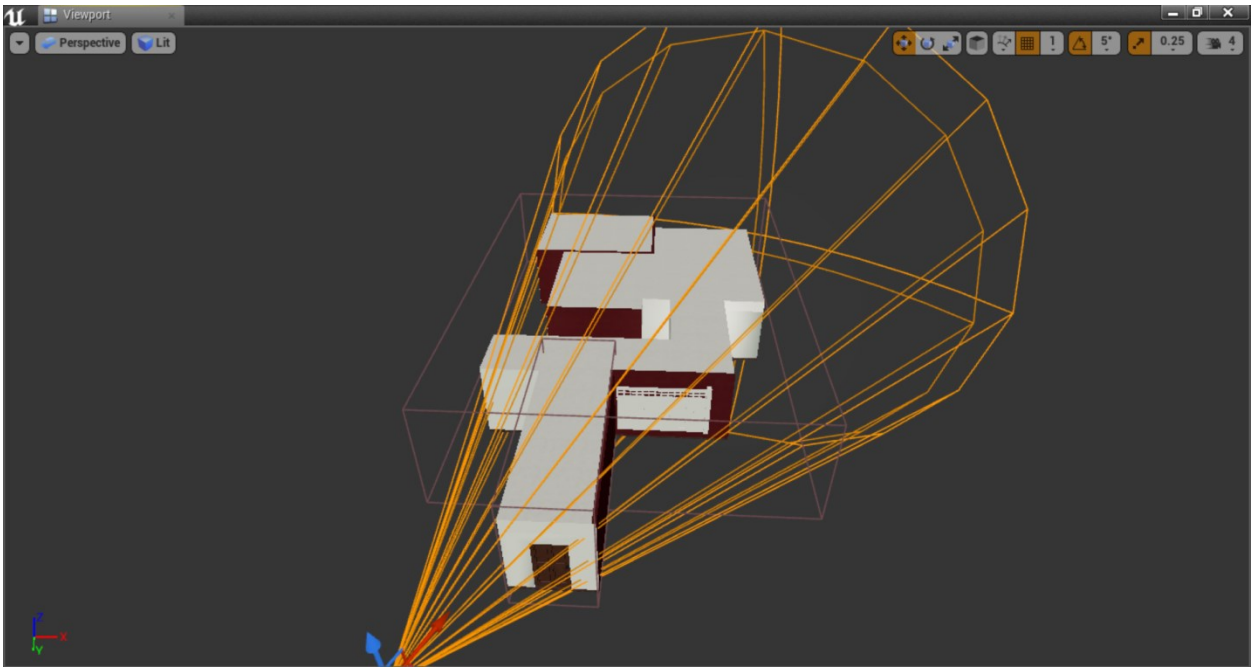

Figure 26A: The ambient Audio component for the architecture Blueprint called AmbientCone; uncheck Spatialize to emulate a sound surrounding the player. Extend the bounds of the falloff past the Blueprint bounds to give an effect of blending with the next Sound Cue, mimicking post processing functionality.

Add a script in the architecture Blueprint Audio Cue appropriate to the current value of IterationCounter defined in the LevelDatabaseActor (see Iteration Counter).

Do this with a Branch based on IterationCounter<12; if true, Multigate (as done in Narration Remixing, below) indexed by IterationCounter to break out to all Audio Cues; if false, Multigate indexed by a Random Integer feeding out to all possible Audio Cues.

Include a DoOnce function within this script (the .wav will still loop based on settings in the Audio Cues).

Narration Remixing

A Sound Cue will be created each iteration and trigger combination, except for iterations 1 and 12 which only use one audio file per trigger. Iteration "13" stands in for all iterations after 12. Sound Cues will allow the randomized play of any number of sound files in that Cue.

Sound Cues:

- narration2_1
- narration2_2
- narration2_3
- narration3_1
- narration3_2
- narration3_3
- narration4_1
- narration4_2
- narration4_3
- narration5_1
- narration5_2
- narration5_3
- narration6_1
- narration6_2
- narration6_3
- narration7_1
- narration7_2
- narration7_3
- narration8_1
- narration8_2
- narration8_3
- narration9_1
- narration9_2
- narration9_3

- narration10_1
- narration10_2
- narration10_3
- narration11_1
- narration11_2
- narration11_3
- narration13_1
- narration13_2
- narration13_3

Example:

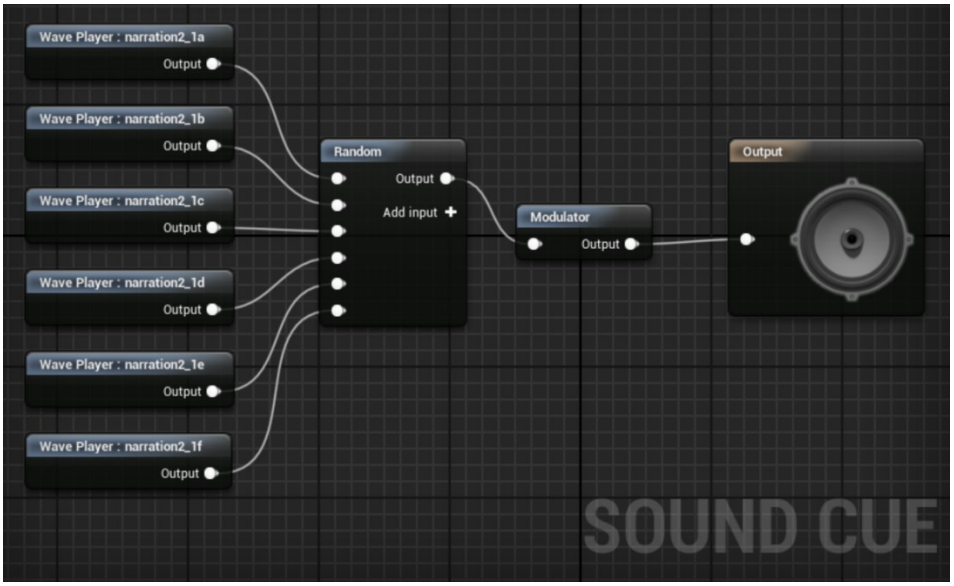

Figure 27A: The narration2_1 Sound Cue. The volume of sound files can be adjusted in-engine at the Sound Cue level.

A script will be added to both architecture Blueprints to play the track or Sound Cue appropriate to the current value of IterationCounter defined in the LevelDatabaseActor (see Iteration Counter) as a 2D sound. This will ensure the player cannot walk away from a sound effect while passing through rooms, that the sound effect will not be spatialized, and that sound effects can play over one another and over the ambient music.

The first narration file played in an iteration will be played OnCollisonBeginOverlap with the Hallway trigger, placed just in front of the trigger that closes the door behind the player. Subsequent narration files will be played based on a randomized timer after the first narration file plays.

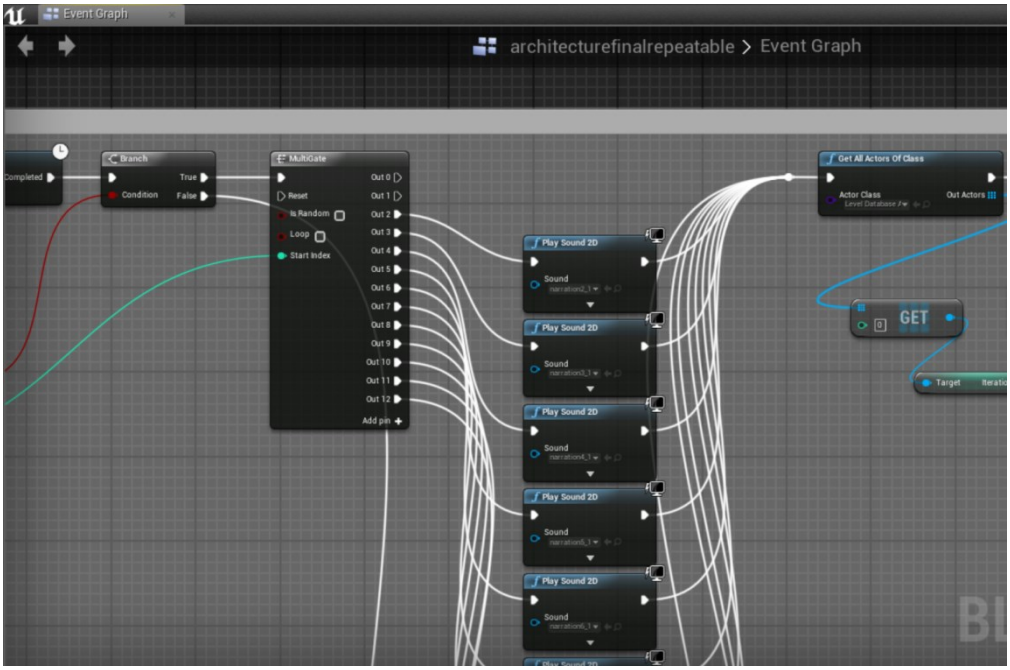

Figure 28A: A portion of the large narration trigger procedure: depending on the iteration as processed through a Multigate node, a 2D Sound is played from a Sound Cue which randomly selects one of its containing sounds, after which another Sound Cue is played after a randomized delay, and another. This example is from architecturefinalrepeatable and therefore does not have Sound Cue for Out 1.

Mapping for these Cues is intentionally "forgiving" (in architecturefinal, Out 12 and 13 are mapped to Sound Cue narration12_1, 12_2, and 12_3 for example) because it is possible to move between iterations quickly enough that a narration sound may be cut off if the IterationCounter increases as it is still playing.

Delay between sound files is random but adjusted so that in early iterations narration files do not play over one another but in later iterations is it a common occurrence.

This script must include a DoOnce node at the beginning of the procedure so that backtracking over the trigger does not replay dialogue.

Ensure that the narration cues in iterations 1 and 12 (architecturefinal) are only capable of playing cues for 1 and 12, and that iterations 2 and 13 are redirected to 1 and 12, respectively. This will prevent errors if a player is still listening to audio cues from iterations 1 or 12 as they trigger the next iteration.

Foley Sound Effect Implementation

Doors opening and closing sound effects will be added to the architecture Blueprint to play appropriately. See Doors for more information.

Additionally, footstep sounds effects will be added. This requires each individual footstep to be imported in individual .wav files. Footstep and door .wav files were sourced from Freesound.org and modified before input. They are licensed under CC0 licenses.

Functionality to play different footsteps based on Physical Material type of the Material detected in raycast directly downwards is added but is not currently utilized. For this reason, the default Surface Type

is assigned a Sound Cue and all Materials eligible to remix onto the Floor model have the default Surface Type.

Firstly, add Surface Types (Project Settings>Physics). At this time only Carpet will be used in runtime.

- Carpet
- Wood
- Stone
- Organic
- Abstract1
- Abstract2
- Abstract3

Then create a Physical Material for each Surface Type with the attribute Surface Type set accordingly. Assign a Physical Material to each Material in the Blueprint under Details (or keep it default).

For each Surface Type, create a Sound Cue. For the Carpet Surface Type this is called footstepcarpetcue. Ensure looping is off.

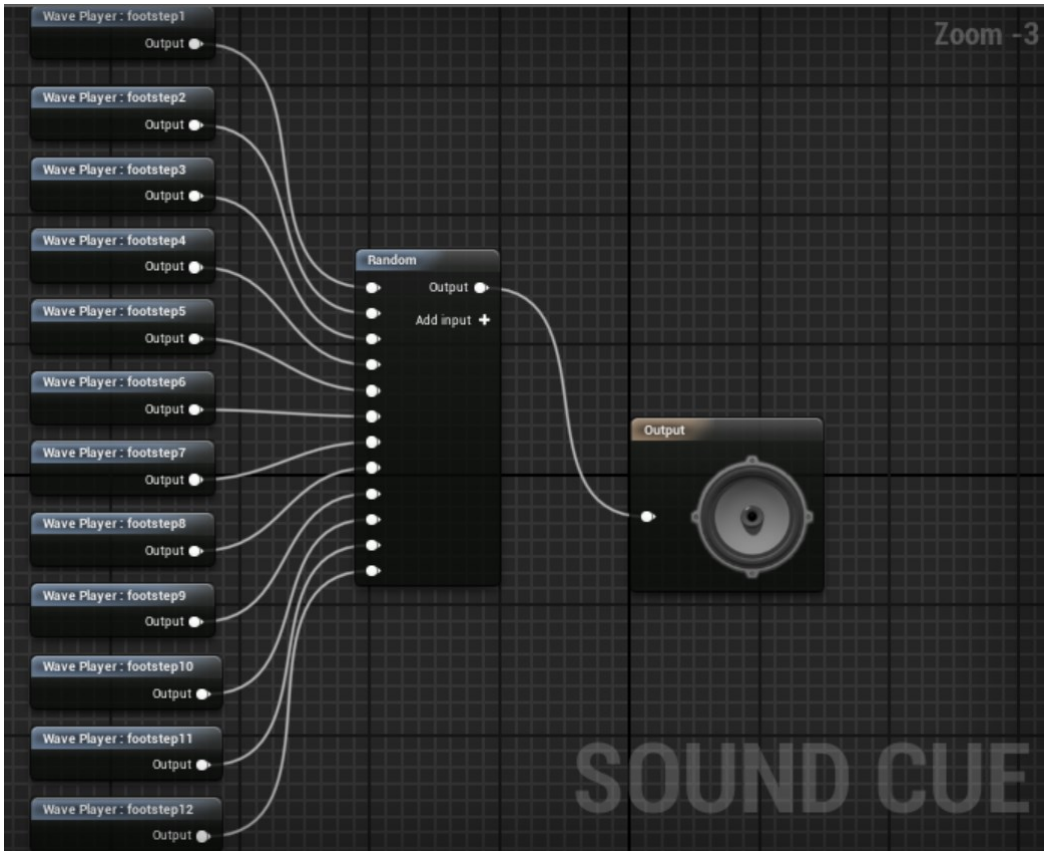

Figure 29A: The footstepcarpetcue, which randomly plays one of the recorded footsteps once.

