

**Ecstasy / Light/ Inertia: Interactive Gamification
for New Electroacoustic Music and Sound Art**

by

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Note 1:

The most current version of *Ecstasy / Light / Inertia* can be downloaded from the following link:

www.jcvasquez.com/eli

Note 2:

This thesis was written in Overleaf using a modified version of the template "mitthesis,"
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Contents

1	Introduction	9
2	Gamification in Music	13
2.1	The Analog Era	13
2.2	Transition Towards the Digital Age	17
2.3	Modern Applications	21
3	Ecstasy / Light / Inertia	27
3.1	Concept	27
3.1.1	Literary and Aesthetic Influences	28
3.1.2	Role of Narrative	31
3.1.3	Audio Technology	33
3.2	Narrative Structure	34
3.2.1	Thematic Analysis	36
3.3	Level design, interactions, and musical content	37
3.3.1	Prologue	37
3.3.2	Chapter 1	40
3.3.3	Chapter 2	48
3.3.4	Chapter 3	50
3.3.5	Epilogue	54
4	Discussion	57

4.1	Overcoming Challenges in Solo Development: Navigating Resource Limitations and Creative Constraints	57
4.2	Evaluation	59
5	Conclusions	63
A	Interactive Script	65

Chapter 1

Introduction

The COVID-19 global pandemic brought significant upheaval to the art world, as public gatherings in concert halls and galleries became an impossibility. This forced the artistic community to explore various online strategies for the dissemination and consumption of their work, as art became a crucial means of emotional coping [1].

Traditional streaming services, both live and recorded, were one avenue explored for remote music distribution. Yet, these mediums proved insufficient in replicating the full concert experience. A large-scale study demonstrated that the pandemic did not boost demand for online streaming, and in fact, global consumption fell by an average of 12.5 percent [2]. This could be attributed to the fact that online music consumption often accompanies other activities and frequently occurs during commutes [3], a routine disrupted by the pandemic. Given the passivity often associated with online music streaming, including live streaming [4], it fails to emulate the complex sensory interaction characteristic of in-person concerts, thus calling for more comprehensive digital alternatives.

Although the pandemic was a transient phenomenon, it highlighted and intensified an existing research question: how to effectively translate physical multi-modal experiences into the digital realm. In response, some artists have explored the principles of game design, specifically 'gamification', which is the incorporation of game-like features into non-gaming interactive contexts to increase user engagement and activity [5]. Gamification has been demonstrated to enhance a sense of achievement, enjoyment, and engagement across various fields from education to work-related activities [6]. In music, it represents

a novel approach with potential to expand audience reach without compromising artistic impact [7]. This is particularly relevant given the dwindling attendance at classical music concerts [8] and the aging regular audience [9].

Certain researchers have proposed re-evaluating the traditional concert hall paradigm, considering a passive, sitting audience as "increasingly incongruous in our data-rich, fast-paced world" [10]. They suggest the use of technology to engage changing audiences. However, simply transplanting traditional interactions into a digital context does not sufficiently appeal to the next generation of concert-goers [11] [12]. Hence, gamification emerges as a promising tool for fostering novel and captivating forms of music interaction for both creators and audience.

The introduced project, "Ecstasy / Light / Inertia", embraces gamification as an innovative approach to engaging with new music. This project features a 3D environment, offering narrative-based interaction and navigation, which is underpinned by the conceptual elements of the displayed music pieces. The intent is to provide a comprehensive virtual substitute for traditional concert settings or sound art galleries. "Ecstasy / Light / Inertia" presents numerous original compositions within virtual spaces, crafted with high-quality 3D scans from real life, and situated within the Unreal Game Engine¹. The project further incorporates HRTF audio², aspects of Nordic nature and modernist architecture, principles of postmodern philosophy, and gamified design and interaction paradigms. The aspiration is to create an environment capable of delivering a portable, engaging, and enduring aesthetic experience. The research objectives of this project are threefold:

- To propose, develop, and assess an innovative paradigm for transposing physical, multimodal artistic experiences into the digital sphere.
- To contemplate the role and potential of repurposed game engine environments for disseminating new music, particularly after a global pandemic that necessitated reconsideration of physical presence for enjoying various sound-focused art forms.

¹Game engines are comprehensive software frameworks equipped with tools for rendering highly realistic graphics, modeling physics, supporting real-time audio and artificial intelligence, among other features [13]. The Unreal Game Engine is a popular choice for both video game development [14] and an extensive range of interactive non-gaming applications [15].

²Head-Related Transfer Functions (HRTF's) refer to the study in music technology of "the ability of humans to use sonic cues to estimate the spatial location of a target"[16]

- To construct a trans-disciplinary project capable of delivering a comprehensive, user-friendly, free-to-use, and remote aesthetic experience, thus addressing potential solutions to issues of geographical location, accessibility, and income disparity in the circulation of art.

The core focus of this work is the exploration and articulation of the creative process involved in developing "Ecstasy / Light / Inertia". It is a deep-dive into the conception, evolution, and realization of the project, mapping out the artistic choices made and the methods employed to bring this unique gamified experience to life. The narrative threads, the philosophical underpinnings, the intricate music compositions, and the game mechanics are all integral components of this artistic endeavor. They blend together to create a compelling and immersive universe, an artwork with its own distinctive voice and spirit. This exploration is not simply about creating a linear narrative or an engaging game but about crafting a resonant artistic piece that transcends traditional genre boundaries.

In terms of the structure of this dissertation, Chapter 2 presents a survey of gamification practices specifically targeted at musical creation and diffusion, spanning from pre-digital eras to the latest advancements in the field. It's important to note that the survey's purpose is to explore the experimental and artistic applications of gamification in music, as opposed to the better-known rhythm-based games such as "Guitar Hero"³ which are more familiar and broadly used.

In Chapter 3, one of the key points of discussion revolves around the amalgamation of various artistic influences that make up the project "Ecstasy / Light / Inertia". In exploring these influences, it's important to emphasize that references to postmodern philosophy incorporated within the project should not be understood as a critical framework for academic analysis or reflection. Instead, they serve primarily as an inspirational source - an abstract catalyst, if you will, that encourages broader and fluid interpretations of the project's structure and thematic exploration. The themes, concepts, and ideas derived from these philosophies contribute to the project's innovative approach, help shape its

³Guitar Hero is a music rhythm video game developed by Harmonix Music Systems and published by RedOctane. Released first in 2005, it gained popularity due to its unique guitar-shaped game controller that players use to simulate playing a guitar, pressing colored buttons in sync with on-screen scrolling notes that represent guitar chords and solos.

narrative content, and inform its gamified design, but they do not form an exclusive methodological structure for this research.

Similarly, it's also crucial to acknowledge that while the music pieces embedded in "Ecstasy / Light / Inertia" are integral to the project, they form part of the overall experience. Hence, the music analysis focuses on details relevant to their immediate presentation context, rather than an exhaustive description typically found in an analysis of a standalone contemporary music piece.

Lastly, Chapters 4 and 5 will present a discussion, future directions, and conclusions.

Chapter 2

Gamification in Music

2.1 The Analog Era

While the term "gamification" is more often associated with video games, the practice of introducing ludic aspects in music-making and listening predates the digital era, and in fact the use of technology altogether. The first examples can be traced back to the 18th century, with at least 20 musical dice-based musical games composed and published between 1757 and 1812 [17]. Each one of them would contain pre-made fragments of popular dances of the time, allowing, in practice, any person to throw a set of dice in order to select a number of them in order and put together a finished piece of music. The first of these works, created with the purpose of being a template for future similar endeavors, was Johann Philipp Kirnberger's *Der allezeit fertige Menuetten- und Polonaisencomponist* (In English "The Ever-Ready Minuet and Polonaise Composer") [18]. The piece included two tables of numbers (one for minuets and one for polonaises) that depending on the current bar number (and the result of throwing the dice) would direct the player to a card from a set included in the back, each one with notated fragments of music [17]. Similarly, a work attributed to Wolfgang Amadeus Mozart (a fact disputed by some researchers [19]) was published as a pamphlet in 1792. It is usually referred as *Musikalisches Würfelspiel* K. 516f (In English, musical dice game) in what is perhaps the most famous example of the practice at the time [20]. The purpose of the system was to create a 16-bar waltz, with 11 unique different choices available for each of the 16 bars, allowing the user to produce

roughly 45.9 quadrillion different versions of the piece. Figure 2-1 shows an early version edited by the German publisher N. Simrock in 1793 (listing Mozart as the author), shortly after Mozart's passing. In spite of the controversy regarding Mozart's authorship, this piece has been reprinted, discussed and realized constantly over the centuries, up until recent computer-generated versions [21] and contemporary re-imaginings of the system such as in Robert Xavier Rodríguez's Musical Dice Game (2005).

ZAHLENTAFEL.
TABLE de CHIFFRES.

		A	B	C	D	E	F	G	H	
Erster Theil.	Premiere Partie.	2	96	22	141	41	105	122	11	30
		3	32	6	128	63	146	46	134	81
		4	69	95	158	13	153	55	110	24
		5	40	17	113	85	161	2	159	100
		6	148	74	163	45	80	97	36	107
		7	104	157	27	167	154	68	118	91
		8	152	60	171	53	99	133	21	127
		9	119	54	114	50	140	86	169	94
		10	98	142	42	156	75	129	62	123
		11	3	87	165	61	135	47	147	33
		12	54	130	10	103	28	37	106	5
		Zweiter Theil.	Seconde Partie.	2	70	121	26	9	112	49
3	117			39	126	56	174	18	116	83
4	66			139	15	132	73	58	145	79
5	90			176	7	34	67	160	52	170
6	25			143	64	125	76	136	1	93
7	138			71	150	29	101	162	23	151
8	16			155	47	175	43	168	89	172
9	120			88	45	166	51	115	72	111
10	65			77	19	82	137	38	149	8
11	102			4	31	164	144	59	173	78
12	35			20	108	92	12	124	44	131

Figure 2-1: Score of Mozart's Dice Game, published in Bonn by N. Simrock (1793)

Later, in the 19th Century we find a system called *The Quadrille Melodist*, created

in 1865 by Professor J. Clinton of the Royal Conservatory of Music, London [22]. It is essentially comprised by a box of cards with fragments of pre-composed music each one, that can be shuffled, reorganized and finally put in a tray with slots for performance (See figure 2-2). As with the previous example, each bar had 11 possible variations. A total of two sets of cards are provided, each one meant to generate a different dance. The piece promises to generate 428 million unique combinatorial variations, however, the real amount of unique combinations possible has been calculated in 7.4 sextillion [23]



Figure 2-2: Picture of the tray with cards placed on the corresponding slots. This set is one of the few surviving, stored at the British Library

It is important to note that musical games (dice-related or otherwise) were far less common in the 19th than in 18th century. American composer Leonard Meyer attributes this to a paradigm shift in late 18th century regarding "attitudes and beliefs" in music composition [24]. Instead of a "gradually unfolding underlying process", Meyer claimed that later Romantic composers were inspired by "taste, coherent expression, and propriety". The latter description could be interpreted as a new desire to craft an author's

piece of organic development and authenticity, apparently in contradiction with algorithmic/combinatorial systems of composition.