To implement this Sound Cue, add a function (in this case it is called Footstep) to the FirstPersonCharacter. Within this function, set up the following walk cycle:

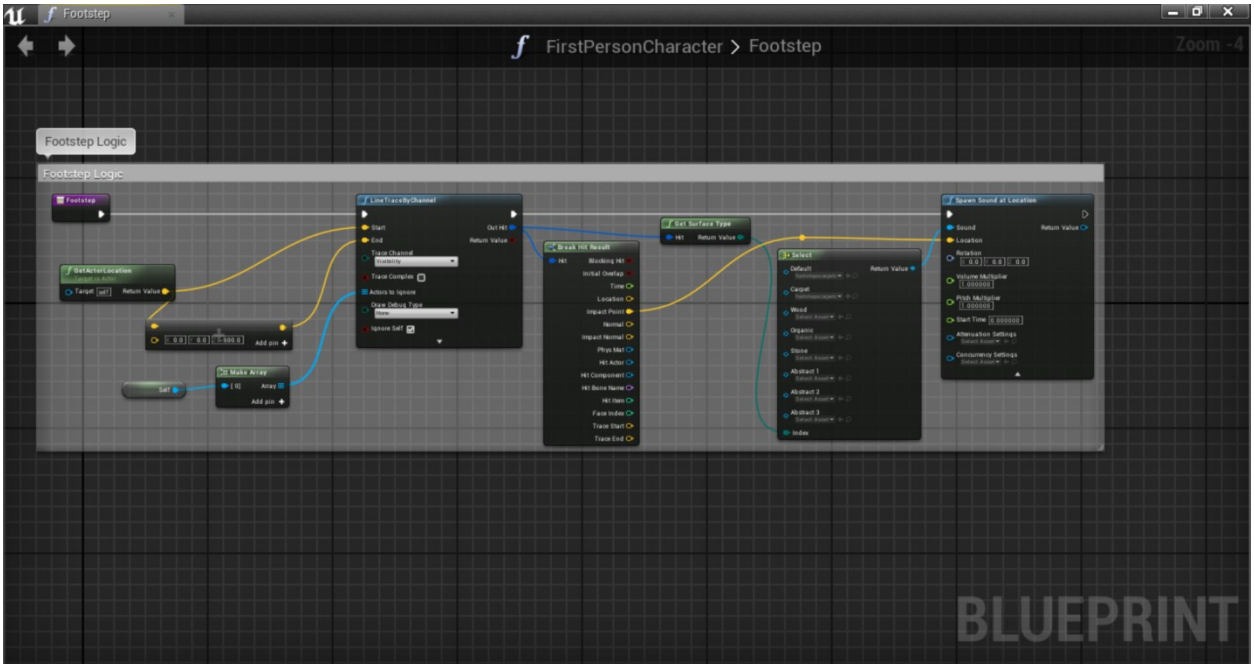

Figure 30A: The Footstep function in FirstPersonCharacter, with a Timeline defining a walking cycle.

This function is called with the Event Begin Play node of FirstPersonCharacter using a Timeline so that the play rate of the footprint sound effect is affected smoothly by player speed:

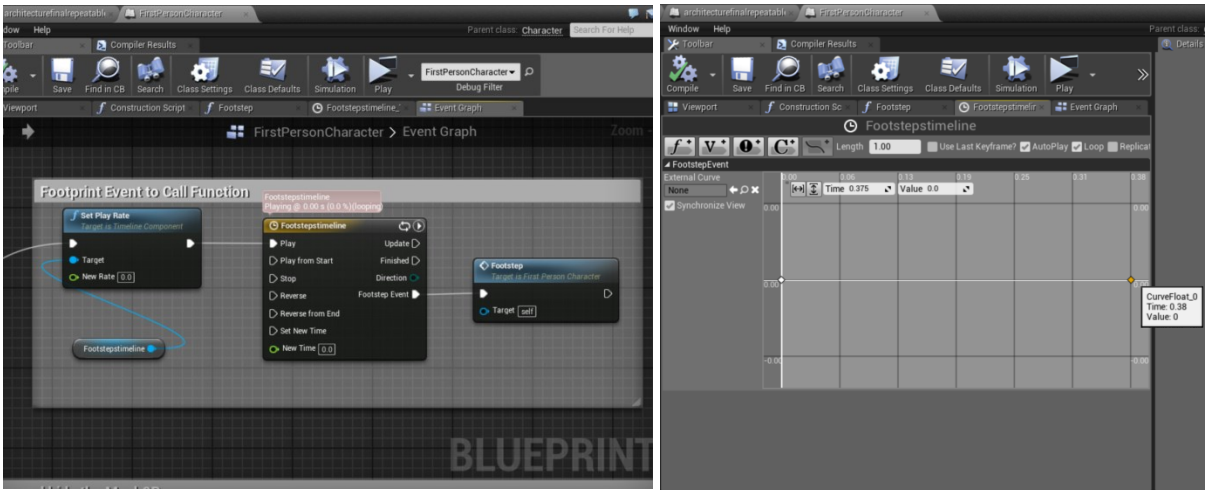

Figure 31A: The Footsteptimeline Timeline that controls the rate of play of the Footstep function. Footsteps are defined as .375 seconds apart but can be adjusted as needed through the Timeline.

Finally, set the rate of play of the Timeline based on InputAxis (FirstPersonCharacter) so that it reads on both orthogonal directions:

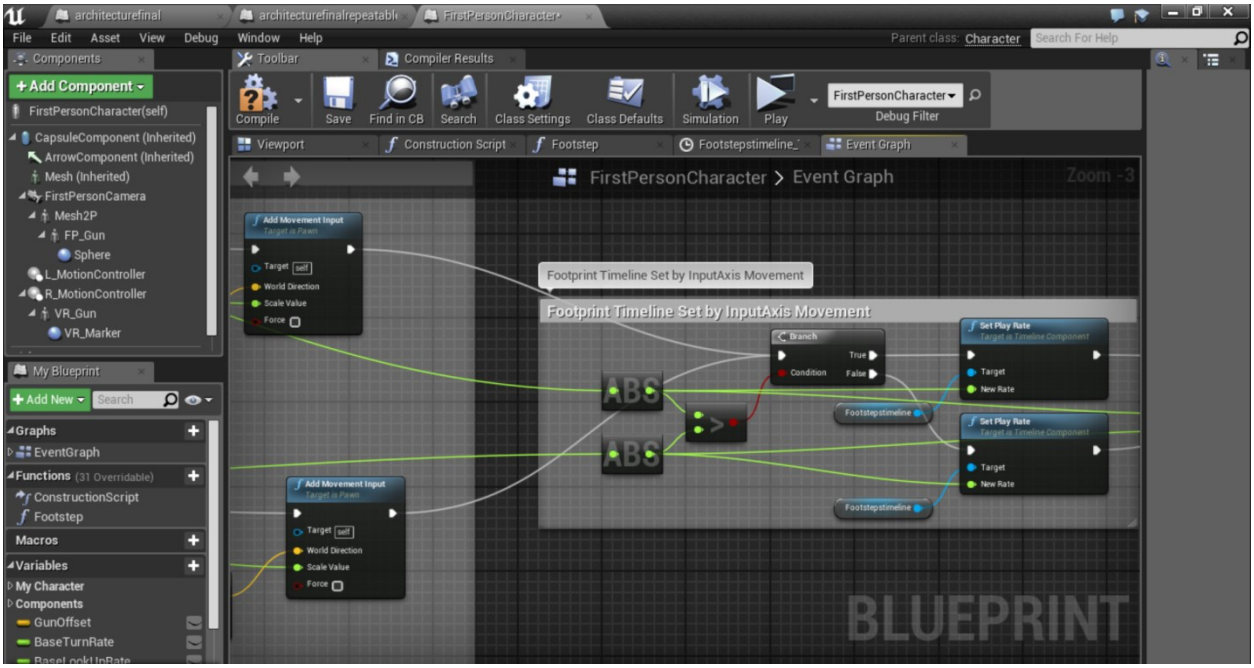

Figure 32A: This Blueprint sets the timeline determining rate of footprint playback based on orthogonal input. Orthogonal input nodes (Add Movement Input nodes, one for vertical movement and the other for horizontal movement) were part of the default FirstPersonCharacter Blueprint.

With this setup, the Sound Cue for footprints (in this case footprintcarpetcue) is always playing, but when the InputAxis readings are 0 (character is not moving) the timeline slows to speed 0. This is necessary for a first person controller with no character animation; if a character walking animation was present the Sound Cue would simply be added as part of that animation.

Slow Down Effect

After iteration 16, the speed of the entire play experience slows until the player is eventually completely stationary. However, this function is only executed when the player character is moving. To accomplish this, the following functionality should be added:

- Global Time Dilation reduction (multiplied by .998 each time input is received)
- Global Pitch Modulation reduction (of Global Time Dilation x .988 each time input is received)
- Yaw, Pitch and Roll Scale reduction (of this same number each, each time input is received)
- Field of View increase (of 1.000024 each time input is received, to a maximum of 180*)
- Auto-quit when FOV = 180*

*Field of View will never reach 180; the player character freezes at approximately FOV=130)

This functionality is contained within the FirstPersonCharacter Blueprint and attached to the end of the Footprint Timeline by InputAxis Movement function described in Foley Sound Effect Implementation, above.

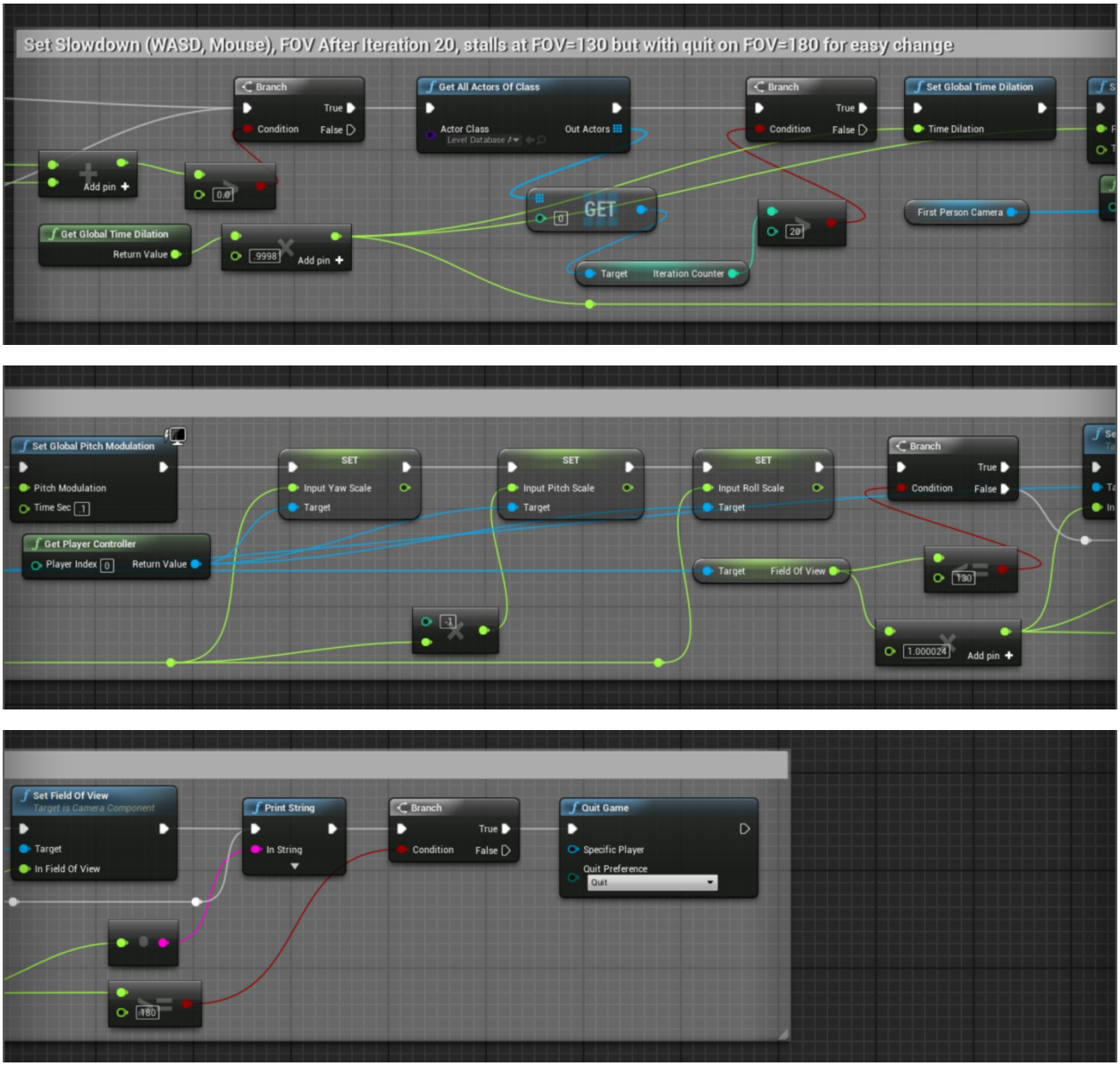

Figure 33A: The slowdown functionality which slows game speed, audio pitch, and mouse responsiveness over time after iteration 20 as it increases FOV slowly. This functionality only works with the WASD + mouse configuration and would need to be reformulated to accommodate controller play. In version 0.1.1, 20 iterations was changed to 16.