Evidently, the explosion of aesthetic trends of the 20th and 21st centuries represented the most fertile terrain for sonic pieces that show a variety of game-like elements. Some pieces have a more subtle ludic influence, such as *Rainforest IV* (1973), by David Tudor, in which exploration and curiosity played a major role during the performance of the piece [25]. Tudor invited the audience to engage with performers activating a metaphorical forest of resonating objects placed in a large space, in an informal setting that made it both popular and accessible to the audiences [26]. Researcher Matthew Rogalsky points that Tudor's intent was to bring focus to the "acoustically transformative properties of objects," something he described as a game of bringing together multiple "natures" [27]. Tudor was fond of inviting children to interact with the piece [28], which would often engage with the objects in a playful manner (See Figure 2-3).



Figure 2-3: Children biting a sculpture, ICA, Philadelphia, 1979. (Photo © Kira Perov)

Game influences are not reduced to the dynamics of interaction: John Driscoll, one of the performers/composers participating in the development of the piece, included a

number of video games sounds as the sources being amplified through the objects [27]. It is not a surprising fact, given that Driscoll himself has been heavily involved with video game design, both in the private and academic spheres [29].

2.2 Transition Towards the Digital Age

The increasing availability of interfaces that allowed interaction with the digital world constituted a crucial milestone for gamification as a field, which explains the strong association that the term currently has with digital technology [30]. One of the first examples of such paradigm is the UPIC system, an acronym referring to the Unité Polyagogique Informatique du CEMAMu (the last word being in fact another acronym, for the *Centre d'Études de Mathématique et Automatique Musicales*). The UPIC, devised by Iannis Xenakis, was comprised of a series of devices and interfaces capable of translating images into sound, having as a focal point a drawing tablet to be used as the main input mechanism for the user [31], as shown in Figure 2-4.

In the 1979 interview with Xenakis published in the magazine 'Le Monde de la Musique' the system is compared with a game for young children, suggesting how the users can devote themselves to the composition pouring directly their imagination into paper, without being preoccupied about an instrument (or music theory) as a prerequisite, almost an obstacle for inspiration and creation [32]. Xenakis repeated the comparison of UPIC with a game in later instances, and made special emphasis in the familiarity that children have with new digital interfaces in the context of music [33]. Children were indeed one of the priority demographics invited to test the system in the early demonstrations [34], in an attempt to investigate and demonstrate how accessible the system was to younger audiences.

In regard to Xenakis' reference to UPIC serving as a vehicle for seamless creation using a common skilled activity (aka. drawing), it can be associated with the *Flow* theory in psychology, described as a level of high engagement with an activity, or "intense experiential involvement in moment-to-moment activity" [35]. The flow state is a common goal pursued in video game design, as it provides a "feeling of total immersion, creativity

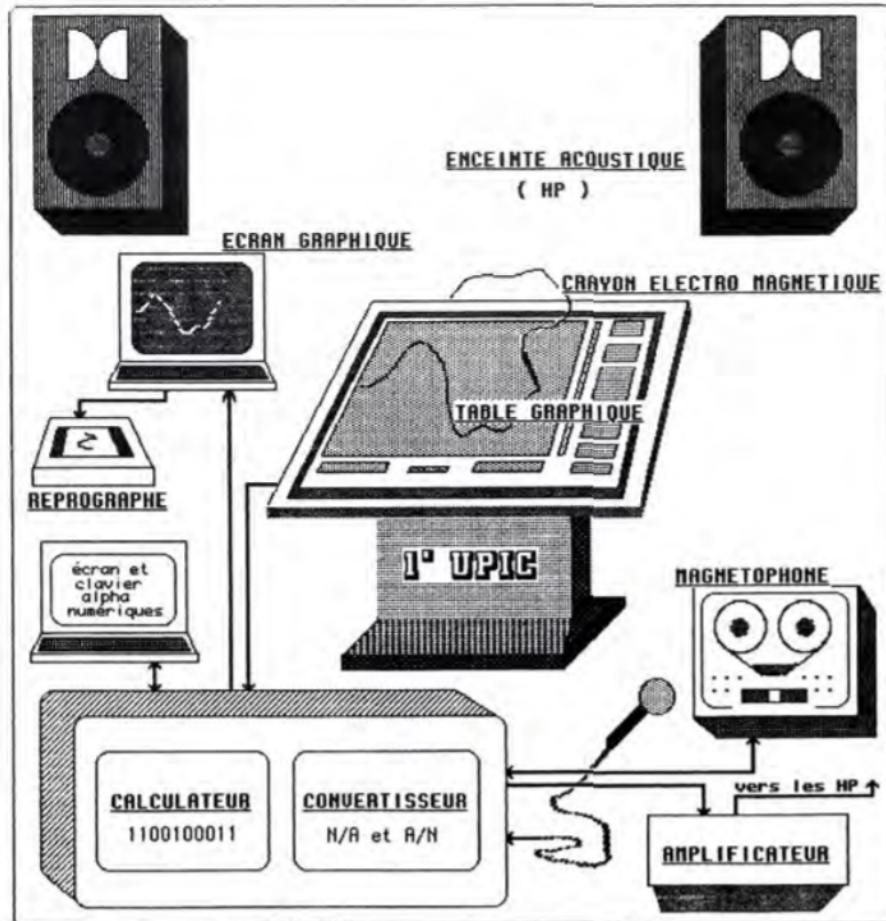


Figure 2-4: UPIC's setup from an internal document of Les Ateliers UPIC: L'UPIC du CEMAMu © CIX Archives)

and involvement where the challenges of the activity and a person's skills to meet them are balanced and high" [36]. Moreover, in the context of gamification, *Flow* has been associated with a state capable of fostering creativity, supporting Xenakis assertions [37].

Another early example of gamified projects in music using the aid of interfaces and computer graphics can be found in the work of American composer David Behrman. A number of his interactive works show clear influence of ludic elements, such as *Sound Fountain* (1982) made with Paul DeMarinis for the Hudson River Museum; *Mbirascope (or Algorithme et Kalimba)*, *A Map of the Known World* (1986-7) and *Keys to Your Music* (1989) [38]. Behrman mentions that the role of computer graphics in those works are crucially linked to the sense of progression and encouragement of exploration, two

pillars of game design [39] [40]. One project, in particular (*Sound Fountain*) goes a step further by including a gamified digital representation of characters playing a variety of percussion instruments. The graphics are displayed in four television sets, which in place are activated by four guitar-like instruments, each of which controls a different variety of functions. Figure 2-5 shows the display being operated by children during an event at the Hudson River Museum.

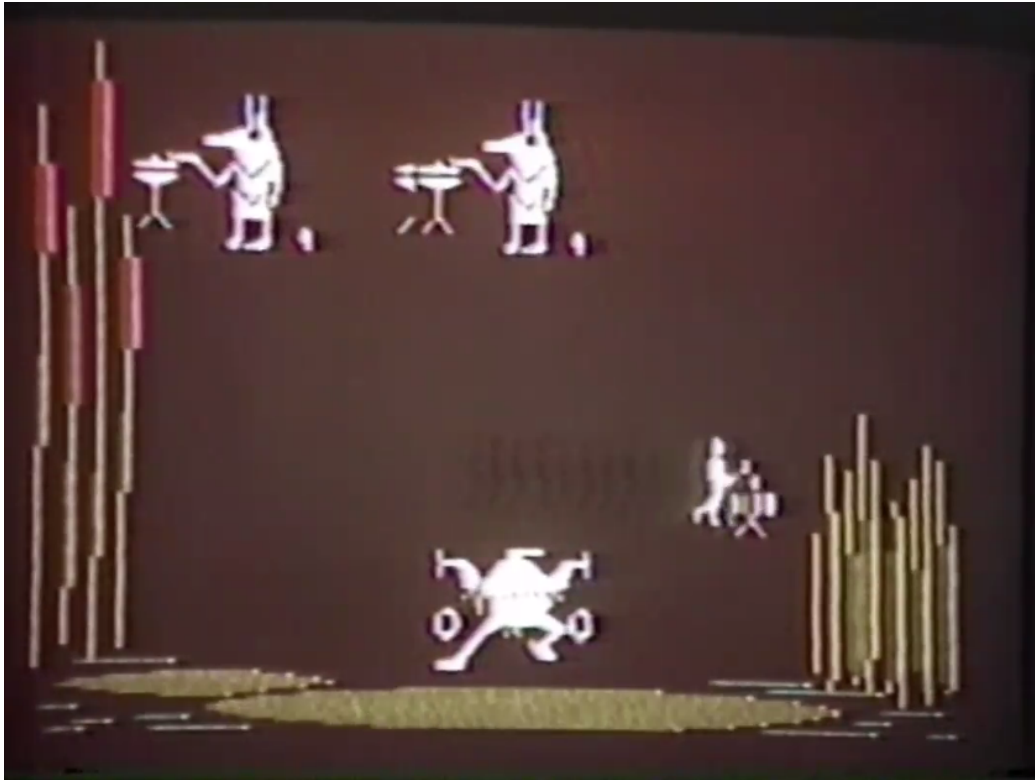


Figure 2-5: Interface of Sound Fountain, taken at the Hudson River Museum. Picture extracted from a colloquium with David Behrman at the University of Virginia, March 19th 2021

The transition towards the digital age of sonic projects of similar scope could only be completed in the late 80's, coinciding with the availability of good quality analog-to-digital and digital-to-analog converters in personal computers. This event "heralded a new era" [41] for computer music, allowing the widespread development of digital experiments with sound. Shortly after, during the 90's, commercial hardware and software became also powerful enough to be able to support three-dimensional graphics operations in both

personal computers and game consoles [42]. These technological developments allowed the creation of fully-fledged interactive projects entirely in a virtual environment, having as a notable example Laurie Anderson's interactive art CD ROM *Puppet Motel*.

Puppet Motel is a project built upon non-linear storytelling that gives agency to the user by allowing navigation through multiple 'rooms', or 'levels' in game design, which are self-contained subsets of physical space governed by a specific interactivity (in the game-design jargon referred as a particular 'gameplay' experience) [43]. The rooms can be accessed via a central 'hub', called 'The Hall of Time' (See figure 2-6), which could be considered a modern interactive equal of the *Promenade* in Mussorgsky's *Pictures of an Exhibition*, which serves as a recurring segment in charge of providing unity and cohesiveness throughout a multi-movement work [44].

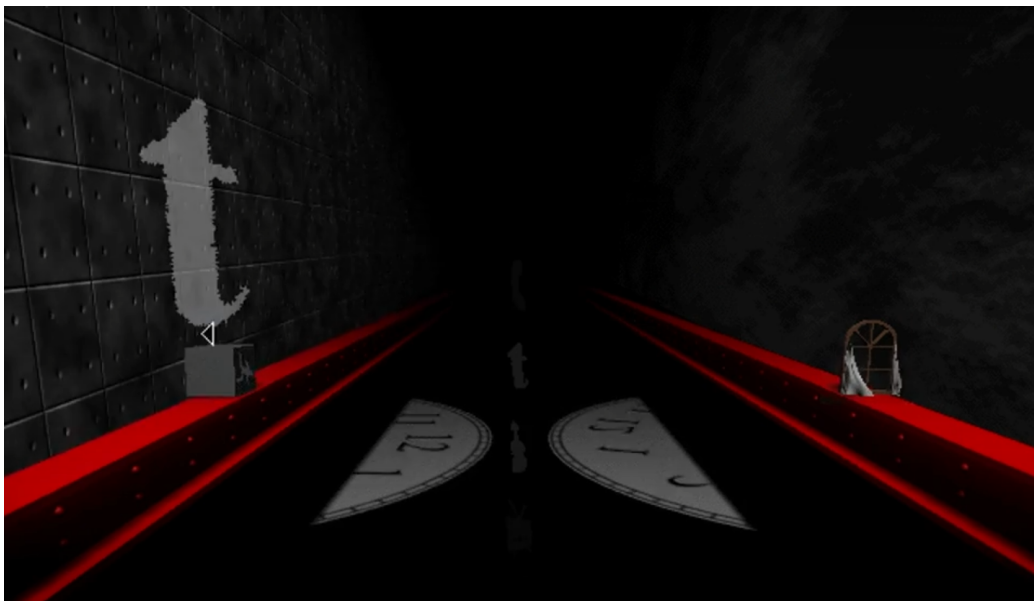


Figure 2-6: The Hall of Time, which serves as a hub for accessing the different rooms in Laurie Anderson's *Puppet Motel*

Throughout the 33 rooms that comprise *Puppet Motel*, the user is faced with architectural structures that defy logic, and interactions that can be divided in two categories: the actions inside the specific room, and the navigation between spaces, which is set as a puzzle in itself [45]. Each room is unique, and there's no unifying aesthetic premise across the rooms other than an overarching general thematic such as loneliness and the nature

human relationships [46].

Puppet Motel is often referred as a game, given how many shared characteristics has with video games at the time, and how it could be structurally considered an artistic gamified version of a regular motel [47]. However, Anderson herself differentiates her work from a video game, particularly when it comes to the incorporation of a personal 'visual language', one with features such as hand-drawn levels and rooms populated by light, sound and her own voice [48]. *Puppet Motel* was a pioneering piece in the sense that would serve as a harbinger for a new generation of 21st century interactive projects occurring in digital contexts that would demonstrate a sophisticated and unique take on the artistic usage of computer graphics, interaction and immersive experiences.

2.3 Modern Applications

Since the year 2010, gamification as a practice has gained an enormous amount of interest in both the private and academic spheres [6]. Studies show the positive impact it has when engaged in activities within fields as diverse as education [49] [50], health [51], innovation [52] and work-related activities [53]. It was also touted as a next generation method for marketing and customer engagement [54].

Specifically in music, one milestone of the application of gamified principles in the early 2010's was 'Rotating Brains / Beating Heart' developed by Pauline Oliveros, Stelarc, Tina Pearson and the Avatar Orchestra in 2010 [55]. *Rotating Brains / Beating Heart* is an interactive remote performance happening with 3d avatars in the Second Life,¹ which was re-purposed as a concert stage where actions, choreography, movements are interaction happen in a synchronous way through the avatar bodies (See Figure 2-7).

Following the path opened by Pauline Oliveros, the projects *She* (2017) and *Croak* (2018) emerged, claimed by the authors (Hans-Peter Gasselseder and Maria Kallionpää) to be the "first-ever interactive virtual reality production of two entire operas" [7]. Moreover, the upcoming project *Climb!VR* is described as both a "virtuoso piano composition for a

¹Second Life is a 3D virtual online world created by Linden Lab, currently with millions of registered users. It is populated by real people from a diversity of countries and allows users to engage in a vast diversity of leisure activities analog to real-life[56]

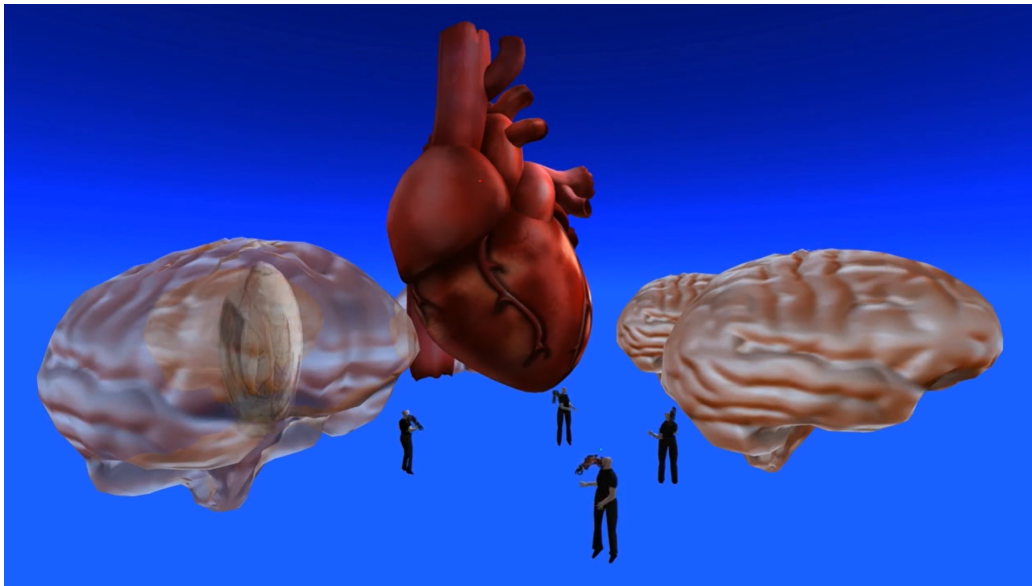


Figure 2-7: Screenshot of "Rotating Brains Beating Heart"

professional pianist and a computer game" that allows participation of the audience via a dedicated smartphone app. Also a project for Virtual Reality is *Dwelling in the Enfolding* (2020) by American composer Matthew Burtner and new media artist Mona Kasra, which uses an interaction triggered by the Oculus Go controller to navigate inhabited glacial landscapes [57]. Other artists, such as composer Joo Won Park, have also made use of existing game peripherals by proposing the controller of the videogame console Playstation 4 as a musical instrument (rather than an interface) in itself, a paradigm which he attempts to validate in pieces such as *PS Quartet No. 1* (2017) and *No. 2* (2019) [58].

A number of projects emerged during COVID-19 lockdown both in experimental and mainstream musical spheres as a direct response for the need of an outlet of music diffusion amid the pandemic. An example of the former was a piece part of the Ars Electronica Festival 2020, in which sound artist Enrique Tomas presented a novel gamified multiplayer online 3d environment featuring interactive sonic artworks, multichannel pieces and live-streamed performances from the physical festival in Linz [59]. The user would take control of a bear-like avatar, and navigate in a boat-like 3d space designed to resemble the Titanic. Tomas selected the pieces displayed from an international call for works, from which close to 40 artists were selected, including my own piece "A Landscape of Events" (See Figure

2-8). The app, funded by the University of Art and Design Linz, was free to download during the days of the festival, and accumulated a total of 369 downloads and 2184 views [60].



Figure 2-8: Screenshot of *Metaverse - Sound Campus* displaying the location of my multichannel piece *A Landscape of Events*

A project of similar scope (also called a Metaverse) was produced the same year by the Lumen Prize organization in collaboration with Leonardo/The International Society for the Arts, Sciences and Technology (Leonardo/ISAST) using the multi-user platform New Art City [61]. The purpose was having a 3d environment that would serve as the interactive virtual exhibition catalog of the artists awarded at the 2020 Lumen Prize. Figure 2-9 shows the lobby, where the user has access to a tutorial, a map of the exhibition, social features and portals to physically teleport to different rooms with artists' pieces. The presence of a lobby is undoubtedly a similarity with *Puppet Motel*, albeit in this case, it serves as a navigational aid rather than a conceptual connecting space. A similar strategy was also used during the Society for Electro-Acoustic Music in the United States (SEAMUS) National Conference 2021, featuring an exhibition done inside the AltspaceVR platform.

In interdisciplinary intermedia projects, the borders between organizations and academic institutions are often blurred. One example is CURAT (Cognitive Surgical Assistance) an initiative of sonic gamification and training software in which the members work



Figure 2-9: Lobby of the virtual edition of the 2020 Lumen Prize. The user is able to navigate freely the space, and select the rooms to be visited

under the supervision of the Bremen Spatial Cognition Center of the University of Bremen in Germany [62]. The games, made in three-dimensional environments, have goals such as following aural queues to find the objective and recognition of objects using sonification techniques. Similarly, the project Keep•It•Human, described as "a social venture at the intersections of videogaming and digital philanthropy" [63] emerged out of the University of Manchester in 2020.

Finally, a mainstream example of gamification as an alternative to a physical concert can be found in the partnership that performing artist Travis Scott had with Epic Games [29], the creators of the Unreal Game Engine². The immersive musical experience, entitled *Astronomical*, happened inside the popular videogame Fortnite, re-purposed as a giant, 3d stage where the audience controlling 3d avatars could navigate a lavish audiovisual spectacle (See Figure 2-10). Forbes magazine reported 27.7 million unique viewers, with 45.8 million views across five days of repeated performances [64]. These numbers demonstrate that the fact that Fortnite is a free-to-play videogame optimized for a large variety of devices, effectively made it a platform for equal access to a large-scale immersive music

²Game engines are comprehensive software frameworks that contain tools to render highly realistic graphics, physics modeling, real-time audio and artificial intelligence support, among many other features [13]. The Unreal Game Engine is one of the most popular choices both for video game development [14] and a vast variety of interactive non-gaming applications [15].

experience. This goes in line with research that points out how enhanced digital efforts of music diffusion impacted positively barriers of social, cultural, and economic nature to arts participation among the general population [1].