Technical Implementation

Editor Settings

This project draws heavily on texture streaming. To increase the texture streaming pool for the Editor preview, enter the following into the Command Line:

```
r.Streaming.PoolSize <size>
```

Where <size> is the desired maximum size of the pool in MB. This project uses a size of 500.

Version Control

To reversion Occlusion duplicate the project folder and rename the folder and .uproject file appropriately. Add the following line in DefaultEngine.ini stored in [Project]>Config:

```
[URL]
 GameName=Occlusionx.y.z
```

Where x = major release (0 for prototype), y = minor release, and z = dot patch.

Change logs will be kept in an Excel spreadsheet by dot patch and include the following information:

1. Serial number
2. Description
3. Source
4. Type (Bug or Enhancement)
5. Resolution Steps
6. Date Resolved
7. Date Certified

Packaging

Create an .ini file called DefaultGameUserSettings.ini stored in [Project]>Config. This file should contain only:

```
[/Script/Engine.GameUserSettings]
 bUseVSync=False
 ResolutionSizeX=1280
 ResolutionSizeY=1024
 LastUserConfirmedResolutionSizeX=1280
 LastUserConfirmedResolutionSizeY=1024
 WindowPosX=-1
 WindowPosY=-1
 bUseDesktopResolutionForFullscreen=False
 FullscreenMode=2
 LastConfirmedFullscreenMode=2
```

This will fix resolution and fullscreen mode and address possible performance issues that occur with default settings.

Run FixUpRedirectors often after deleting, renaming, and/or moving folders and assets, or the next build will likely fail (Error 25).

To package the project, first Build All Levels including lighting, then save, then package in that order.

When packaging, use the following settings:

- Format: Windows 64-bit
- Build Configuration: Development for private releases and Shipping for shared releases such as 0.1.0
- Ensure Use PAK File and Include Prerequisites are set to true in Project Settings>Packaging

Packaging may take multiple hours and is subject to a high failure rate, although packaging quickly after even a failed packaging speeds the process considerably.

Common packaging issues:

- File addresses can be a maximum of 260 characters; some starter content assets violate this limit and cannot be used
- Unreal Engine will not package to or from a networked location such as Google Drive
- Ensure there is sufficient room on the drive to which the package is being saved; packaging temporarily fills many more GB of space during the process than the package will ultimately use, so approximately 5 GB of buffer room is required
- When using networked locations, if file conflicts result in file duplications such as asset.uasset being duplicated as asset (1).uasset, this will cause the packaging to fail because the file name includes unsupported characters (parenthesis); even if the project is later moved off of a networked drive these files must be deleted
- Similar to the above issue, copying files to a new drive may also cause duplication with (1) or (2) in the file name; as a best practice, always search the project for these characters before cooking
- Using Force Delete and failing to run Fix Up Redirectors, even on unused content, may permanently render the project unable to package; in this case the project content must be migrated to a new project

Appendix B: Dialogue Script

The following script will be used for versions 0.1.0 and 0.1.1:

Line	File Name	Source	Delivery Notes
Oh, hi, hey. Hello?	narration1_1a		Curious
I thought I was all alone here.	narration1_2a		Curious
Go on ahead, I'll try to find you.	narration1_3a		Friendly
It's strange, I don't know you.	narration2_1a.wav		Curious
Do I…do I know you?	narration2_1b.wav		Curious
God, you look familiar.	narration2_1c.wav		Wondering
You seem so familiar.	narration2_1d.wav		Wondering
I'm sure I know you.	narration2_1e.wav		Wondering
We've got to know each other.	narration2_1f.wav		Wondering
Do you know me?	narration2_2a.wav		Curious
I actually don't think we've been introduced.	narration2_2b.wav		Friendly
No no no, I don't think we've been introduced.	narration2_2c.wav		Wondering
Do you know who I am?	narration2_2d.wav		Curious
Are we acquainted?	narration2_2e.wav		Curious
You've got to recognize me.	narration2_2f.wav		Wondering
Why…why you? Why you and me?	narration2_3a.wav		Curious
Why us?	narration2_3b.wav		Curious
Do you know…why we're here? Together?	narration2_3c.wav		Curious
It seems so strange that it's you and me.	narration2_3d.wav		Wondering
Well, we're in here together.	narration2_3e.wav		Friendly
You're the only one here, besides me.	narration2_3f.wav		Friendly
Here, walk with me.	narration3_1a.wav		Conversational
Come over here.	narration3_1b.wav		Detacted
Going my way, huh? Huh.	narration3_1c.wav		Conversational
Was it like this for you, after college?	narration3_1d.wav		Detacted
I've been doing this for a while.	narration3_1e.wav		Detacted
What was it like for you, after college?	narration3_1f.wav		Curious
You probably know, I've been in kind of a hard place since college.	narration3_2a.wav		Conversational

I'm been not myself lately. You probably noticed.	narration3_2b.wav		Conversational
Come over here.	narration3_2c.wav		Conversational
Haven't really been myself, you know.	narration3_2d.wav		Detacted
Some things are just unbelievable.	narration3_2e.wav		Detacted
Guess you noticed I haven't been myself.	narration3_2f.wav		Conversational
Just you know, biding my time and swimming against the tide.	narration3_3a.wav		Detacted
multiplicity, change, and development are characteristic of stability.	narration3_3b.wav	(Lynn, 1999, p. 15)	Flat
Do you ever worry, I mean? About all this?	narration3_3c.wav		Curious
Underemployed. Overweight.	narration3_3d.wav		Curious
Everyone moved away. Collegiate diaspora.	narration3_3e.wav		Detacted
Pulled in a million directions.	narration3_3f.wav		Detacted
I need a change. I need to get my shit together.	narration4_1a.wav		Worried
I walk with kind of a hunch. Not a physical problem. I just look down a lot.	narration4_1b.wav		Detatched
Do you ever just go outside and feel the breeze and think "I need to get my shit together?"	narration4_1c.wav		Worried
You know, I've noticed you have great posture.	narration4_1d.wav		Conversational
<sigh>	narration4_1e.wav		Worried
I need to just…change. Change more.	narration4_1f.wav		Worried
But what does it matter after they left?	narration4_2a.wav		Wondering
Maybe I should go, too. Maybe it would fix my posture.	narration4_2b.wav		Angry
Have you ever heard of the Seed Cathedral? It was in Shanghai. Reminded me of Kew Gardens. It was beautiful.	narration4_2c.wav		Conversational
Ever heard of the n-body problem? Poincare. This idea that there are problems for which no discrete solution exists.	narration4_2d.wav		Conversational
Do you travel?	narration4_2e.wav		Conversational
Turning, turning, zoetropic.	narration4_2f.wav		Flat
I've walked these halls for so, so long. You would've believe it.	narration4_3a.wav		Conversational
But that's besides the point now. We're here, together.	narration4_3b.wav		Dissapointed
Wish I could travel more. But I'm here with you.	narration4_3c.wav		Dissapointed
I want to travel more. I'm stunted. We're stunted.	narration4_3d.wav		Worried
How far do you have to go before it counts as travelling?	narration4_3e.wav		Worried
The farther I get the thinner I'm spread out.	narration4_3f.wav		Worried
You don't know anything about me, do you?	narration5_1a.wav		Conversational
Haven't got a clue about me, huh?	narration5_1b.wav		Conversational

You don't know me. Don't worry. Most people don't.	narration5_1c.wav		Conversational
No discrete solutions. Wild. I used to think about it all the time.	narration5_1d.wav		Conversational
We should try to meet up.	narration5_1e.wav		Conversational
Let's try to meet up. You just have to move a little faster.	narration5_1f.wav		Conversational
Still around? Meet me ahead. I'll try to get back in time.	narration5_2a.wav		Conversational
Try not to fall behind.	narration5_2b.wav		Conversational
Have you ever been to the Cathedral of Christ the Light? Oakland, of all places. I used to go there. It was like being in a pop-up book.	narration5_2c.wav		Conversational
A design process of sequential formal operations is recorded in the building's configuration through colors, alignments, imprints, additions and subtractions	narration5_2d.wav	(Lynn, 1999, p. 13)	Flat
Can you trace your steps back? Did you try?	narration5_2e.wav		Conversational
Hey, hey, stay with me.	narration5_2f.wav		Worried
My dad was a garage loony, a tool guy. For two years he worked on a team competing for the X Prize.	narration5_3a.wav		Nostalgic
Mom used to call me a "maximalist." If less is more, think of how much more “more” is.	narration5_3b.wav		Nostalgic
My dad was a tool guy. Always taking things apart and putting them back together differently.	narration5_3c.wav		Nostalgic
Dad taught me a lot. How to take things apart, mostly.	narration5_3d.wav		Nostalgic
You know how I don't have any siblings, right? Did I ever tell you that I wish I did?	narration5_3e.wav		Nostalgic
My mom was a big collector. We collected everything. Plates, Hot Wheels, beer cans. Never used any of it.	narration5_3f.wav		Nostalgic
I need to see you. Just a little farther ahead, I'll meet you.	narration6_1a.wav		Conversational
I need to meet you. Here.	narration6_1b.wav		Worried
Shit, I think I'm as lost as you are.	narration6_1c.wav		Angry
A couple more doors…	narration6_1d.wav		Worried
Two to the left. Then to the right…	narration6_1e.wav		Worried
Hey, it's ok. Don't cry. You're almost there.	narration6_1f.wav		Worried
I studied Biology in school. Not diligently. I remember basically nothing.	narration6_2a.wav		Conversational
God, how long have we been in here?	narration6_2b.wav		Worried
as a group, would develop a specific language to match the specificity of their work is unsurprising.	narration6_2c.wav	(Costa, Riley, Robbins, & Betsk, 1998, p. 87)	Flat

It's not like Paris. Remember?	narration6_2d.wav		Conversational
Underground, underground, underground.	narration6_2e.wav		Flat
Hey, calm down. Don't worry.	narration6_2f.wav		Worried
The minute we were inside the door clicked shut behind us, locked, and we were prisoners	narration6_3a.wav	(Schram, 1972, p. 23)	Flat
Gradient forces; temperature, saturation.	narration6_3b.wav		Flat
Unexpected spatial and material relationships developed.	narration6_3c.wav	(Costa, Riley, Robbins, & Betsk, 1998, p. 104)	Flat
Remember BIO 1001? All I remember is blastomas. How a human embryo forms from a salt gradient.	narration6_3d.wav		Nostalgic
Doors and doors and doors. Jesus.	narration6_3e.wav		Worried
Self-similar to self-similar to	narration6_3f.wav		Worried
A multiplicity is neither one nor many, but a continuous assemblage of heterogeneous singularities	narration7_1a.wav	(Lynn, 1999, p. 23)	Flat
I think about those collections of my mother's a lot. All those plates. All those beer cans.	narration7_1b.wav		Nostalgic
More doors. More fucking doors.	narration7_1c.wav		Conversational
Bending, changing, lengthening.	narration7_1d.wav		Flat
So, anyway, nothing is the same.	narration7_1e.wav		Flat
So much has changed.	narration7_1f.wav		Worried
Have you seen my keys? I lost my keys.	narration7_2a.wav		Worried
I'm always losing my damn keys.	narration7_2b.wav		Conversational
If you find my goddamn keys around here, let me know.	narration7_2c.wav		Worried
Damn. Lost my keys again. Keep a lookout?	narration7_2d.wav		Conversational
Always losing things. Keep losing things, keep moving forward.	narration7_2e.wav		Conversational
Have you seen a, uh, a gray hoodie lying around?	narration7_2f.wav		Conversational
Without any sign of common sense or logic…[it] will draw nearer to dream.	narration7_3a.wav	Rene Magritte (quoted in Hughes, 1999, p53)	Wondering
transparent planes simultaneously enclosing and enclosed.	narration7_3b.wav	(Costa, Riley, Robbins, & Betsk, 1998, p. 111)	Flat
It is a body that is both at rest and in motion at the same time.	narration7_3c.wav	(Costa, Riley, Robbins, & Betsk, 1998, p. 122)	Flat
It's like a goddamn maze with you.	narration7_3d.wav		Angry
I feel like everything has fled.	narration7_3e.wav		Worried
Don't you leave, too.	narration7_3f.wav		Angry