Figure 2-10: Screenshot of "Travis Scott and Fortnite Present: Astronomical"

The above examples demonstrate a significant potential for the exploration of gamified immersive 3d environments for musical diffusion. The remarkable turnout of the audience in both experimental and mainstream contexts suggests a high degree of engagement from the audience, indicating a highly positive response. While the interest in gamification in music has increased exponentially in the last few years, there is still a need for further research and creative projects capable of exploiting the multifaceted possibilities of the practice. **My project, Ecstasy / Light / Inertia, aims to build upon that success by going one step further and developing an environment that amalgamates sound, the virtual space, an overarching concept, and the user's interaction into a single, cohesive aesthetic experience.**

Chapter 3

Ecstasy / Light / Inertia

3.1 Concept

As previously mentioned, the interactive experience "Ecstasy / Light / Inertia" utilizes narrative-driven gamification to present a novel method of experiencing music through a three-dimensional (3D) environment. This experience merges real-life 3D scans, Head-Related Transfer Function (HRTF) audio, postmodern philosophy, and gamified design, all of which are created within the Unreal Game Engine. The experience centers around the narrative of a female protagonist named Luz, who embarks on a journey to explore her backstory and current whereabouts. The project aims to establish a new paradigm for translating physical multi-modal artistic experiences into the digital domain, reflect on the role of game engine environments in creating and disseminating new music, and promote accessibility and equality in art circulation. The following sections will delve into the literary and visual influences, narrative devices, and technical aspects that constitute the entirety of this experience. Depending on the user, playing through the experience from start to finish take a minimum of 25 minutes, potentially expanding to over an hour and a half depending on the level of exploration that the user undertakes.

3.1.1 Literary and Aesthetic Influences

This section describes two important sources of inspiration for the overall experience of *Ecstasy / Light / Inertia*: (1) Postmodern philosophy and (2) Nordic Nature and Modernism. It is, however, crucial to establish that the influences detailed herein only pertain to the described contexts. Neither this document nor the creative project it represents seek to delve extensively into these subjects beyond their immediate relevance to the interactive experience.

Postmodern Philosophy

"*Ecstasy/Light/Inertia*" draws substantial inspiration from postmodern philosophy, most notably the perspectives of French philosopher Jean Baudrillard. Baudrillard is celebrated for his conceptualization of "hyperreality" and "simulacra," which have been incorporated as integral philosophical foundations of the project.

Baudrillard's concept of hyperreality explores the growing inability of consciousness in our postmodern age to distinguish reality from simulation. In essence, hyperreality refers to the generation of 'real' from artificial sources, to such an extent that they become more real, or "hyperreal," than the reality they emulate [65]. This is mirrored in "*Ecstasy/Light/Inertia*" by the use of a video game engine to create lifelike visuals scanned from real-world elements.

Moreover, Baudrillard's term "simulacra" is linked closely to this concept. Simulacra are copies that depict things that either had no reality to begin with or that no longer have an original. In the context of "*Ecstasy/Light/Inertia*," the simulacrum is the game environment itself – a digital replica without an original, yet possessing a reality of its own.

The concept of simulacra is not only integral to the technology behind "*Ecstasy/Light/Inertia*", but it is also explicitly mentioned in the script, playing an important role in shaping the narrative journey of Luz, the protagonist. As Luz ventures through the virtual landscape, she encounters fragments and echoes of her past: "I have seen many relics of my past and self in this world. But it is all... fractured. Reflections of memories and dream-

like simulacra, all woven together with the thread of my strange life.” These fragments are not exact replications of her memories, but rather, they are simulacra - distortions, exaggerations, or idealizations of her past that blend reality and fiction, creating a new narrative fabric unique to the game environment.

The world Luz navigates is populated by these dream-like simulacra, with reality and hyperreality converging and diverging in a dynamic dance. This introduces a profound, self-referential layer to her journey. As she notes, “This world is made of me, after all. I must step into its facets, both terrifying and awe-inspiring. They are nothing new. Just me. Just me.” The recognition that these simulacra are extensions of herself leads Luz to explore this world with a sense of obligation and self-discovery, embracing the awe along the way. The narrative thus becomes a process of self-encounter, where Luz must interact with the hyperreal renditions of her memories and experiences, further blurring the lines between the real and the hyperreal, between the self and its simulacra.

Also noteworthy is the incorporation of French writer Paul Virilio’s theories that focus on the rapid succession of events in modern society as a quintessential feature of contemporary life [66]. Virilio’s works are recurrently referenced in the narrative through direct quotations or indirect allusions in music and design choices. The enigmatic language of both Virilio and Baudrillard’s works that allows ample scope for artistic interpretation significantly inspires “Ecstasy/Light/Inertia”.

The project’s title, “Ecstasy / Light / Inertia,” serves as a symbolic representation of the interactions between the user and the virtual environment. These interactions mirror the complex dynamics outlined by Jean Baudrillard in his 1983 work “Fatal Strategies” [67]. Here, Baudrillard speaks of an escalating dominance, or **ecstasy**, that objects and events attain as they transcend their original purpose and take on a life of their own. The resultant power dynamic affects the observer, initiating a transition from initial fascination to eventual indifference, or **inertia**.

In “Ecstasy / Light / Inertia,” the notion of **light**, as conceptualized by Baudrillard, plays a profound role. For Baudrillard, light signifies the singularity of an object or event, representing the self-contained significance of the same. His portrayal of light as being “harnessed and engulfed by its source,” leading to a “brutal involution of time into the

event itself," results in an "event without precedent and without consequences - the pure event" [67]. This notion finds reflection in the immersive experience the user undergoes within the virtual realm of "Ecstasy / Light / Inertia".

The participant, in engaging with the gamified artwork, is pulled into a self-contained experience - a "pure event," embodying the transformative power of light as conceptualized by Baudrillard. Yet, the significance of light extends beyond the theoretical into the aesthetic sphere, bridging to the project's second salient influence, which we will discuss in the following section: the impact of light as perceived in the Nordic natural landscape and within the realm of architectural modernism.

Nordic Nature and Modernism

The unique geographical positioning of the Nordic countries, with sunless winters and endless summer days, has markedly shaped Nordic modernist architecture. According to Finnish architect Juhani Pallasmaa, Nordic architecture traditionally exudes a sensitivity to light, with an emotional dimension being ascribed to it in modernism [68]. As expressed by Norwegian historian Christian Norgberg-Schulz: "It is precisely light that defines the Nordic worlds and fuses all things with mood. (...) In the North, we occupy a world of moods, of shifting nuances of never-resting forces, even when light is withdrawn and filtered through an overcast sky" [69].

This understanding of light is represented in "Ecstasy / Light / Inertia" in several ways: the inclusion of the term in the title, the name of the main character (Luz, which means 'light' in Spanish), post-production visual effects and the environmental art design throughout the experience (influenced almost exclusively on Northern European modernism and nature). Additionally, the concept of light is interwoven organically and in a recurrent manner with the narrative, the latter serving as the main connecting bridge between the multiple influences, and the chief method for progression's encouragement throughout the experience.

3.1.2 Role of Narrative

Gamified projects with compelling narratives can be an ideal tool to move from a passive practice of content consumption into an active, focused, interactive engagement inside a virtually recreated world [70]. While there is an ongoing discussion in the community regarding the roles of narrative vs. gameplay in video games [71], both seem to produce emotional responses from players, coined as “Game Emotions” and “Narrative Emotions,” respectively [72]. While the latter is a non-exclusive feature of video games, for “Ecstasy/Light/Inertia,” an overarching narrative arc was chosen as the main tool for engagement and progression encouragement. This allows players to explore the sonic content in an organic, focused way (i.e., while unfolding the plot) as opposed to passive music listening done in a dispersed manner.



Figure 3-1: Luz, the lead character of “Ecstasy / Light / Inertia”, sitting in her apartment, while a voice-over guides the player through the characters’ past

The player is presented with a non-linear narrative surrounding “Luz,” a female Asian-American Buffalo-native character modeled using the highly realistic Epic Games’ Metahuman project [73]. The story switches between two different narrative lines in different periods of time: (1) Luz’s backstory in her apartment at an unspecified moment in the past and (2) Luz’s current whereabouts (playable levels) occurring in a remote Nordic snow-covered area where she suddenly and inexplicably awakens. The latter reveals the

main objective of the experience mediated by the narrative: uncovering the real nature of the place while explaining why and how the sounds and objects around are tied to her previous life events. The aim is to have the complex sonic soundscape accompanying the narrative in a non-intrusive manner, unfolding organically in the background. The music, however, is often referenced in the script as a recurrent anchor point.



Figure 3-2: Luz in front of a sphere, which doubles as a localized sonic source

In the process of crafting "Ecstasy / Light / Inertia", a comprehensive backstory was created for the game's protagonist, Luz. This was not intended to be directly incorporated into the game, but to serve as a vital underpinning, shaping Luz's reactions to events and maintaining consistency in her character portrayal throughout the game's narrative. The document explores Luz's past experiences, relationships, and personal quirks that make her the complex character she is in the game.

The comprehensive character study outlines Luz's life trajectory, detailing her origins, her family history, significant relationships, and key life events that have formed her. It encompasses aspects of Luz's life that contribute to her personality and how she interacts with the world around her. This includes her love for music and reading, her experiences with hardship and transient living, and her deeply embedded creative inclinations.

Additionally, the document highlights important aspects of Luz's character, such as her empathetic nature, her struggle with her temper, and her love for adventure. It outlines her relationships with key figures in her life and how these relationships have shaped her

worldview and her reactions to the experiences within the game. These include her father and his profound influence on her musical tastes and her mother and their complicated relationship.

Even though not all aspects of Luz's backstory made it into the game, this detailed document is instrumental in grounding her character and understanding her responses to the game's events. It helped infuse the game with depth, adding layers to the protagonist's actions and choices, making the character of Luz more compelling and believable. This attention to Luz's background is reflective of the meticulous detail and thoughtfulness invested in the crafting of "Ecstasy / Light / Inertia".

Finally, it is worth mentioning that the narrative style of "Ecstasy/Light/Inertia" was inspired by Cormac McCarthy's novel "The Road." This style is characterized by spare, minimalist prose with a focus on sensory detail and evocative imagery that conveys a sense of desolation and isolation. The narrative is often nonlinear with jumps in time and perspective, creating a fragmented and disorienting effect. The style emphasizes the emotional impact of the story rather than the details of the plot, attempting to create a haunting and introspective atmosphere.

3.1.3 Audio Technology

Two types of audio behavior can be encountered in the experience: (1) Regular stereo sound and (2) localized (aka. spatial) audio. The latter uses a technology called *audio path-tracing* for all of the sources placed in the three-dimensional space. Inspired by light ray tracing¹, audio path-tracing allows real-time modeling of the behavior that sound takes when propagated over real space and submitted to a number of physical phenomena that modify the way it's perceived. The algorithm used in "Ecstasy / Light / Inertia" is provided by Nvidia VRWorks Audio [74], placing particular attention on the modeling of sound propagation (sound bouncing in direct and indirect paths), occlusion (objects/structures

¹Ray tracing is a computer graphics technique used for rendering realistic images by simulating the behavior of light in a virtual environment. The technique involves tracing the path of light rays as they interact with objects in the scene, taking into account factors such as reflection, refraction, and absorption. By tracing the path of light rays from the virtual camera through each pixel of the image plane, ray tracing can produce highly realistic images with accurate lighting and shadows, as well as complex effects such as caustics and global illumination.

placed in between the source and the listener), directionality (accurate localization of sonic sources) and attenuation (variations on the perceived volume from the source based on distance). This specific technology was chosen as the fidelity of the localization of the sonic sources in the three-dimensional greatly contributes to the feeling of immersion.