Making something from nothing - from what most people perceive as nothing - gives me a sense of purpose.	narration8_1a.wav	Baby Smith (quoted in Plowman, 2010, p. 143)	Flat
Multiplicity is about hiding, pain, and survival.	narration8_1b.wav	Anonymous (quoted in Hughes, 1999, p. 44)	Flat
fusion and unification are distinct from a discrete totality or whole.	narration8_1c.wav	(Lynn, 1999, p. 30)	Flat
Hey, stay with me. I'm ahead of you, I think.	narration8_1d.wav		Worried
Keeping on going. I think I'm just ahead of you.	narration8_1e.wav		Worried
I always thought you were faster than this.	narration8_1f.wav		Angry
I remember you being easier to find.	narration8_2a.wav		Angry
Someplace there are colors/I can see./Blue and purple,/Green and Yellow,/Someplace the grass is,/It is lovely to walk around.	narration8_2b.wav	(Schram, 1972, p. 19)	Flat
Did you know that Albert Rothenberg thought that the mental processes of madness and creativity were parallel processes? Differentiated mostly by a degree of organization?	narration8_2c.wav	(Hughes, 1999)	Flat
enveloping surfaces, according to a logic which is both constructional and occultative.	narration8_2d.wav	(Costa, Riley, Robbins, & Betsk, 1998 p. 31)	Flat
Shhhh. Hear that?	narration8_2e.wav		Conspiratorial
Was this - wait - go back. Can you go back?	narration8_2f.wav		Conspiratorial
Strange attractors like this one depict a system whose behavior never repeats itself and is always unpredictable and yet, paradoxically, always resembles itself and is infinitely recognizable	narration8_3a.wav	(Briggs, 1992, p143)	Flat
It is a desperate, completely creative, and wonderful survival mechanism.	narration8_3b.wav	Anonymous (quoted in Hughes, 1999, p. 44)	Flat
Who is to know? Is this fragmentation or creativity?	narration8_3c.wav	(Hughes, 1999, p. 45)	Curious
Did this place get smaller?	narration8_3d.wav		Worried
It reminds me of the steam tunnels. Freshman year. You remember?	narration8_3e.wav		Nostalgic
Don't worry, keep going and it'll become familiar again.	narration8_3f.wav		Friendly
External objects assume monstrous forms…The most singular ambiguities, the most inexplicable transpositions of thought take place.	narration9_1a.wav	Charles Baudelaire (quoted in Hughes, 1999, p.167)	Flat
functions such as daydreaming or absorption in an activity to the exclusion of all others; as well as pathological forms that signal avoidance of an unbearable memory.	narration9_1b.wav	(Hughes, 1999, p. 45)	Flat

Thus, the same entity duplicated identically but in a different gradient space might have a different configuration.	narration9_1c.wav	(Lynn, 1999, p.32)	Flat
Hey, remember Grand Junction, 2006? Remember that whole day it just snowed and snowed?	narration9_1d.wav		Nostalgic
Remember how it snowed the day before graduation? Tossing our caps into snow on the ground?	narration9_1e.wav		Nostalgic
Was this like I left it?	narration9_1f.wav		Worried
Do you what? This is what I think: how nice it would be if the idea that we were all brought up with was just to grow up and find someone to love, and that was all	narration9_2a.wav	(Schram, 1972, p. 100)	Wondering
But even strange attractors can convulse and change their basic shape if the system is perturbed enough, just as a heavy rainstorm can make a stream burst its banks and take a new course	narration9_2b.wav	(Briggs, 1992, p. 140)	Flat
The denial of reality, of the material, is necessary if form is to emerge as a meaningful symbol, as an autonomous creation of man.	narration9_2c.wav	(Costa, Riley, Robbins, & Betsk, 1998, p. 32)	Flat
In school I wasn't fascinated by anything. I had all the world's most interesting material thrown at me, this captive audience, and I let it roll off my back like water.	narration9_2d.wav		Nostalgic
Hey, you remember?	narration9_2e.wav		Nostalgic
No? Do you remember Yuma, 115 degrees and the swamp cooler went out? I wanted to absolutely die.	narration9_2f.wav		Nostalgic
Did you see that?	narration9_3a.wav		Worried
I don't care what they make of it. I don't care if they eat the fruits I drop.	narration9_3b.wav	(Hughes, 1999)	Angry
Redirection is a tool that works two ways.	narration9_3c.wav	*Letters* by Calliope Musicals	Angry
Shh! I hear something.	narration9_3d.wav		Angry
His mind can skip over syllogisms with ease, in a nonlogical, dream-sequence kind of "knight's move" continuum.	narration9_3e.wav	Charles Tart (quoted in Hughes, 1999, p. 106)	Flat
What was that?	narration9_3f.wav		Worried
The time of my wondering has come to its end. Now they are getting down to their vicious business.	narration10_1a.wav	(Schram, 1972, p. 113)	Conspiratorial
These moments of possibility are called bifurcation points.	narration10_1b.wav	(Briggs, 1992, p. 112)	Flat
It's like a washing machine knocking, or a truck throwing its trailer.	narration10_1c.wav		Flat

The shape of statistics, or parameters, may yield a culturally symbolic form	narration10_1d.wav	(Lynn, 1999, p. 39)	Flat
Maybe you should just stop. Stop moving.	narration10_1e.wav		Angry
It's getting to be too much. I'm starting to think you should just…just stop.	narration10_1f.wav		Angry
Nothing stands still for us. This is our natural state and yet the state most contrary to our inclinations.	narration10_2a.wav	Virginia Woolf (quoted in Briggs, 1992, p. 99)	Flat
The unconscious is the ocean of the sayable.	narration10_2b.wav	Italo Calvino (quoted in Hughes, 1999, p. 62)	Flat
Sometimes I feel like you have…you have a deep ocean of dark water inside you.	narration10_2c.wav		Worried
However, a number of other factors were also reported like passive personality, cognitive impairment, language difficulties, and life events.	narration10_2d.wav	(Arnone, Patel, & Tan, 2006, n.p.)	Flat
Never meant for it to work. It was experimentalist. It was exploratory.	narration10_2e.wav		Defensive
It was not supposed to be like this. I was supposed to pull away in time.	narration10_2f.wav		Defensive
High-quality scientific investigation has shown there is excellent evidence for a nonmaterial quality to the human mind.	narration10_3a.wav	Charles Tart (quoted in Hughes, 1999, p. 7)	Flat
Widening interest in the post-Newtonian, postindustrial societies of the developed world in the applications of nonordinary reality	narration10_3b.wav	(Hughes, 1999, p. 18)	Flat
but they become subjected to the dominant psychotic individual's idiosyncratically devised intervention	narration10_3c.wav	(Daulatabad et. al., 2016, n.p.)	Flat
Secondaries, traditionally described to have a submissive role in the dyad but otherwise mentally sound, could actually be extremely vulnerable to developing or having a significant mental illness themselves.	narration10_3d.wav	(Arnone, Patel, & Tan, 2006, n.p.)	Flat
You weren't supposed to follow me.	narration10_3e.wav		Defensive
I need you. I need you to follow me.	narration10_3f.wav		Angry
Have you heard of this idea of the "virus of suggestion"? It's Henry James. It was his idea about capturing the Muse.	narration11_1a.wav		Conspiratorial
The most important results are summarized in Table 2. On comparing marital status with folie à deux, we found to be significantly correlated	narration11_1b.wav	(Rodríguez-Cerdeira, Sánchez-Blanco, Sánchez-Blanco, & Carnero-Gregorio, 2017, n.p.)	Flat

In terms of the content of delusions, persecutory and grandiose were very common but there was a plethora of other different types.	narration11_1c.wav	(Arnone, Patel, & Tan, 2006, n.p.)	Flat
I think of myself as a suggestible person. Do you?	narration11_1d.wav		Conspiratorial
Where are you even going?	narration11_1e.wav		Conspiratorial
You're lost, aren't you?	narration11_1f.wav		Angry
The thing that is screaming around in our minds every minute, every second in this terrible place, but I couldn't say it until now because Ms. Love told me to be sure to tell everything in order.	narration11_2a.wav	(Schram, 1972, p. 40)	Flat
This is the doom of the Makers - their Daemon livings in their pen. If he be absent or sleeping, they are even as other men.	narration11_2b.wav	Artistotle (quoted in Hughes, 1999, p. 33)	Flat
The person who harbors the delusion acts as the inducer and the belief is adopted by the receiver.	narration11_2c.wav	(Daulatabad et. al., 2016, n.p.)	Flat
The treatment that is often advocated i.e. separation, has also been shown to be inadequate or insufficient in a large number of cases. We hope these findings make clinicians aware that the phenomenon that is essentially the transfer of psychotic symptoms from one (primary) individual to another (secondary) can occur in many situations outside of the confines of the current diagnostic classification systems	narration11_2d.wav	(Arnone, Patel, & Tan, 2006, n.p.)	Flat
Stop following me!!	narration11_2e.wav		Angry
Get away!! This is MINE!	narration11_2f.wav		Angry
it was difficult to get patients to fully accept their diagnosis. Olanzapine, an atypical antipsychotic, was the most commonly used antipsychotic agent at a dose of 10–20 mg/day	narration11_3a.wav	(Rodríguez-Cerdeira, Sánchez-Blanco, Sánchez-Blanco, & Carnero-Gregorio, 2017, n.p.)	Flat
a firm, fixed and false belief inconsistent with a person's sociocultural background that is maintained despite irrefutable scientific evidence to the contrary	narration11_3b.wav	(Daulatabad et. al., 2016, n.p.)	Flat
In previously published work, we showed that separation of the dyad doesn't always result in disappearance of psychopathology.	narration11_3c.wav	(Arnone, Patel, & Tan, 2006, n.p.)	Flat
Can you…can you still hear me?	narration11_3d.wav		Worried
Find me. Find me if you can, please.	narration11_3e.wav		Worried
I'm giving you what I can. Don't listen to them.	narration11_3f.wav		Angry
It's a folie-a-deux. A madness shared by two. That's what the doctors said.	narration12_1a.wav		Flat
So you could say you followed me in here, really.	narration12_2a.wav		Flat

But you can't follow me out.	narration12_3a.wav		Flat
Mad, mad, mad.	narration13_1a.wav		Flat
I can't!	narration13_1b.wav		Angry
You can't get out, can you?	narration13_1c.wav		Worried
Get out. Get out, get out, get out.	narration13_1d.wav		Flat
Why are you still here?	narration13_1e.wav		Curious
Hi, hi, hi, hi, hi, hi, hi.	narration13_1f.wav		Flat
No, no no no no.	narration13_2a.wav		Flat
Come closer.	narration13_2b.wav		Conspiratorial
Keep moving. Don't stop.	narration13_2c.wav		Worried
You can never, ever go back.	narration13_2d.wav		Worried
Shhhhhhh.	narration13_2e.wav		Conspiratorial
Shh!	narration13_2f.wav		Conspiratorial
Don't worry, I'm not getting out either.	narration13_3a.wav		Conspiratorial
Wherever you go, there I am.	narration13_3b.wav	(Samoylov, 2016)	Conspiratorial
In, in, in, in.	narration13_3c.wav		Conspiratorial
<laughter 1>	narration13_3d.wav		Soft, unsettling
<laughter 2>	narration13_3e.wav		Loud, racous
<laughter 3>	narration13_3f.wav		Sincere

Appendix C: Interview Transcripts

Transcript of Interview with Christina "PhaZero" Curlee

Notes: Interview conducted via email on February 8th, 2017. The following is the raw interview text with minor formatting adjustments.

Question: Your work strongly incorporates glitch art or net.art imagery. Why do you use such imagery in your experiences?

My degree is in actually in Studio arts and the courses and art cultures I have the most experience with would be in Transmedia where net.art and glitch art calls home. I like that both net.art and glitch art are arts of subversion. They take things that are highly corporatized and "de-market" them. It also is a snap at the art world as it tries to continuously define what is good and correct. It's a rebellious way to play with conventions and redefine art. When people think, they have it figured out, here comes an artist to move the bar around. In a way I think its very post-modern and contrary to many art critics I really like post-modern work and post-structuralism. I like breaking conventions, I like being hard to pin down, and having a real sense of humor in my work. I like both critiquing and respecting the art and game world. I think the net and glitch artists also have this push and pull.

Question: Can you share some of your major artistic influences for these projects?

I've been exposed to a number of artists and find inspiration in everything from Hieronymus Bosch to Jenny Holzer to David LaChapelle. Video art, net.art, and new media is a strong influence a few names being Ant Farm, Joe Hamilton, Sondra Perry, Cory Arcangel, JODI, Milisthando Bongela. Art theorists like Sally Mckay, Rosa Menkman (Glitch Studies Manifesto), Olia Ialina (Digital Folklore). From the past, I have always been inspired by the writings of the surrealists and in fact keep a copy of the Surrealist Manifesto everywhere I live. I also find the Futurists writing and passion (and insanity) for technology a great source of project ideas. I strongly believe my art history and transmedia education has a major influence on my work and what I contemplate.

Question: You use the "aesthetic" of Unreal Engine a great deal in your work to produce a certain look. Can you talk about what this aesthetic is and why you use it?

Unreal is super sleek, and has this quality to the lights and textures to give things a AAA feel. Its also a running joke that things like the ambient occlusion and light effects in Unreal are just 'too much'. I really like this about the engine though, I like using this overpowered machine and subverting it for these crazy little art projects. The tension between the technology and the idea, just feels right to me.

Question: Some of your experiences are very chaotic, glitch-like, and difficult to navigate thematically or spatially. How to you ensure your experiences are grounded and navigable for your players?

Playtesting. This is where interdisciplinary methods are very important, I want the players to be interested and curious, not confused and frustrated. I use level design techniques such as lighting and props of interest to guide players, I also reward players for getting "lost" by giving them additional rooms to find or tidbits to explore. I like to think of my games thus far as playgrounds more than linear paths. After moving through my levels hundreds of times, I watch players navigate and tweak the games. I also usually provide controller support to help out players that are not used to PC gaming. My greatest issue now is I'm a high skill player so I'm useless for playtesting, and other high skill players move around my work with ease. In the future I will have to move towards more level design for players that are not used to pc games.

Question: You warp navigable space quite a bit in your games. How do you approach laying out space in an experience, and why do you choose to handle space so chaotically?

I think I do this mainly because of two reasons. When I was a kid I liked games that could be broken and that had a bunch of Easter eggs. One that comes to mind is Twisted Metal- you could break everything in the game and find these little teleports to take you to secret areas. I loved secrets and surprises. I'm taking this language found in games and using it as my art, I'm kind of re-arranging the pieces into something new. The next reason would be a sort of ode to the internet and technology, and the collapsing of space. Often in my teleporting games I'm talking about the instantaneous transfer of information and spaces, and making them literal. I handle space chaotically because one of the things I love about 3D is it's not linear and games are a manipulation of both time and spaces. I like really pushing the engines in ways they're not always played with to communicate in ways not possible in any other medium. A game is a multidimensional world and moving the players position, effecting time, breaking everything linear is way to not pretend like it's not a game, it's not a suspicion of disbelief, I'm showing the parts- in a tradition found in many other areas of fine art such as when the modernist painters begin painting canvases completely black so that you would have to confront the fact that it was paint. Not a lady or bowl a fruit, but paint. So, in a way this is my most "studio arts" practice but thus far the audience whether they realize what's going on or not seems to enjoy it, not unlike how the layperson still enjoys the museum.

Question: Do you think of your experiences as primarily emotional or primarily cerebral? Why?

I think emotional. They definitely start from a cerebral place and if you want to dig deeper into the experience, knowledge of philosophy, art theory, media theory, and game studies would definitely help but ultimately, I try to distill my ideas into a game that will be engaging to the player with what's presented to them. Especially in my latest game, Breathe, I included many references to media saturation, racism, sexism, and societal pressures but I designed the game to most closely focus on the mechanic of "breathing" and pushing through darkness and obstacles. Artifacts has many references to media theory but on the surface, its playful, exploratory, and upbeat. The emotions take precedence over the conceptual aspects.

Question: Do you believe that your hardware and software tools define your work (i.e. would you call yourself an artist working in the Materialist tradition)? Why or why not?

Oh no, games are in a way a means to an end. I've worked in Installation art, video art, photography, and painting- and my motives never changed. In the future, if a medium comes about that I may communicate with more strongly, then I will use that but thus far the strength of game engines and design capabilities makes it where games are the best way, I can get through to my audience and include them in my work.

Notes: Interview follow-up conducted via email on February 13th, 2017. The following is the raw interview text with minor formatting adjustments.

I forgot some really importance influences [by the way] - Claes Oldenburg and Robert Rauschenberg. I was exposed to fine arts from a very young age through the Dallas Museum of Art youth programs like Go Van Go and the Youth Museum Guides - and these artists I absolutely loved my entire life. I probably first saw Stake Hitch by Oldenburg when I was 6 years old. This type of art most strongly affected me because I learned from a young age that art could be fun, playful, accessible and childish (in a good way). Rauschenberg showed me how pop imagery could be presented non-cynically and technical excellence had a place in fine arts. Both artists never seemed to be talking down on the public and I love that about them. Another huge influence is pop surrealism and low brow art, art for the people in a way. And also for years I was a graffiti artist, I've always been interested in art that didn't need permission from institutions to flourish. I'm all about the breaking of the gallery walls.

Transcript of Interview with Ramy Daghstani

Notes: Interview conducted via Skype on February 6th, 2017. The following is the raw interview transcription with minor editing and formatting.

Klew Williams: Okay so to start just for the recording especially, I'm just going to say that your name is Ramy - tell me if I'm pronouncing this incorrectly - Daghstani?

Rami Daghstani: Yeah.

KW: Perfect. You work for Artifact 5 you're making *Anamorphine*.

RD: Yeah.

KW: Perfect, and today I'm just going to ask you about your work specifically on Anamorphine but I don't want to get too specific with anything, I know it hasn't been released yet, if there's anything you don't want to answer feel free not to answer it.

RD: Sure

KW: Feel free to go on tangents, tangents are good

RD: Okay

KW: What I want to talk mostly today about is making meaningful experiences with space – with the use of space with architecture, specifically I'm thinking about experiences like confusion and dissociation and disorder and fugue and sort of a "disreality" or a dreaminess. This is what I'm writing my paper about and this is what I really want to talk to you specifically about today. So at any time feel free to jump in with a tangent or a different question or a question for me.

RD: Sure

KW: Okay so-

RD: So- how we use story in space?

KW: Yeah, so we can start at a really high level in terms of one of the things that I wanted to ask you about, and this probably won't come as a surprise, is *Anamorphine*'s interesting spatial transitions. Right, where you're looking at an object and you turn around and you're in a different space. And this seems to be a tool to move the narrative forward, it's also an experiential tool and so I thought it would be a good place to start you could talk about sort of how those were designed and why you chose that method and what the experience there you're getting at is.

RD: Yeah sure. So for us the transitions were I mean they were some of the first things we started working on. to get the game going. We started with portals as the first one but that really just became a way of stitching the narrative together. All the other transitions were really <unintelligible> in terms of communicating narrative I would say. So if you play our demo or look at some stuff online you-you'll have seen these transitions where you go to your apartment or into like this purple – this purple landscape and we have some other transitions as well like marbles that come together. It's all these things that we were- they were pretty goal oriented in terms of we wanted to get the player on – not just from one place to another geographically but we also want the player to move to another space emotionally. And from conception to execution for transitions that's always the idea behind those where is the player now and what emotional journey do we want to kind of mimic or make a metaphor out of and writer in actuality <unintelligible>. Some of our earliest, earliest prototypes had a –had a shattering effect, like you would you would pop out of. This was back in 2014 when we first showed the idea of the game to the public and that was – that was an effect that really hit home for a lot of people. So it was a – it wasn't even using the same engine that we use now we were in UDK, when that was still a thing, and you would walk down this hall, this kind of weird kind of music hall with columns on the edges and you would walk up to the podium you would get on it and all of the columns had transformed into buttresses and then everything would shatter in front of the player and have it skewed under perspective. And we wanted to give the feeling- well we wanted to give this feeling of like anxiety, of like things not working, that the players' world is falling apart so we literally shattered it and made it fall apart, so all the transitions have this specific goal in mind and as we kept making the game, working on it in a more serious fashion, everything became about how we use the space and what kind of a space we're putting the player in since we don't have words or action buttons or voiceover or dialogue or text, I mean we have some like there are things that are written – written out in the world so <unintelligible> written notes in terms of those, in terms of text that's on top that's like narrated? That doesn't exist so everything's about the space you're in and for us to be able to communicate any kind of potent story we need to take the player out of – we find that we need to take the player out of real spaces and put them in these extravagant either totally unique spaces or we can grab them and move them into these spaces that look like real spaces that they're used to but they're transformed in a way that doesn't make sense anymore that's much larger than life like twisting, compressing, expanding on the places they are to manipulate the emotional experience that the player's going through.

KW: Sorry, I'm taking notes. You're hitting a couple of my other questions which is great. So my next question was going to be on manipulation of space, so the idea of the kind of playing with scale or orientation, which I think you hit on. And I also wanted to ask you about the lack of dialogue narration, which, so the question there was, in the demos I noticed there is no dialogue narration either written or audio, and I didn't know if that was going to persist for the entire experience, and

without having to reveal that information, why did you choose not to go with any narration, because in a lot of similar experiences you'll see people have chosen to do an audio or some kind of a notes system or something like that but you haven't.

RD: Yeah, it came out of two things – for one we didn't have a budget to make fully voiced character interactions right? To do the lip syncing, the intonation, the recordings, the kind of scope for that wasn't in the feasibility for an independent studio like ours, and then the other thing is that we wanted to make something different and so we placed the limitation where we only wanted to do outright exposition on the player and that meant no cut scenes and other stuff like that but it also meant no voice over no narration of any sort on top of the player experience. It was a purely player-driven experience and that was also just a limitation of not having any text or voice as a way of pushing us to create a –in a way – in an effort to push us to create new environments and new experiences to communicate different things like how do you communicate a couple going through tough times or anxiety, or love even? How do you do that just by using the space you have. So in an effort to make the game unique in its own way.

KW: Okay, sorry I'm writing this all down. I don't a hundred percent trust my voice recorder, and it helps me to structure my thoughts. Okay great. Okay so circling back to space cause I want to talk a little bit more about that, for me – for my academic work in my thesis I'm talking a lot about the format of my work is almost, it's very academic, it's a lot of actually it's a lot of art criticism and sort of history and context but one thing I talk about is almost this how to approach of creating certain experiences outside of the normal scope of what we consider a video game outside of kind of those tropes, and one thing I want to talk about a lot is I read this fantastic architecture book which – it's not my discipline but it really got me thinking and I've kind of incorporated it into my research, and I noticed that – I missed IndieCade East last year, it was the same time as an event in New York but I read the talk brief online and you talk about representing the mind of the character as a spatial environment.

RD: Mmhmm, yeah.

KW: So I just wanted you to expand on that thought a little bit more.

RD: Yeah, that as we kept developing the game we really found out that the core appeal of the game was that you were doing – you were doing what we ended up calling rendered emotions which is specifically grabbing an internal state and then externalizing that into the environment. And it became the way we were designing all the spaces in the game to the point where it – to the point where we – we'd re-write the narrative based on what's possible within that lens. Some things we definitely preferred to do because they were more possible to do in terms of rendering emotions and that definitely became the –the driving method of designing spaces and informing the entire narrative as well and it comes from…very similarly to how the transitions were designed like thinking about – we would think about an emotion and what we associate to that emotion so like an example is if you're nervous then we would kind of do some word association like you're trembling, shaking, shortness of breath maybe, nothing seems solid and then we'd try to like project that onto the environment so the player as a – not just as a person experiencing the narrative but also as a person playing the game and exploring the space they get to explore that emotion as well so things like getting lost or confused become much more appealing to make within our game because we have all of the technology to do that so with portals – portals allow us to create self-moving spaces that become maze-like and so that's the thing that is easy for us.

KW: It um –

RD: Rendered emotions is definitely like how – how we approached a lot of the things that happened.

KW: Rendered emotions, that's a great phrase. Rendered emotions is a great phrase. It- that's interesting this, to me, there's a common theme when you talk about which emotions you're going to render sort of the same idea of what you're talking about with transitions where you – or the lack of narrative, spoken narrative, where you talk about basically having self-imposed limitations on your development and that sort of reminds me like of writing a sonnet, so like Spencer invented the Spenserian sonnet because he hated writing freeform poetry because it was too much, it was like too- he always felt like he could be more creative with limitation.

RD: Yeah, he- it's like the oldest trick in the book when it comes to like artists, right? They try to limit themselves in one way and causes them to express themselves in another way and that's the kind of thing we wanted to try with Anamorphine, so far so good it's- it has really pushed us to think outside of the box.

KW: Great, awesome. Okay, so let's talk a little bit more about audio. I don't know how intimately you were concerned with audio but maybe just at a really high design level noticed a lot of the importance of specific audio cues in the demo, but they were also sort of few and far between, they were heavily emphasized. The music playing for instance. So I wanted to ask about how those were designed specifically relating to the design of space and visual imagery, sort of like chicken and the egg maybe.

RD: What and the egg?

KW: Chicken and the egg, sort of like how much was one a guidance for the other, that sort of thing.

RD: Right, so the interesting thing, what I noticed what people say about our studio quite often is that it's a unique thing to have an audio designer work on a game from pretty much day one of full time production on this project. So, since we've started we've always had an audio designer – our audio designer Beatrix [Beatrix Moersch], she's always been on the team. Every time we were – she was there during our collaborative writing process she's there all the time doing builds and doing design – in the design meetings, she always has an input on the sonic aspect of the game. She's why they, that they now – it's not a master <unintelligible> for us now because we have so few tools at our disposal it's really important for us to have an audio designer and say like – cause Mo [Mohannad Al-Khatib] and I, when we started building the game audio wasn't something that we do, so when we started – when we started the writing process when we started designing some scenes we really just have that space so then Beatrix can come in and say we can add some things here that will sound interesting, go back with the player and it does help a lot with, like you said, level design and having correct audio cues, and just –she's done quite a few interesting things in our limitations especially in terms of transitions, audio is really interesting when it comes to transitions because we move a lot of audio from 3D space to 2D space and then back again.