3.2 Narrative Structure

The narrative design of this story adheres to the classic 'hero's journey' archetype ², casting Luz as the 'hero'. In the context of "Ecstasy/Light/Inertia," the hero's journey unfolds across five segments: a Prologue, three Chapters, and an Epilogue. Each segment presents unique challenges and furthers Luz's character development, as detailed in the following sections.

- Prologue: The narrative commences with Luz in her apartment, accompanied by a musical backdrop. As the music gradually fades, Luz embarks on a narration. She recounts a nostalgic memory of dancing with her father to the tune of "Rain Song" by Led Zeppelin, against the backdrop of a setting sun. A sudden commotion in the kitchen interrupts the memory. The scene concludes with a close-up of a guitar pick on the coffee table, accompanied by a voice-over musing, "A memory is a shimmering drop of nostalgic sunshine, the torch we all must hold". The project's title, "Ecstasy/Light/Inertia," appears, concluding the Prologue.
- Chapter 1: Luz awakens amidst a foreign, snow-clad landscape, hemmed in by rocky formations. A floating sphere guides her to an ice cave, the entrance to which is secured by a puzzle. Inside the cave, she encounters clusters of sound sources, symbolized by additional spheres, and an altar housing the guitar pick from the Prologue, previously owned by Led Zeppelin's Jimmy Page and then by her father.

²The "hero's journey" is a narrative pattern identified by mythologist Joseph Campbell in his book "The Hero with a Thousand Faces" [75]. This pattern, characteristic of various mythologies, religions, and storytelling traditions, encapsulates a protagonist's quest, replete with trials and tribulations, culminating in a transformative achievement or realization. This narrative format resonates with audiences as it mirrors the universal human cycle of struggle, growth, and transformation, and hence is prevalently employed across literature, cinema, and other storytelling mediums.

A flashback illuminates the guitar pick's significance to Luz, revealing her father's recent demise. At the cave's end, Luz contemplates the uncanny parallels between this world and her life.

- Chapter 2: Luz navigates a corridor leading to an imposing, church-like edifice. She reminisces about her global travels and her father's Northern Lights tales. Reaching the staircase's summit, Luz finds the church's door locked. She retrieves her father's guitar pick, which doubles as a key, unlocks the door, and steps into the church, which is bathed in dazzling white light. The chapter culminates as she steps into the building, the screen dissolving into white.
- Chapter 3: Luz embarks on an exploration of a mystifying building filled with four portals. Each portal serves as a gateway to distinct landscapes, triggering a specific memory from Luz's past. These memories are intrinsically associated with a unique musical composition and a destination, such as a Chinese landscape, a Japanese museum, and the icy expanses of Finland. Conversely, the fourth portal ushers Luz into a stark, lightless void, an area seemingly devoid of any tangible memories. After traversing all the portals, an underground passage reveals itself. Luz ventures further into the depths below, musing on her purpose and sensing the imminent culmination of her journey.
- Epilogue: Luz finds herself in a grand hall, faced with an enormous, semi-transparent sphere that communicates with her in a synthetic voice. The sphere presents her with a choice: to "sever all existing bonds for a brief glimpse of the truth" or to "maintain the aural connection to her past" (the guitar pick). Luz's decision at this juncture defines the narrative's resolution, leading to one of two possible endings based on the player's choice. This section marks the narrative's apex, as Luz is compelled to make a momentous decision that will irrevocably shape her destiny.

The narrative design of this story was meticulously planned so that each segment naturally builds upon the one before, facilitating a sense of forward momentum and progression. The incorporation of puzzles and surreal visuals, coupled with philosophical undertones,

imbues the narrative with a depth and intricacy that maintains player engagement. These elements are seamlessly intertwined with the diverse musical compositions organically embedded within the experience. Luz's character development is comprehensively realized across the narrative, with each segment shedding light on a different facet of her personality and growth.

3.2.1 Thematic Analysis

In order to gain deeper insights into Luz's narrative arc, I performed a thematic analysis of the interactive script (appended), utilizing the methodology formulated by Braun and Clarke [76]. This framework facilitates "the identification, analysis, and interpretation of meaningful patterns ('themes') within qualitative data."

To ensure an impartial extraction of themes and minimize my personal biases as an artist, I employed ChatGPT-4, an advanced language model developed by OpenAI. By applying this model to the analysis, I was able to generate an interpretation free of personal presuppositions, which could otherwise influence the thematic extraction process. Consequently, the following recurring primary themes were discerned:

- Identity and self-discovery: Luz embarks on a mission to unearth the truth about her past and herself. The narrative prompts an exploration of identity's essence and the integral role memories play in crafting one's sense of self.
- Sacrifice and loss: Both conclusions of the story necessitate Luz relinquishing something significant in return for knowledge or solace. This underscores the theme of sacrifice, hinting at its necessity for attaining certain objectives. Furthermore, the narrative probes the concept that loss can serve as an impetus for transformation and personal growth.
- Light and darkness: Metaphors of light and darkness pervade the narrative, characterizing Luz's journey. These themes intertwine with the concepts of self-discovery and growth. Light symbolizes wisdom, comprehension, and optimism, while darkness epitomizes ignorance, apprehension, and ambiguity. The varied endings provide

distinct viewpoints on the emotional implications of light and darkness in human existence.

- **Music and memory:** Luz's memories are frequently stimulated by music, with her guitar pick embodying her link to the past. The narrative accentuates the capacity of aural stimuli to stir emotions and recall memories, implying that a profound connection to music can mold an individual's identity.
- **Choice and Agency:** The narrative emphasizes the crucial role of choice and agency in shaping individual trajectories. This is exemplified in the narrative's interactions and diverging conclusions. Additionally, the story bestows agency upon the user to steer Luz through her journey, thereby reinforcing this theme.

3.3 Level design, interactions, and musical content

This portion describes each section of *Ecstasy / Light / Inertia* parsing them into two categories: (1) Level Design, which includes aesthetic choices, visual factors, interactions, and related elements, and (2) Musical Content, detailing the auditory facets. It is crucial to note that the majority of the musical pieces utilized are existing standalone compositions of my authorship created since I joined the Department of Music at the University of Virginia. As these pieces are integrated into the narrative as layers, this document does not delve into a detailed analysis of them. Instead, it describes the role they play within the holistic experience.

3.3.1 Prologue

Level Design

The initial chapter of "*Ecstasy/Light/Inertia*" provides an introduction to Luz, the protagonist, while setting the tone and underlying themes of the project. This chapter predominantly features non-interactive cinematic content, characterized by slow camera pans and close shots of Luz, projecting a sense of emotional intimacy. An example of this is illustrated in Figure 3-3.



Figure 3-3: Screenshot from the Prologue, showing a close shot of Luz

The theme central to this chapter is nostalgia and the power held by memories. A segment of it recollects Luz's memory of dancing with her father—a moment of unadulterated joy, punctuated by a sudden, disruptive noise, which serves as a reminder of the fleeting nature of such instances. This chapter implies that memories, particularly those associated with music, can act as a comforting source of nostalgia, offering a sense of continuity and connection to one's past. The Prologue alludes to "Rain Song" by Led Zeppelin, a song that triggers Luz's memories and exemplifies the capacity of music to evoke potent emotions and recollections. Furthermore, the use of a record player to play the music underscores the significance of physical media and the connection between music and tangible objects.

To visually convey this concept, I employed post-production effects such as convolution bloom, warm color correction, and lens flares. Convolution bloom is a visual effect that emulates the behavior of light as it passes through a camera lens, imparting an ethereal, dreamlike glow. The warm color correction imparts a nostalgic, sentimental touch to the visuals, eliciting a sense of warmth and comfort. Lens flares, produced by light reflecting off the camera lens, further accentuate the dreamy, nostalgic atmosphere of the visuals.

The aim of this chapter is to introduce the themes and set the tone for the ensuing narrative. The utilization of evocative language and vibrant imagery instills a sense of nostalgia, preparing the ground for a deep exploration of memory and music. In summary,

this chapter serves as an introduction to the world of the game and its characters while offering a glimpse into the emotional journey that awaits the players.

Music Content

The prologue integrates two key auditory elements: a background musical piece and sound design that aligns with the narrative.

- **Background:** The background music throughout the prologue is a programmatic ³ single-form composition consisting of 11 layers of digital alterations of an original guitar recording. This recording features the opening chords of "The Rain Song" by Led Zeppelin, as shown in Fig 3-4. An improvised piano melody overlays these layers. The layers are spectrally complementary—long-duration drones sharply filtered to occupy different frequency ranges—creating a complex texture. The primary digital effect applied to the source material is Granulator II, a Max4Live synthesizer [77], which employs flexible quasi-synchronous granular synthesis. The layers are then combined with a range of delay, reverb, and comb-filter effects to foster the sensation of a unified, monolithic 'drone' rather than disparate tracks.
- **Narrative-aligned Sound Design:** The prologue employs sound design that aligns with and reinforces the narrative, thus creating an immersive experience for the players. The use of foley ⁴ allows the audience to imagine the physical actions and details of the scene. Instead of visually portraying Luz's memory of dancing with her father as a young girl, the scene unfolds entirely through sound. The camera pans across an empty living room, enabling the audience to visualize the physical actions based on the auditory cues. Similarly, the abrupt disruptive event that occurs in the narrative is represented by a sharp, loud, complex sound of indeterminate origin,

³Programmatic music, in the context of supporting a visual narrative, refers to a musical composition crafted to accompany visual media such as film, TV, or video games. It is designed to heighten the emotional and immersive experiences of the viewer, enhancing the visual narrative by supplying a harmonious auditory depiction of the characters, events, and emotions portrayed on screen.

⁴"Foley" refers to the process of creating and recording sound effects that synchronize with on-screen movements and actions in film, television, and other media. It includes sounds such as footsteps, rustling clothing, and handling objects, enhancing the immersive quality and realism of a visual production.

The Rain Song (Intro)
Music by Jimmy Page & Robert Plant

All Gtrs.
 6 = D 3 = G
 5 = G 2 = C
 4 = C 1 = D

Slow ♩ = 74

Figure 3-4: Transcription for the guitar chords used as a source for digital transformation during the Prologue’s background piece

leaving the nature and implications of the disruption to the audience’s interpretation in the context of Luz’s story.