KW: Hm, that's interesting.

GD: Yeah, and we've…

KW: Why do you do that?

GD: We do it because, for example when you're in, I believe this is the demo you've played as well, when you're in the apartment and you go to the music room and you see that <unintelligible> light up, like the cello, and the entire room kind of disappears into the mindscape, her playing the cello, that audio which is in 3D space gets moved over into 2D space so that when you're in the mindscape and you're

opening these alcoves – sorry when you're opening these monuments, these like seeds and they flower up and then a new layer of audio gets put on top we get to do this – it just becomes a more experiential - <laughs> sorry, it kind of becomes, I guess the audio becomes less about audio cues and more about adding to the experience that the player's going through fully. So, because that one track gets used for both, in each transition that track moves from 3D space to 2D space, and then when you're done with that mindscape you transition into the concert hall that 2D space goes back into 3D space and it goes back towards Atlanta who's really far away, and we just traveled through that sound to her. And we've built a lot of technology to assist the audio with the transitions, so if you're transitioning from one geographical space and you're being tugged over to another <unintelligible> so and then we fade them out, so that you don't lose- because otherwise sonically what you'll get is a- you get a clip, like a pop or a hard cut, and to avoid that we have to manage the audio with the player in the game, cause it's like one thing to play the game and to not notice the portals and the transitions because they're seamless but then you add audio those transitions have to be seamless on the other side as well, and we built a lot of technology to spatialize audio as well, yeah. We spent quite a lot of time on audio to make sure it's good.

KW: So the- the transition idea from 2D to 3D space, I want to make sure I'm capturing this correctly, is sort of the idea of going from a specifically – a specific kind of anchored in space experience to a more universalized or abstracted, like when that transition occurs it becomes- the idea is that it becomes like – it comes out of that, right?

RD: Yeah exactly. It becomes more of from above you for instance, yeah. So you can imagine a radio playing a song but then that song coming over and playing on top of the experience the player is going through, or the exploration <unintelligible> so it's – it forms the mood as they're exploring the areas. And we can do that by like mirroring music and just by regular BG, like background music stuff, that you would see in any other game but the fact that we wrap all of that up, the entire composition is done we can grab it and re-split it into different locations in real space so like that layer you were hearing is on your right now, that other layer is on your left which is exactly what happens when we move through the landscape to concert hall, each seed you opened added a layer to the quartet and then that whole background audio of the entire quartet playing together gets split up to each person in the quartet and so you can hear them spatially again.

KW: That is cool. Okay, yeah audio's sort of one of these things that I'm thinking about a lot because I'm implementing audio as part of this project I'm making a prototype, and I'm making it in Unreal, and Unreal has, natively really poor sound – audio support, and I didn't know that, because I'm not an audio person, right? They only support- you only support import of 16-bit wav files, that's it. And I was like, ah this might be a problem, because I'm paying somebody to record dialogue and spatialize it, not an issue <laughs> Worked through it. Okay so, my next question is –

GD: Yeah that's why we aren't really using – why we're using our own for that kind of stuff.

KW: Yeah, it occurred to me very quickly that- well, obviously as a team of one you do everything and it's just a prototype but if I was ever to go refactor and try and do an alpha then I would need somebody in audio for sure. It always takes, it takes a couple people. Okay, so my next question is sort of something that I want to talk about tangentially in my paper and maybe you'll have a comment, it's something that I appreciate a lot about Anamorphine which is that it's not a prescriptive experience, and part of this is due I think to the lack of specific narration, but it's really open to a degree of interpretation and I wanted to ask you if you had sort of design conversations or did design thinking about how prescriptive you wanted the experience or about how open to interpretation that you wanted that either narratively or visually?

GD: Definitely making a game like ours, early on we had to acknowledge the fact that people are going to interpret things differently, or even misinterpret things within the game, and that that's okay. It's – even now we do playtests on the game and people come back with – we always ask them 'what did you do within the game', 'what did you think happened' or 'what was the goal in the game' and sometimes they come back with these really curious answers that are not entirely off-base. And that's okay, we're okay with that. Some things, however, we pay a lot of attention to, and we notice this a lot with the transitions and the weird spaces we go into, we test those a lot with people just to make sure that we're not doing something way off-base, something that we really don't want to be touching. So we used to have a transition- well no it wasn't even a transition it was like this – cause people really liked the shattering effect we had in our very first prototype, they really wanted to see it again in the current incarnation of the game, and when we implemented that technology the first time, the shattering was happening in a bedroom I believe, it was in a bedroom, and so everything around the bedroom would break up into pieces and then get scaled and skewed in such a way that it looked intact from your point of view, and then you would move a little bit and you would see that everything was actually broken off and contorted to far away from you. So from that one point of view everything looks fine but then when you move away everything was kind of in shards and as you kept looking around in the bedroom things keep rotating and it gave that same sense of anxiety and that things were wrong, but it also gave a sense that there might have been some kind of domestic abuse, and that was not what we wanted to do at all, so we scrapped the whole thing and we- we're going to keep the technology but we're going to do it somewhere else where it's more appropriate and less – or not associated - we don't want it to be associated at all with that kind of feeling. So in terms of like making sure we're on message, there's definitely a lot of leeway we're prepared to accept, but we always test to make sure that there isn't some kind of – some kind of acceptable margin and that people aren't interpreting things in really weird ways like that's not at all what we wanted them to feel or how to react. And that's one of the big things that we talk about when we go to – when we go to talks and game conventions we talk a lot about, since the whole thing is about like rendered emotions, there's no – there's no substitute for humans testing these emotions. You need people on seats playing the game to feel the things and report back about them otherwise you're bound to get surprises. But yeah just definitely like a lot of space for people to interpret the game and we're comfortable with that to I would say a pretty far extent, yeah.

KW: Okay, so it's almost like you have kind of keystone moments in the experience where you try to more tightly control that versus like other transitional experiences, it's interesting.

RD: Yeah, yeah definitely, I mean the story itself is not really complicated either, like we're doing a lot of stuff – we have a lot of locations but we're doing things to tell this as well, so we don't have a complicated story, there's only two characters right you don't have to pay attention to like a lot of moving parts I would say in terms of like a narrative structure with seven actors like actively influencing a plot like that's not what we have it's just like you and someone else and you're just going through- you understand as you're playing the game that you're going through keystone moments of their lives and the story itself is not too complicated we just hemming it in a new way.

KW: Can I ask if –

RD: …experiencing more of those moments, yeah

KW: Can I ask if the reason that you went with sort of a simplistic story with few actors is because- was it sort of that self-limitation for creativity or was it sort of because you're telling the story in a really interesting way? Or – or both.

RD: It's because we're telling the story in an interesting way. I think there was … maybe in one of the drafts, one of the narrative drafts, there was a third character or maybe even a fourth but that never made it to production. But it's largely because of the way we're telling the story that we wanted to have a simple plot. If we had something complicated it'd be- it'd be harder for us to – or it'd be just as hard to communicate it but people wouldn't be able to interpret it using the tropes that they understand?

KW: Right. Okay, okay so I'm looking at my notes. I think I kind of have one - one last question and it's, maybe it's sort of an interesting one to end on. Sorry, my computer is dying, okay. No, sorry, let me plug my computer in.

RD: Yeah, go ahead.

KW: Okay, yes, this is good. Alright, I want to end on this question because I think it's like really open-ended and maybe if we talk about it we will only have more questions and answers but that is okay, especially for the sort of thesis I'm writing which is very like open-ended art criticism. So I wanted to circle back to the transitions idea, my first question actually, and I want to talk about what –what right now I'm calling in my work the aesthetics of change, this idea that I find sometimes in experiences where you are constantly moving forward and can't go back, where you're going through like a series of portals which is an aspect of the demos that I played from Anamorphine, and is an aspect of the prototype that I'm making and intentionally so, for this reason. The – the act of doing that in a simulated experience is – it can be very morbid, it can be very like fatalistic and sort of mortality-driven in a way. But it can also be sort of – it's a transformative experience too. Like this going through portals, it's sort of trippy, right? It's like – it's sort of a trip, and it can be kind of meditative and transformative but also I think there's this other aspect of it that's really morbid of never being able to go back. So I don't know if you had thoughts on that.

RD: Yeah, a lot of our game is linear as well, portals go one way, transitions go one way, it's a lot about – it is – I can see what you mean by the morbid aspect of it and it is in line with like making a kind of dark gloomy game that's not about usual gaming topics like heroism or bravery, using our creativity and these kind of things want to tell a story that was a little different, that reflected a different part of human nature, and it definitely has that morbidity to it but there's also a part of it that's like you have to have this mentality of like only going forward either personally or something that you have to pull out of a game like you can only go forward and if there's a morbidity- there's a morbidity to that and then I don't know but like one of the – one of the - yeah I'm wondering if I'm getting at this spoiler character…I mean, even one of the ideas of the game is you can either get stuck in the past or you move forward. And certainly for a lot of games it's always about moving forward and hopefully the idea that the takeaway is that you should always move forward. It's not – it's not healthy to stay back but there is this dualism to the portals, there is this, it is both an escape and a way to keep on going. Yeah. Yeah I mean I hope that addresses your ah…

KW: No, it does. I think it's interesting to have your comments about it being sort of a dualism.

RD: Yeah because it can't just be about – I mean it – I mean it's like you said there is something fascinating about it, but at least in our game the portals are meant for you to always kind of keep going somewhere, right? So the game - and it was important for us to make a game that didn't rewrite the past. That was really important for us, we didn't want to have a game where you dwell on the past where like bad things happened and you went back into the past and you make a different decision and you change the outcome. Those things don't happen. We wanted to make a game where something tragic happens but you have to find a way to go forward, and ultimately that's the point that the game's about is how you go

forward and how you – how you make those choices. The duality aspect is something we actually struggled with early on. I think… which was it, because at the beginning there was a hole – there was like this big hole in our game design where portals were a way of escaping a reality and that was the only thing we had in our game was just like the escape and then we had to kind of – and the way you would escape was like through these – through the alcohol bottles and they would go into this big conglomerate together and they would create a portal into like a desert space and you'd go into that space, and that space was free and vivid and you could escape the – the dullness, the grief of your reality, and we didn't' have a flipside to that and maybe this is because like ultimately we're making a game that's going to be consumed by people who are expecting a game to some extent, but we needed to have a flipside to that, it couldn't – it couldn't just be like an escape and we had settled on like going back to this hub point, this temple where you could like go back and revisit memories, and the preservation was one of, like, the snapshot was one of those moments that was like the flipside of the portal. Which in a way is like coming out of a portal and you're sometimes…

KW: Yeah.

RD: But yeah but as we kept writing – from that point on when we kept writing the narrative and keeping in mind these two feelings of like preservation and escapism or like treasuring memory and escaping from the memory, these two feelings kind of drove out the narrative to be the way it – to be the way it was, and to become what it is now. So yeah I think, I think initially we were pretty stuck on just having the morbid aspect of – of the portals, but in line with the game we had a positive way of expressing them too.

KW: Yeah, I think there's like a weird positivity in that kind of fatalistic aspect.

RD: Yeah, it's not, yeah it's not a like a happy positivity but it is a positivity that gives you closure.

KW: Yeah it's a cathartic thing.

RD: Yeah, cathartic, yes that's better.

KW: That's so interesting. When I pulled out my experience goals for my prototype I named anti-catharsis as one of the things that I wanted to get to, right? So this is like an interesting counterpoint. Okay, those were all my questions – sorry go ahead.

RD: Yeah I just wanted to say like yeah, I think it just comes from like if you see the portals in another way, if you look at that linearity as a way of like never looking back – and it takes heart and it takes a kind of strength to like not look back, to always plow forward and to always go – and to decide for yourself that every day is going to be like – every next day is going to be better than the last, and like that kind of idea can also lend itself to the portal idea.

KW: Absolutely, I think so, yeah. I – I don't know, I think that's part of the reason it's such a compelling experience, those transitions are so compelling. I mean they're visually compelling, right? But in terms of the experience I think it's really, it's got all of that in it. Cool, well is there anything else you want to talk about, or you want to add? Or do you feel complete?

RD: What would you – I think I want to say something about your second question on the list, what was that one?

KW: So my second question (we did skip around a little bit), I asked you about using defined and undefined space, I don't think I said it exactly that way, I had asked you about the character's mental space as a physical manifest space which is something that was in that IndieCade summary

that I kind of latched onto. But – but we talked a lot about - from that we talked about the rendered emotions which I think is – addresses that.

RD: Yeah, I think there was a question about the … was there a question about the technology or like the portal?