3.3.2 Chapter 1

Level Design

Chapter one introduces Luz’s awakening in a mysterious, barren landscape of snow and towering rock formations. The player, controlling Luz, navigates through a labyrinthine ice cave characterized by elements found in Nordic nature. Luz’s guide is a translucent sphere that responds with disconcerting sounds when spoken to, as depicted in Figure 3-5. The sphere leads Luz towards a door to the cave, the opening of which requires puzzle-solving.

The puzzle stirs Luz’s memory of philosopher Paul Virilio, whose work she was introduced to by her father. She recalls Virilio’s book "A Landscape of Events"⁵ and finds

⁵"A Landscape of Events" [66] is a book by French philosopher and cultural theorist Paul Virilio. Virilio discusses the influence of speed and technology on human experience, particularly concerning urban environments. He argues that technological and transportation advancements have compressed time and space, leading to the erosion of traditional cultural and social values. The book suggests that this shift towards speed and mobility has given rise to a new urban landscape, where the city is perceived not as a static entity, but as a dynamic, ever-changing environment.



Figure 3-5: Luz encounter with the first floating sphere

a link between the book's themes and the fast-moving sounds surrounding her. As Luz delves deeper into the cave, she encounters more spheres and contemplates the existence of related entities and formations.

During the course of her journey, Luz stumbles upon the guitar pick from the Prologue perched atop a pillar. The unexpected discovery prompts a non-interactive cinematic flashback to the Prologue's apartment scene, where Luz reveals the guitar pick's significance. After this revelation, Luz proceeds through the cave, ultimately encountering a second puzzle, solving which concludes Chapter one.

The inclusion of classic slide puzzles in this chapter serves a dual purpose. Beyond mere entertainment, they gamify progression processes, instilling a sense of accomplishment, engagement, and motivation. The player's problem-solving skills are put to the test, transforming a mundane task into a stimulating game. The slide puzzles, comprising a grid of squares with a single empty space, require strategic planning and patience, thereby stimulating cognitive and emotional engagement. Moreover, these puzzles extend the player's stay in areas featuring site-specific music, allowing for an extended auditory experience.

The second puzzle features a picture of American sculptor Louise Nevelson, as shown in Figure 3-6. Known for her monumental wooden assemblages, Nevelson created abstract three-dimensional structures by combining disparate found objects like furniture pieces.

This combinatorial approach to sculpture inspired the design of the ice cave level. Upon solving the second puzzle, Luz reflects on the parallels between Nevelson’s work, the ice cave, and her own life.



Figure 3-6: Example of the last puzzle

Music Content

The narrative and its accompanying sounds unravel progressively as the player traverses the icy landscape. One of the first instances of this occurs when the player encounters a puzzle surrounded by eight spheres—or speakers—laid out in a double-diamond arrangement. At the center of this configuration, a sphere continuously plays an acousmatic⁶ piece titled “Landscape of Events”. An overhead view of this set-up can be seen in Figure 3-7.

“Landscape of Events”, heavily inspired by Paul Virilio’s eponymous book, explores the distortion of time perception due to the relentless acceleration of life depicted in modern media. It manifests as a collage of disjointed processed field recordings, arranged across seven equally timed episodes. The piece, which runs for 4:42 minutes, debuted at the XI International Symposium on Soundscape on October 3, 2019, in Lecce, Italy, an event hosted by the FKL-Forum Klanglandschaft. The full piece can be listened to here: https://www.jcvasquez.com/portfolio_page/a-landscape-of-events/

⁶Acousmatic music is a form of electroacoustic music that obscures the source of the sound, prompting listeners to focus solely on the auditory experience [78]. Typically performed in a concert setting, acousmatic music leverages multi-channel speaker systems to produce an immersive soundscape that emphasizes the sensory qualities of sound over visible performances.



Figure 3-7: Aerial view of the puzzle surrounded by 8 sound-emitting spheres in a double-diamond arrangement

Upon entering the cave, the player encounters a generative multi-channel installation that permeates the entire maze. Certain areas within the maze house clusters of spheres emitting stereo sound from their specific 3D spatial locations. The count of spheres in each group gradually varies in accordance with the Lucas series⁷, as depicted in Figure 3-8. Alongside the sound, each sphere features a ring of light that responds in real-time to the pitches in the surrounding audio output via a simple visualization system of an spectral analysis. An example of this can be seen in Figure 3-9.

Within the areas of sphere concentration, each sound source randomly selects a track from a pool of 17 pre-recorded layers, which are primarily improvisational. Each sphere can generate stereo sound via two distinct channels, resulting in a total of 28 stereo sources or 56 individual channels. The sound layers typically maintain consistent textures, with pitch alterations occurring over time. The generative system also integrates four fully realized electroacoustic music pieces as possible layers. Detailed descriptions of each layer can be found in Figures 3-10 and 3-11.

The four comprehensive pieces integrated into the generative system are not designed

⁷The Lucas series, named after 19th-century French mathematician Édouard Lucas, is a mathematical sequence akin to the Fibonacci sequence. It starts with 2 and 1, with each subsequent number being the sum of the two preceding ones. The series reads as follows: 2, 1, 3, 4, 7, 11, 18, 29, 47, 76, 123, and so on.

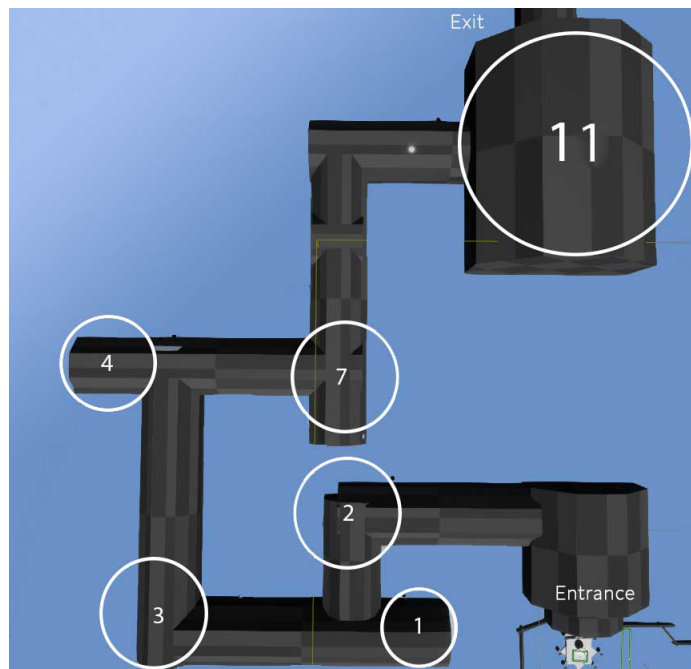


Figure 3-8: Overview on the grouping points for spheres, signaling also the number of stereo sources playing simultaneously



Figure 3-9: Screenshot of Luz encountering a group of spheres

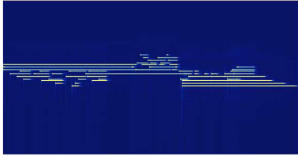
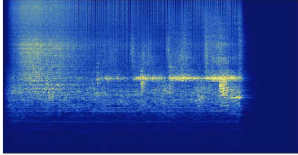


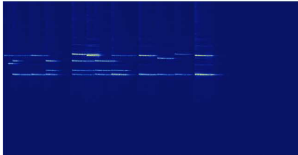
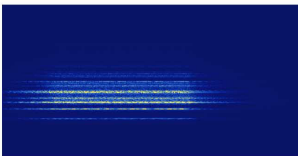
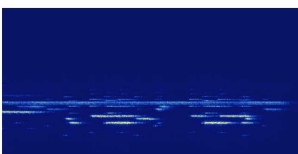
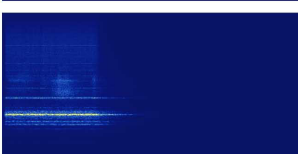
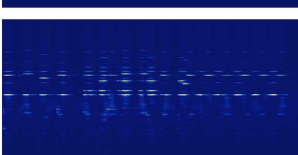
Name	Spectrogram (Time-scaled)	Length (MM:SS)	Description
1.wav		03:09	Improvisation over a diatonic cluster, with a persistent C9 Major chord in the background.
2.wav		00:32	Single-gesture layer. Field recording of wind, heavily distorted at first and then significantly cleaner. Timbral function.
3_pedesis.wav		02:00	Piece's name: Pedesis, for two flutes. See analysis in the text.
4.wav		03:08	Improvisation over a diatonic cluster, focusing on large grouping of notes connected by passing ones
5.wav		02:06	Orchestration of an Am9 chord with sine waves. Slow pace.
6.wav		00:28	Drone-like texture with a single chord: C7 with B as the bass.
7.wav		01:21	Drone featuring a diatonic cluster (E-A), with a pedal point on C. Slow pad.
8.wav		00:36	Long pad combining a sustained D with a subtle oscillating white noise
9.wav		02:16	F13 chord, with a constant harmonic pedal on A. Periodic slow attacks on a high frequency range, featuring different intervals of the chord.

Figure 3-10: Description of the layers, including duration and an individual spectrogram scaled to fit the table. Page 1 of 2.

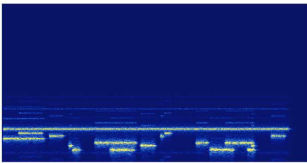
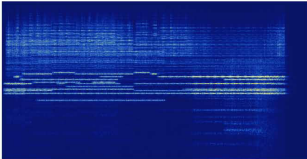
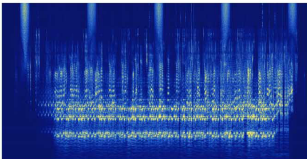
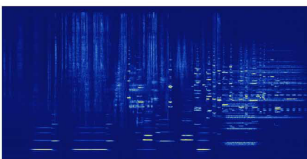
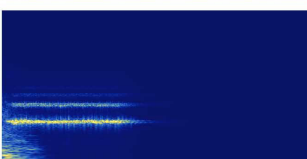
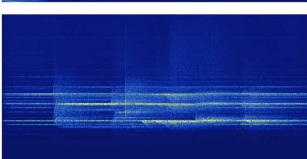


Name	Spectrogram (Time-scaled)	Length (MM:SS)	Description
10.wav		02:40	Low-frequency content with long pitches below 100 Hz. Perceived as a timbral gesture rather than specific pedal points.
11.wav		02:53	Improvisation with diatonic pitches between the 300 Hz and 1000 Hz range. The upper arpeggiator provides a constant shimmering rhythm
12_tulog.wav		01:32	Piece's name: The Unbearable Lightness of Glitch. Acousmatic. See analysis in the text.
13_convection.wav		08:00	Piece's name: Convection, for reed quintet. See analysis in the text.
14.wav		00:32	Single percussive gesture with high levels of energy on the low-frequency range. Long decay.
15.wav		01:27	Drone with a pedal point in C, combined with subtle noise oscillators. Sporadic gestures by manipulating the delay time of a delay effect.
16_coinula.wav		02:57	Piece's name: Coinula Biore, for flute and electronics. See analysis in the text.
17.wav		03:07	Melodic diatonic improvisation with sharp attacks and long decay, forming eventual clusters.