KW: I didn't ask about the – that would be interesting – no we were talking about the audio technology a lot and going from the 2D to 3D space during the transitions, and sort of like universalizing that, let's see. We did transitions, space, rendered emotions, audio design and cues, being prescriptive rather than open to interpretation and to what degree, narration, audio or written narration, and the change aesthetics. We talked about self-limitation.

RD: I don't know, I thought there was a question at some point where I wanted to mention that very initially the game started with Mo and I had like two different ideas for a game, he wanted to do – he wanted to do a game where you would kind of go into these environments that would be like three dimensional paintings. And you could go around and explore these three dimensional paintings and find out what they were all about, and I just wanted to make a game where you could twist and turn space in over itself and do these kinds of like – like we were talking about, twisting scale and think direction like having space move around on its own like those kinds of things. And in the very beginning that was what the aesthetics of the game were.

KW: You mentioned that to me the last time that I saw you which is really interesting that it started that way, because those two ideas which I – which have a common thread, I don't know, they came together like completely.

RD: Yeah, yeah.

KW: Cool, alright well thank you so much for your time, I really, really appreciate it, this helps my research immensely, and I hope I will see you, maybe IndieCade or someday.

RD: Yeah, I'll be at IndieCade, Sam's going to be at GDC.

KW: That's right, I'm going to meet up with her, that's going to be great. For sure, thank you for hooking us up, because I would love to hear her comments as well.

RD: Yeah, if you have any more questions shoot me an email and I'm happy to answer.

KW: Thank you so much, I really appreciate it. Take care.

RD: You too.

Transcript of Interview with Gillian Smith

Notes: Interview conducted via email on March 18th, 2017. The following is the raw interview text with minor formatting adjustments.

Question: Firstly, you mentioned the idea of "baked in aesthetics" for digital design tools, which is something game artist Christina "PhaZero" Curlee talks about, specifically in relation to Unreal Engine – but you spoke about it in relation to architectural modelling tools. I wanted to ask you to

expand on the idea of how specific digital tools can have very clear aesthetic presences. How is this like traditional media/craft, how is this different?

So, I think this is something that happens in games as well as architectural modeling tools for sure. It's often pretty obvious if a game is made with Unity, especially if the people making it have kept certain default behavior (default physics, default controls, default screen resolution/graphics setting screen...). I think this is something to be expected, and not necessarily bad. The tools we use shape the artifacts we create with them. Doug Engelbart (famous for inventing the mouse) had a nice piece on "augmenting human intellect" where he talked about how the tools we use circumscribe our behavior. He use as an example "augmenting" the practice of handwriting by various the size and weight of pens, and argued that a larger-than-life, heavy pen will result in larger, more clumsy writing that is slower to achieve. Game engines and generative design software are more complex examples of this, where the space of potential artifacts that can be made are framed and limited by the capabilities of the software. I think some of the best works of art/design come from teasing out and pushing those boundaries -- a sculpted statue from metal or marble where a cloak looks real, or a quilt that deliberately uses threadbare fabric. In games, I think this requires us to really think deeply about what a game engine is doing, and why, and how it works so that we know what the boundaries are and how to push them (and, at the very least, overriding default engine behavior).

Question: Follow-up: what was the aesthetic motivation for taking a digital game into the tactile world in *Threadsteading*?

Threadsteading had a lot of motivations, but maybe the one most relevant to your question is the motivation to see how the technological constraints of the machine and the aesthetic properties of the medium could drive innovation in game design. The game is designed around these, especially around the need for gameplay to be based around a continuous line, and the emergent behavior during play creating a pattern with a fairly even pattern spread across the entire map. We were also exploring craft as a form of play, but more heavily structured with game mechanics and rules. I can see a whole space of new games opening up that use craft practices to produce a finished object at the end of play. Using the machine was also important to us, though. You could imagine playing *Threadsteading* by hand without the aid of a machine, just in an embroidery hoop. But hand embroidery looks quite different from digital -- it's more organic, more error-prone, and has a far wider variety of stitches. I'm really happy that a result of the game is something that looks computer generated because it is so precise, kind of as a nod to the unexpected way that computation intersects with sewing.

Question: Secondly, can you expand a little on your comments about how generative design forces designers to make a commitment about what a thing could be or what is a valid state for that thing? How is generative design an exercise in drawing boundaries?

But, the rough idea is that generative design requires us to draw boundaries, whether explicitly or implicitly, because we are defining a space of all potential things that the system can generate. We make this declaration through both the data we provide to the system and the algorithms that we author. There will inevitably be some kinds of things (levels, characters, buildings, whatever) that cannot be created by the systems we author. I've heard it described as sculpting a generative space - every line of code you change, every data source you provide, is shaping a multi-dimensional space of objects that the system is going to be able to create. Sometimes this only really has impact on some minor aspect of your game, but

sometimes it has far-reaching implications. I think it's important for us to be conscious of the formal claims we are making about what our generative systems create: http://www.tandfonline.com/doi/full/10.1080/14626268.2016.1147469

Question: Finally, you talked briefly after your presentation about the need to understand the superset of possible generations – the generative space – to best be able to design an experience that is not overly weighted towards one type of generative production. Would it be accurate to call this a curatorial exercise? A mapping exercise? A collaboration between a human designer and a computer algorithm?

I think I'd best describe it as a mapping exercise. I think that generative design is a collaborative conversation between human design and computer algorithm. You write an algorithm, see what it creates, and go back and forth editing that algorithm until you've found a generative space that seems appropriate to your goals (which may have shifted over the course of the conversation). But it's hard to understand just from seeing a limited amount of output what the system is actually capable of creating, so I advocate for also finding a way to examine the generative space. I first wrote about this a while back: http://sokath.com/main/files/1/smith-fdgpcg10.pdf . There's now a researcher in the UK called Michael Cook working on building some of these ideas into a tool in Unity, called Danesh: http://www.gamesbyangelina.org/2016/02/introducing-danesh-part-1/

Transcript of Interview with Chris Solarski

Notes: Interview conducted via Skype on January 30th, 2017. The following is the raw interview transcription with minor editing and formatting.

Klew Williams: So, my questions are mostly about that. So, through the lens of where I see you coming from in your writing, of treating the visual and experiential aspects of video games as fitting into a fine arts category and a fine arts tradition. So I wanted to ask you things about evoking those experiences, either with pathing or with environmental design, things like that. So I can start – I can read you my questions, or if you have…? Ok, so the first question I have is in regards to sort of using the video game-like format or some of those tropes in an art format. So, things like the standard vernacular of the video game: controls, camera movement, a UI, a start menu, an exit menu. When interactive art uses some of these tropes, do you feel like in a purely artistic expression it can detract from an emotional range you're trying to show? Or do you feel it can add to it? Or do you feel it's sort of neutral?

Chris Solarski: This is a topic I hadn't sort of considered before, but I, sort of my – what comes to mind is I would say in these cases it's probably detracting or sort of, can be damaging to experience if it's something that's present during the gameplay itself or sort of like during the experience itself. Because I think there's, you know, there's – it is a complex interaction often, and having a menu up front or a tutorial, you know, I don't think there's anything wrong with that as long as it's – the experience is simple enough that you can't get lost in it. Unless…unless being, unless there is an artistic reason for having the menu. I mean, there's, there's also you know, you could make an artistic statement based on menus themselves, so. But as, from my perspective, you know, I like to make connections between classical

paintings and games, and films and games, you know, and having a menu or something like that, or alerts or even just social features like, "your friend has logged in" is the equivalent of someone's mobile phone going off in the cinema <laughs>. Or there being bad lighting in a like, disrupting the painting surface in a museum or something like that. It's sort of stops, prevents you from experiencing the artwork in a pure way.

KW: Ok. That was sort my instinct on the topic. That there's at least certainly a limit to how much you can put in an interactive experience that, if you try and get almost, if you try and get too tongue-in-cheek with it, it'll break. Right? Like, if you're like, "and then hit shift to crouch and space to jump!" and at some point it becomes, then it becomes a game, or it becomes, it feel likes –

CS: Yes, yeah. And when we – something to consider is that some of my favorite game designers like Genova Chen or Art Jensen, so the creator of *INSIDE*, Genova Chen is the Creative Director of *Journey*.

KW: Ah, yeah.

CS: They, they really are champions of very simple controls, that, you know – it's the idea that you enact PS3, PS4 controller, I don't know. Just, how many buttons it has, sort of, I don't know – ten or more. And the idea is that it's, game designers often see this as a challenge, to try and assign a function to each one of those buttons. But the simpler the controls the more easier it is to be immersed in the experience. You don't have to think about what you have to do, you can be more fluent as far as interacting with the art experience. So I the simpler controls are also part of this urge to have menus and alters or not. And overly complex controls are also a very big barrier that can even prevent people from re – sort of continuing a game. Because it's sort of often, as a game is designed at the beginning to be very simple and it gradually introduces controls, and then all of a sudden you have, I don't know, twenty button combinations you have to remember. And then if you take a break it's just like having, taking a break from learning a language. Because it's so, such a mental obstacle to think – "oh, Lord, I have to actually <laughs> learn all those things again but I'm halfway through the game." So, sort of this – simpler is easier and more conducive for art as well.

KW: Yeah, I find the switching off as a gamer, as a entertainment gamer, switching off between the keyboard and my Steam controller is like switching languages <laughs>. That resonates with me for sure. So, it's interesting you bring up Journey. I wanted to ask you about, well, in a general sense I wanted to ask you about some of the things you said in the Gamasutra article that you wrote that I thought was really important for my thesis. You talk about, let's see, I have some notes – you talk about pathing and environmental design, like, more at the end of the article. You talk about like character design, and fine arts origins of game art first. And then you kind of get into pathing and evoking things like aggression or tranquility with environmental design, right? Either sort of railroaded paths or like verticality and stasis. And in that article you talk about Journey which has really interesting open pathing in general, right? Now I've never played Journey because I don't own a PlayStation. I've watched it on YouTube, I've watched it beginning to end. But I did want to ask you to just expand on this idea, it's kind of important to my design with the prototype is, sort of pathing and environmental design for things like confusion, or disorientation.

CS: Sure. Because it's, well, Journey is, I would maybe describe it as a very controlled experience that from section to section the designers have you know very much dictated each of the elements of dynamic position that I outlined sort of more in my new book than in the article so really expanded on that article and the elements like the pathway shapes whether the character can jump or not sort of how fast the character moves, these are all defined by the designers and so from section to section they can, in a way change the whole composition to make it more aggressive or more harmonious and depending on how the

character feels, how it can be guided by the player, what are the secondary characters doing? Are they gliding with the avatar, the main character, or are you actually trying to escape the gaze of some of these guardians I think they're called. So there's sort of a very guided, very controlled experience and *INSIDE* works the same way. It's not that you have a run button so that the player can decide when to run, it's like so when action is turned up sort of to become more aggressive then the designers have automated the faster run speed to make the – to make you - well one is you have less to think about but also you just become agitated automatically because your character is suddenly faster and more responsive, and let's say your – the controlled game design has a much more accurate way of influencing your emotions relative to the narrative, as opposed to a game which allows you to decide when you can swing your sword or when you can shoot when you can jump or run you know like *GTA* it's sort of a – all the actions are available to you all the time whereas so there are moments where you can have dissonance because of that you can be in a –a shopping mall or suddenly start shooting everyone even though there might be a nice music playing in the background, whereas in a controlled experience such as *Journey* or *INSIDE* everything is being orchestrated beautifully to create very powerful emotions and physical actions in the player relative to what is happening in the narrative at that very moment, so from moment to moment.

KW: So, the idea of-

CS: Does that answer your question?

KW: Yeah, no, that's super – that's super interesting because I had thought about dissonances being an experience to intentionally evoke as a designer, but instead this is the idea that the more controlled a design is, the more harmonious in general it is. And that-

CS: Or that it can be because you can make it deliberately unharmonious but it's up to the designer you can actually just say when these moments should happen or not, whereas in an open world game for instance, you, you know the player decides it's sort of these are the two extremes, either the designers can decide from moment to moment or the player decides and you as a designer have much less control over <unintelligible>. So how many - sort of maybe there is just to distinguish the difference between an aesthetic harmony which you want to evoke, or harmony between what your intentions were and what the player is doing at the moment.

KW: Yeah, no, that's a good question. I'm talking more about a dissonance between – as a play experience, so not a dissonance between what is – necessarily between what is design and what is experience but more that is part of the design of the experience or that is incidental to the experience sort of.