Figure 3-11: Description of the layers, including duration and an individual spectrogram scaled to fit the table. Page 2 of 2.

to function as standalone compositions. Rather, they are reconfigured as additional layers, introducing considerable complexity into the generative composition system. The descriptions of these pieces are as follows:

- "Convection" is an 8-minute composition for reed quintet and electronics. This piece transitions from an initial state of white noise to a concluding form with a single sustained pitch, simulating a macroscopic transference of sonic elements. Written specifically for the Splinter Reeds ensemble, it simulates a large-scale cross-synthesis between two types of timbral content — (1) air noises and key clicks, and (2) the sustained pitch content. "Convection" first debuted on February 1st, 2019, at Old Cabell Hall of the University of Virginia. A video can be seen here: <https://youtu.be/rW3tlhzdwnM>
- "The Unbearable Lightness of Glitch, No. 1" is an acousmatic miniature formed using recordings of poet Pablo Neruda reading his own love poems. The piece, dominated by the "Glitch" aesthetic,⁸ illustrates how digital new media can reshape, distort, and repurpose poetry, language, and our general perception of cultural stimuli and emotions. The piece, which lasts 1:35 minutes, premiered on December 7th, 2022 at the 18th International WOCMAT (Workshop on Computer Music and Audio Technology) Conference. A video of the piece can be found here: <https://youtu.be/B8Fb4HKnB3E>
- "Pedesis" is a 2-minute piece for two flutes. "Pedesis", or Brownian motion, denotes the random movement of tiny particles suspended in a fluid medium. The piece uses approximate rhythms and specific articulations to emulate aleatory "collisions" of the sound "molecules" within the piece. It consists of 4 episodes of activity, employing extensive use of trills, flutter tongue, rapid short semitones, and key clicks. A recording of the piece, along with the score, is available here: <https://youtu.be/lkfpPraDnGo>

⁸The *glitch aesthetic* refers to a style in digital art and music that embraces and deliberately incorporates errors, distortions, and anomalies that are typically avoided in most production contexts. These "glitches" are often the result of manipulating digital data or hardware in unexpected ways, creating unique and unpredictable audio-visual effects.

- "Coinula Biore" is a composition for flute and electronics that delves into the potential of musical quotation and appropriation within electroacoustic music. This piece reinterprets Luciano Berio's Sequenza VIII for solo violin, transforming it into a flute composition. The title, "Coinula Biore", is a rearrangement of "Luciano Berio", echoing the concept of repurposing in the composition. The piece, lasting 3 minutes and 20 seconds, flows seamlessly through three texturally similar parts. It premiered at the National Conference of the Society of Electroacoustic Music of the United States, hosted by the Berklee College of Music. You can watch the performance here: <https://youtu.be/pHVEC7gdXv0>

3.3.3 Chapter 2

Chapter 2's level design in the game is imbued with symbolism, serving to underscore themes of personal journey and self-discovery. The integration of clues from the protagonist Luz's personal history adds depth to the gameplay, and the ambiance is further enriched with the incorporation of music, atmospheric effects, and cutscenes, cultivating an environment of introspection and spirituality.

Level Design

The narrative arc of this level traces Luz's ascent towards a towering church, resembling the Hallgrímskirkja in Iceland. The church signifies the abstract concept of spiritual enlightenment, untethered from any specific religious denomination. This chapter serves as a brief transitional phase, bridging the gap between the ice cave of the previous segment and the church interior that will be encountered in Chapter 3. Figure 3-12 presents a screenshot of this level.

The opening cinematic sequence provides glimpses into Luz's personal history and travel experiences, underlining the significant impact of her past on her current journey. This connection is emphasized through subtle symbolism, such as the use of a guitar pick to unlock the church door, a nod to her father's influential role in her life. The Northern Lights in the backdrop are a potent symbol of her lineage and the continued influence of



Figure 3-12: Overview of the starting point of Chapter 2, showing the church, the northern lights, and heavy snow

her ancestors.

As Luz approaches the church, her attention is drawn to a group of spheres hovering in front of the edifice. These spheres symbolize life's cyclical nature and the inexorable passage of time, portraying a parallel with Luz's own search for meaning and direction. Access to the church is facilitated by the player's interaction with a pillar. The guitar pick is used as a key, triggering the activation of the doors. The level culminates in a cinematic sequence where the camera transitions through the church doorway.

Musical Content

During the initial cinematic, sound design is again used to enhance the narrative. The use of sound effects such as fragments from field recordings from Japan, Colombia, Finland, and China adds to the immersion for each memory as Luz narrates her thoughts about travels to these countries, while also serving as an anticipatory gesture for further sonic development of each one of those destinations in the following chapter.

The background music of the level is a texture generated using "Swarmalators T" in Ableton Live, a device developed by sound artist Dillon Bastan. This music is designed to provide an audio representation of a group of spheres congregating near the church present in the level. "Swarmalators T" is a Max for Live synthesizer which employs a

swarm of oscillators (Swarmalators) that move in a 2D space and are also synchronized.

Each oscillator, or 'swarmalator', is depicted as a colored circle on the main display, where every independent sample playback is represented by a single 'swarmalator'. The device adopts principles similar to a flock algorithm⁹, which dictates how the spheres congregate in 3D space. In this case, however, these principles control the behavior of the sonic 'swarmalators', yielding an auditory parallel to the visually flocking spheres.

The musical piece loops continuously, merging seamlessly with stereo background field recordings of wind. This accounts for the potential indefinite period of player exploration within this level.

3.3.4 Chapter 3

Level Design

Chapter 3 deepens the introspective narrative established in the previous chapters, immersing the user more profoundly into Luz's memories and internal reflections.

The player navigates a hub area, architecturally inspired by the Museum of Contemporary Art Kiasma in Finland. This space features four distinct portals, each situated atop a pillar and represented by a static sphere. These portals trigger Luz's recollections associated with each space, and can be explored in any order. A prompt appears when Luz nears a pillar, indicating the user to press "E" for teleportation to the corresponding environment. A visual representation of the hub along with snapshots of each space is provided in Figure 3-13.

One portal leads to a China-inspired environment where Luz reminisces about her experiences amidst the rural landscapes of China. She describes these settings as "starkly beautiful", in stark contrast to the "rainbow-hued technological wonderlands" of contemporary cities. This dichotomy symbolizes Luz's longing for simplicity, as portrayed by the rural backdrop. This minimalist environment is modeled after a real-life Gazebo located

⁹Flock algorithms are a class of algorithms used in computer science to simulate the behavior of a group of entities, such as birds, fish, or even particles. They operate on the premise that the collective behavior of a group can be modeled by a set of simple rules governing the behavior of each individual member. By applying these rules to each individual in the group, the algorithm can simulate the collective behavior of the group as a whole.

at the edge of Xi Lake in Hangzhou, China.

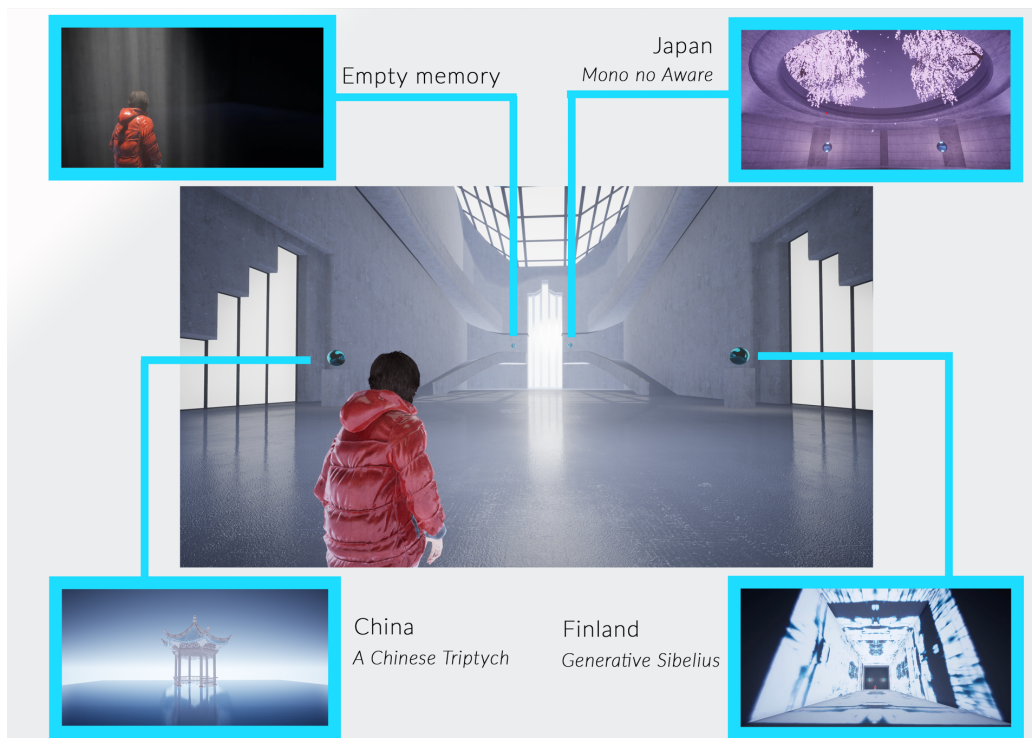


Figure 3-13: Overview of the hub with screen captures of each one of the four possible destinations inside the portals.

Another portal transitions the player to a Japan-inspired space, where Luz recollects a museum exhibit featuring a reflective pool. This memory resonates deeply with Luz, creating a "shattered windowpane" reality that juxtaposes memories and present occurrences. This space is designed with inspiration from a room in the Naoshima Contemporary Art Museum in Japan.

The third portal teleports the player to a Finland-inspired environment, where Luz recounts a moving experience of listening to a choir sing Jean Sibelius' "Finlandia" in Helsinki. Described as a moment when Luz's "fire burst again to flame," this memory signifies Luz finding solace and hope in music.

The final portal introduces the player to a dark, mist-filled space, emblematic of a memory Luz struggles to remember. Her senses capture the "scent of the flora and the texture of soft jungle soil underfoot", yet the visual details elude her in this dimly lit environment, highlighted only by a lone spotlight on Luz. The term "locked tight"

suggests a conscious effort to repress this memory, hinting at an underlying emotional turmoil not further explored in the narrative. This area's design purposefully confounds the player with a lack of visual guidance.

After engaging with all four portals, an underground passage reveals itself. As Luz ventures towards the final area, she contemplates her purpose in this place. Chapter three concludes as the camera fades to white.

Musical Content

The music in each space is thoughtfully designed to echo Luz's shared memories. Luz's voice-over narration accentuates the introspective tenor of the chapter, weaving a cohesive narrative connecting each memory to her past.