CS: Okay, yeah cause it's, if you – like - in the article and in the book especially I really highlight that the characters' – I call it "lines of movement" so the term has changed from the article it's – so the characters' lines of movements are its animations like the broader animations like in *Journey* there are very fluid ones in Vanquish the character zig zags around when it's being boosted, and *INSIDE* it's quite horizontal and vertical lines of movement in matching the type of gameplay. So these, the lines of movement, are the most influential way to affect your player. And because what the character can do how fast it moves or so the lines of movement how many times it starts or stops has the greatest physical effect on the player and also because it's a physical effect if you're giving them – if you're orchestrating very agitated movements then they will start to feel agitated as well. If you're bringing out a very sort of evoking very graceful movements they will feel more graceful in their body the sensations, and also their emo – their wellbeing will feel more graceful as well. And when you talk about dissonance the, it's sort of like going off a bit on a tangent but I watched a while ago a film called *There Will Be Blood* by Dylan Tichenor and Daniel Day Lewis and what I really found very powerful is that the character I think he was

just walking through the desert so his pace was very slow but the music was very fast-paced and very aggressive and it was sort of I would say his outward appearance was calm but the music was representing his inner sort of tension and so you know if you think of video game experiences or if you break it down into dynamic compositions sort of as you've read already, the idea is that you can start with the lines of movement you know that's sort of the core-the player's core connection to the virtual space you know it's sort of influencing their physical movements and then you can take anything and any one of the other elements of dynamic composition and try to sort of counter it you know and using this example from *There Will Be Blood* it could be that you choose a very slow walk speed and very graceful turn speed or very gradual one but have very aggressive music and you know that's sort of the simplest example I think I can give where the music suggests that something much faster is happening but it's sort of kind of – this dissonance you might be looking for.

KW: Okay, I think I have to watch *There Will Be Blood* then.

CS: Okay, <laughs> it's a very powerful film and I mean Daniel Day Lewis is just an incredible actor so.

KW: Yeah. Okay I think that kind of actually segues into another set of questions that I had, which are about aesthetics in games and on the other side of the spectrum away from a heavily designed aesthetic into maybe an emergent aesthetic. Sometimes I think of it almost akin to emergent gameplay but I don't know, we'll talk about it and then you can tell me that I'm wrong probably, because I feel wrong it doesn't – it's not quite coalescing yet. I'm interested in the aesthetic of randomness in an experience either specifically designed randomness so specifically the game is saying this set of possibilities can happen to you and one of them is going to, less about the randomness of a play style. And also the aesthetic of change. I'm going to have this experience where players can always go forwards through these rooms and they can never go backwards and that's designed and there's artistic reasons for that but there are also like experiential reasons for that And so I have this- and this happens in a lot of linear games or this happens in a lot of interactive art where you can always continue on and you can't necessarily back track and so it's this constant evolving experience it's like going through a series of portals maybe it's going through a series of changes in maybe a random way maybe a controlled way and it's not something we talk about a lot in traditional art and it's not something we talk about in cinema. Obviously a movie can only go forward but we don't talk about the random qualities of experiencing a movie much, it seems really elusive to me and I wanted to see if you have comments about it.

CS: I have to think about that, the random qualities of experiencing an artwork and have you got any kind of ideas associated with painting or film that you think about when you're posing that question or?

KW: It's- it's tough for me to draw- I mean I can think of images *La Guerra*, right, Picasso, I can think of images that are like a lot of –like a lot of sort of midcentury abstract work evokes for me a sense of randomness or change but that seems – it's very designed it's very by nature of the medium very static, right? I think sometimes about some of the weird cinema stuff that's happened like experimental cinema like Brian Moriarty taught me about something called the Kenoautomat which was a World's Fair cinema project that the audience voted on the outcome of the film. Right so it's not necessarily a random experience of cinema but a- an influenced experience and then there's that group dynamic so it seems kind of random like "what are we going to choose". That's as far as I ever get with that one.

CS: Yeah cause it's –it's definitely – I'd say it's something that probably hasn't been done or that I'm not aware of yet that – now I will always sort of tend to go back to these lines of movement cause they are really just the player's connection to the virtual space and how you design that you know really influences

the player's sense of agency and physical sensations and mental sensations as well. So it's definitely something that could be a very interesting exercise if you could kind of just from room to room in a very simple way change the speed and the responsiveness of the character as well. But there are also things like in *The Beginner's Guide* which is by Davie Rayden<sp?> who developed the Stanley Parable as well so he did the even better *The Beginner's Guid*e it's an incredible game.

KW: I've played it, it's something!

CS: Oh okay so there's that instance where you have to – you can only walk backwards

KW: Yes.

CS: And so you can also do another thing where you can only look left or only look right or something. I would find it interesting you know on a room basis like you said you revisit this room over and over but if you think of a jazz drummer kind of changing the beat constantly you know you could even change the movement every I don't know thirty seconds or something and create – or even make that random too, give it a very stilted very confusing experience where the game becomes – the game experience or maybe like the goal actually becomes trying to understand what – how the controls have changed and you have to in a way catch up to – kind of regain control in a way sort of by finding out what has changed about the controlling.

KW: That's interesting, I had made a note when we were talking earlier of the idea of maybe speeding – you could easily mathematically just randomly speed up the responsiveness of the mouse or the walk speed even the camera height you know there are so many – everything is accessible. It's like almost overwhelming for me.

CS: Yeah because then it sort of becomes – one is the challenge for the player becomes kind of trying to re-reinterpret the controls every time there is a change. And as a player's in it to be fairer you could indicate when a change has happened or be very unfair and just also make it like a vague thing but another thing would be the game itself you know if you think about navigating a video game environment traditionally like what Super Mario or Pac Man sort of required was the mastery of the game itself to get over the pitfalls, get from one ledge to another. You know if you're constantly changing the speed then just getting through a door might be difficult if you go very, very slowly and then all of a sudden crank the speed up and then the player might end up walking into the wall instead because they misjudged like the change in –in pace of the game experience. So it's it can be a commentary on that. I think it would be a very interesting experience cause I can't say there's been anything – you know for me that would be the –a very nice reflection of sort of like Picasso's work in a way, sort of but using what is the essence of gaming as opposed to a commentary on multiple perspectives inside there which I think has been done in a few cases already.

KW: Sorry, I'm just taking notes. I don't completely trust my voice recorder plus it helps me structure my thoughts.

CS: Sure, okay.

KW: That's so interesting that- I had not thought of how in a way an experience in which you're passing through a series of portals and that you're moving forward through represented time and through space is like really kind of coming full circle with Mario and like "get through the level", right? Like, what's your objective in 95% of early video games is like "get through the level". It's so interesting.

CS: Yeah cause I was even thinking something like much simpler like you have a chair like the pathway to the door is not there so you might have a chair and a table so the line has to be kind of it can be more like an s-curve or something you have to get through but of course every time you change the controls simple obstacles become very difficult if you – if it's just slow and forward then of course you can get past but if every time you press forward you go left and then you know it becomes a huge challenge trying to just circumvent a simple chair and table just to get through the door or if- if the speed starts off slow but it's constantly accelerating then you know like a rocket taking off then of course that's a completely different experience that would be very hard for the players to adjust to so yeah it's an interesting experience sort of like kind of that – as like you know linking back to traditional games in general sort of that idea of navigation.

KW: Yeah as I- as I continue on thinking about how the experience is going to come together, which – I had a working prototype of my sort of my interior geometry and how it was going to allow you to move through it continuously right it basically just put rooms in front of you and took rooms off behind you but an Unreal Engine update broke my prototype <laughter> So I – I will be remaking my prototype. But as I work through these questions I think about more and more I think about how it's really like very much part of a materialist tradition. It's in a lot of ways a discussion of its own medium which is good I mean I think that's a rich vein of inquiry I don't think people talk about interactive art or games in like through the Materialist lens much or if they do I'm not read on it so it's really exciting for me.

CS: What do you mean by Materialist lens?

KW: So an idea that like an absolutely integral part of a piece of artwork is the material that has been used to make it. It was – materialism in the US was like a sort of mid to late century semi-avant-garde like "I'm going to make stuff out of straw and burlap or glass or canvas", you'll still see – I still see some things in galleries that are just canvases that are wrapped in interesting ways which is always sort of a kick to see but the idea that there is a –an unavoidable statement in using the media you've chosen for your art.

CS: Oh yeah I see, now I see how it kind of relates to everything…

KW: Yeah, so using games- using a digital medium, an interactive digital medium in general but specifically using like a video game control scheme or a video game UI as being like the material you're working on and what does that say about the work, which, in this point in time I think – I see video games as being like, I don't know, like ceramics in that it was once considered not fit for the gallery but now you know like – once it was just a practice medium for bronzes but now it's going to be like in the gallery and I see that kind of happening, you saw it happening with drawing, like pencil drawing in like the late 80s of suddenly pencil drawings were in the gallery and not just as "look at these drafts this person made for this sculpture" you know, as real artwork the art of you know Julie Romero to installations based on drawing so I kind of see video games – I kind of hope that video games will become part of that tradition of "this material is not fit for the gallery" transitioning to "of course it is", right?

CS: Mmhmm.

KW: So that's kind of the perspective that I've been thinking about a lot in – we talk a lot about what we as a community or as an industry talk a lot about what the experiences of using a UI or what the experiences of using those buttons are like and what it does to you psychologically but we don't talk so much about using – leveraging all that existing knowledge to an art –sort of an artistic context.

CS: Yeah cause there's sort of – I'm not sure if that's kind of related. I mean you- when you mentioned that – this might be sort of another tangent but

KW: Tangents are good!

CS: We use kind of these stereotypes when we create characters or often in narrative that you, you know you have the cowboy or the space person and it helps sort out the hero, sort out <unintelligible> you know it helps people to understand the narrative much quicker and then of course you can counter the expectations in different ways and in ways is it related if we say these – these sort of controls make games familiar in a way sort of in the same way

KW: Absolutely.

CS: You can also just counter people's expectations by making back – forward a back action, a backward walking action or something like that so. Yeah it's just like using your finger to tap to make a selection on your iPhone it's you know the – the – this language had to be taught by Apple and – but once people understood it it's sort of – it's something that's repeated over and over again and kind of changing it means that people have to relearn you know even in the smallest way people have to relearn things and there will always be a protest and you know even unlocking your iPhone – I have the iPhone 6 I think and the iPhone 7 or the newest operating system has a different opening function where you have to double tap or something like that and people are frustrated or they prefer the old one. So again it's sort of you can see how changing interaction can be frustrating it can even kind of prevent people from enjoying the experience so stuff like that.

KW: I'm writing this down. Yeah that actually already kind of answered my final question that I had which was – I wanted to ask you – so I'm talking a lot about making people feel really confused and dissociated and – and maybe frustrated right? Depending on their disposition. But you can only get so far with that I've found in an experience even if you're trying to do something that evokes a certain frustration, players or users or your audience will only stand for it for so long before they need something familiar to ground them. It also is a reason why almost all interactive experiences like this tend to be very, very short. You know something you could experience at least mostly in 5 minutes or 10 minutes. But I want to ask you like yeah so – in an- in a game like experience that's like super disorienting or even frustrating you know how to keep –how to keep it grounded and how to keep it like psychologically navigable, how to keep it so that players won't just throw their keyboards at me when they play right? Something that somehow is compelling to be a part of despite the fact that it might be frustrating but – that's kind of the same idea, right?

CS: Sure. There's this thing…because it's technology that often goes wrong you know even off your phone you know the worst thing that could happen is that people just think your game is broken you know that ideally the game I would say would be a goal can be playable even when you're not there to supervise that would be the basic goal and if your game is so random there is the danger that people will think that something's wrong or they're doing something wrong, you know especially if it's a gallery setting then maybe many people have never played a game and they all think you know they would be repulsed by – or like feel very offended or sort of feel unable to – to properly work the game whereas that was the intention so it's – so technology – with technology we have these expectations that things should feel – or communicate always the intention in a way sort of like to you know otherwise people have the danger to walk away so that's why I mentioned – something related to what I mentioned earlier too you know to avoid having people throw the keyboard at you it sort of- I think the you know thinking how what the clearest communication would be to communicate when a change has happened in the controls and also to make the change part of the game experience you know this is what makes games so good that

you know they make not- in a very general sense they can make boring things seem fun and they can also make randomness you know a challenge and also a fun experience so if you keep certain things consistent, show when changes happen, or clearly indicate when a change has happened to the controls you know and maybe keep it specific to controls then you, you know there's – people will feel that there is a fairness there while you are changing sort of one core element.

KW: I think that's a good word for it is fairness, I don't – I don't want it to seem unfair, right? Yeah. So. Yeah in – some level of consistency – I'm sort of hoping to get to that through the architecture. The architecture- the interior spaces you're flowing through they're like a series of hallways and a series of rooms, and those are immutable. The architecture does not change. It's sort of the set dressing in a way. And the music and I'm – I've written a script and I'm recording dialogue with a voice actor next week and there'll be a- there'll be some short lines given, it'll be spatialized as if somebody's whispering in your ear, and those lines will change as well, those are subject to randomization as well.

CS: Okay

KW: That'll be strange, we'll see if it works out. It's all very experimental but that's good, that's the point, right? That's what a thesis is for <laughter>.

CS: I'm very sorry Klew, I'll have to get going.

KW: No, not at all.

CS: Okay so, yeah we have to leave to – yeah so my wife has to do some work so I have to look after my son.

KW: Wonderful.

CS: Yeah but I hope that was helpful.

KW: It was extremely helpful, thank you so much for your time!

CS: Sure, sure

KW: If you think of anything else to add, yeah, drop me a line I'll – I want to collect all your thoughts. Am I going to see you at GDC?

CS: No, no, unfortunately not. I'll be in Australia actually.

KW: Oh wow, okay.

CS: Maybe next year.

KW: Alright, that sounds good. Take care.

CS: Thanks! Bye-bye, you too.