The pieces presented in each space include:

- China: "A Chinese Triptych", an 8-channel acousmatic piece. This piece was composed using recordings from an extensive sound documentary carried out in various Chinese cities, namely Hangzhou, Suzhou, Shanghai, Wuxi, Harbin, and Beijing, during 2017-2018. "A Chinese Triptych" seamlessly weaves together sonic events from rural, industrial, and digital China, aiming to portray the diverse and contrasting lifestyles in China. With a precise duration of 6 minutes, a number associated in China with events "flowing smoothly", the piece is structured and proportioned akin to a triptych—an art format composed of three interconnected sections, with the central panel being the largest. The piece can be heard here: https://www.jcvasquez.com/portfolio_page/a-chinese-triptych/
- Japan: "Mono No Aware", a 4-channel acousmatic piece. "Mono No Aware" embodies a Japanese concept reflecting a nostalgic understanding of the fleeting nature of things. The piece symbolizes a mental journey of a train traveler in Japan, diving into fragments of past memories that inevitably morph and intertwine. Utilizing a variety of timbral developments intrinsic to the acousmatic genre, the piece presents a structure depicting a non-linear approach to time. The field recordings used were captured in Tokyo, Osaka, and Kyoto in November 2019.

"Mono No Aware" is a binary piece, approximately 5 minutes and 17 seconds long. It begins with an introduction of departing train sounds, setting the stage for an imaginary sonic train journey. Following this, section "A" unfolds, marked by a predominantly fragmented, chaotic texture. A brief transitional phase gradually dismantles "A", leading to section "B", composed chiefly of slow-attack multi-layered chords. The piece concludes with the final part of the recording first presented during the introduction, symbolizing the journey's end.

Notably, Section "A" employs a technique that I branded as "klangfarbensampling"—an adaptation of *klangfarbenmelodie*¹⁰. This technique involves the distribution of a timbral "melodic" line composed of fragmented recordings juxtaposed with textural sound layers. The dispersed melody is itself a condensed version of the piece embedded within the first section, further illustrating the non-linear approach to time. The piece can be heard here: https://www.jcvasquez.com/portfolio_page/mono-no-aware/

- Finland: "Generative Sibelius", an audiovisual piece. This experimental video piece showcases an audiovisual transformation of a 1950s film featuring composer Jean Sibelius in his home in Finland, depicting his life in self-imposed isolation. The final video was rendered from a custom piece of generative software that executes 'freeze' audio manipulations, as devised by Jean-Francois Charles [79], on an original recording of Sibelius' Op. 75 No. 5 for solo piano. The audio undergoes analysis using the `fzero~` object—a fundamental frequency and pitch estimator in Max 8—and the resulting data manipulates delay, blend, and smear aspects of the film.

"Generative Sibelius" is part of a research project probing art appropriation and digital fragmentation as a conduit between music technology and classical tradition, achieved by executing extensive digital modifications on music from the common

¹⁰Klangfarbenmelodie is a German term describing a musical technique where the melody is dispersed among different instruments or voices, creating a shifting, kaleidoscopic effect of changing timbres. Developed in the early 20th century by composers such as Arnold Schoenberg and Anton Webern, this technique was part of the expressionist movement in music. Klangfarbenmelodie is often used to accentuate the unique characteristics of different instruments or to generate a sense of fragmentation and dissonance in the music.

practice period. In "Ecstasy / Light / Inertia", "Generative Sibelius" is pre-rendered with a duration of 3 minutes and 37 seconds, and is projected onto most of the faces of a rectangular room, creating an immersive experience. A fragment of the piece can be seen here: https://www.jcvasquez.com/portfolio_page/generative-sibelius/

- Empty space: For the empty area, the voiceover recording undergoes further processing with the Portal effect by OUTPUT, which synergizes delay and granular synthesis. The grain's size and offset are controlled by the Strange Mod device for Max4Live, developed by Dillon Bastan. The Strange Mod employs multiple Strange or Chaotic Attractors to generate a moving 3D coordinate that can be assigned to different parameters for automation, similar to a Low-Frequency Oscillator. The end result is a texture evocative of the Text-based composition aesthetic prevalent in countries such as Sweden during the 1960s.

Within each of the spaces, the title and duration of the background music piece are displayed, informing the user that an actual musical piece is integrated into the environment. The user can choose to fully listen to the piece or press "E" again to return to the hub and continue exploring other memories.

3.3.5 Epilogue

Level Design

The game's final chapter presents the player, Luz, in a spacious spherical room where she encounters a talking translucent sphere, as shown in Figure 3-14. The sphere provides Luz with a choice: either to sacrifice all ties for a peek into the truth or to cling to the sonic anchor of her past. The game has two distinct endings, based on the player's selection.

Selecting to sever all ties, Luz relinquishes her most precious possession—a guitar pick gifted by her father, which the sphere then assimilates. It reveals that the enigmatic world is woven from the gleam of the "souls and skin" of predecessors, and with the forfeiture of her most cherished possession, Luz has successfully passed the "final test of light-bringing". In this ending, Luz merges with the world to guide like her predecessors,

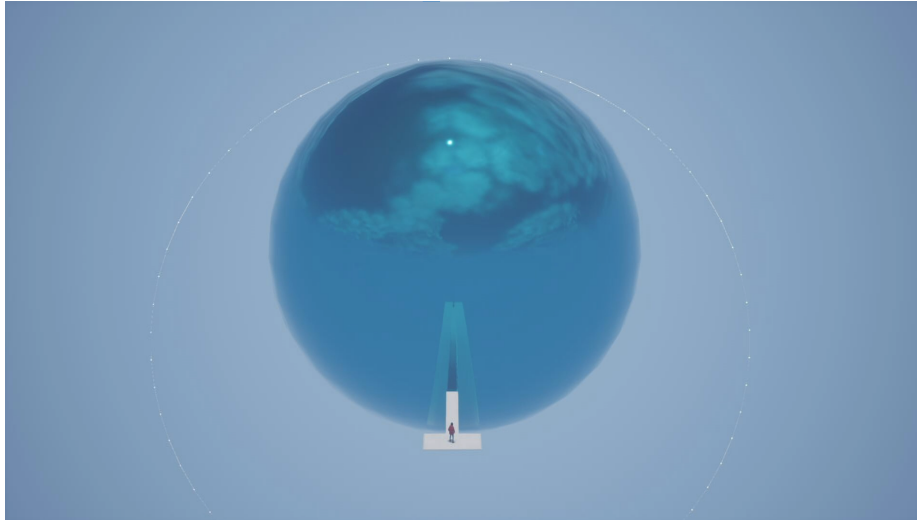


Figure 3-14: Aerial view of the room where the epilogue occurs.

illuminating the path and nurturing the "flame" for successors. The game's closing scene depicts Luz stepping into the sphere, causing her to disintegrate. In her place, a small sphere materializes, which then joins the group of spheres previously seen gathering outside the church. As the credits roll, the narrative concludes.

Choosing to maintain Luz's "sonic anchor to the past", Luz elects to hold onto the guitar pick. The sphere acknowledges her decision with "pure empathy", informing Luz that her journey will be purged from her consciousness, and she will be relocated to a preferred moment from her past, destined to remain there indefinitely. The game concludes with Luz returning to the apartment from the Prologue, where the game's story initiated. However, the scene is nearly completely shrouded in darkness, with only a thin ray of light illuminating the record player and the guitar pick resting on her palm.

The concluding chapter of the game provides a suitable culmination to the player's exploration through the realm of Ecstasy / Light / Inertia. It weaves the game's themes of memory, identity, and sacrifice, aiming to deliver a visually captivating resolution. The choice posed to the player significantly impacts the narrative and alters the game's finale, reinforcing the player's agency as consequential and profound. The first ending depicts Luz's disintegration and reincarnation as a small sphere, symbolizing her integration into the world. The second ending implies that although Luz may not have unraveled the truth of her journey, she finds solace and chooses to remain in the comfort of her memories.

Here, the narrative suggests Luz's "undying flame for her father bridges across worlds and dimensions", and she carries this love "back to bygone days, where it will burn forevermore".

Musical Content

The musical component in this chapter is entirely programmatic, aimed to direct the player's focus towards the unfolding plot. An A minor progression: I - v6/4 (minor) - VI7 - v6 (minor) is utilized. These chords are executed in an arpeggiated pattern on a piano, and significantly manipulated using Valhalla's Supermassive reverb plugin.

The voice-over for the talking sphere was created using the Pitch Accumulator effect, a software plugin by Ina-GRM. This plugin allows for the adjustment of an audio signal's pitch by a specific number of semitones, either higher or lower. For creating an extraterrestrial effect on the voice, two distinct pitch shifts were applied to the same signal. One shift decreased the pitch by 0.51 semitones, while the other reduced it by 5.49 semitones. When combined with the original signal, these pitch shifts produced a deep, foreboding, and mildly dissonant texture. This effect was deemed appropriate for the voice of a gigantic sphere in the Epilogue's context. The audio chain concludes with the reapplication of Valhalla's Supermassive, enhancing the auditory expression of awe when encountering a seemingly incomprehensible entity.

Chapter 4

Discussion

4.1 Overcoming Challenges in Solo Development: Navigating Resource Limitations and Creative Constraints

Undertaking solo development of a gamified experience can present a myriad of challenges, necessitating significant skills, commitment, and resilience. While feasible, an individual pursuit of such projects can encounter hurdles that potentially restrict their scope and viability. My endeavor in single-handedly developing *Ecstasy / Light / Inertia* confronted me with several typical challenges, prompting me to devise strategies to surmount them.

A primary challenge of solo game-like project development is resource limitations. Developing a gamified project necessitates diverse expertise, including programming, 3D modeling, art design, animation, and sound design, among others. As a composer, I encountered limitations in the project's visual design. To maintain high quality across all aspects, I decided to create a shorter gameplay experience than typically found in small-scale indie video game projects. This allowed me to concentrate resources on developing a polished and cohesive experience in less time.

To address areas where I lacked expertise, I hired external assistance, such as custom 3D modeling by Andrei Rodriguez and narrative writing by Sam Ripley. Collaborating with them not only provided the necessary resources but also introduced new possibilities

for the project. Sam Ripley's influence, initially hired for a specific task, proved vital to the entire project. Her contributions to the character's backstory made the character feel organic and human-like, leading to modifications in the pre-planned structure to better suit her crafted narrative.

Creative limitations imposed by working alone could also hinder the project's potential. As a solo developer, brainstorming and refining ideas proved challenging. Collaborating with other developers, such as consulting Ling Chen, VR and AR Production Associate at The World Bank, and Felipe Bravo, a game developer at Goodgame Studios, resulted in more creative and innovative concepts. Their input expanded my ideas and offered valuable feedback to enhance the game-like experience.

Proactively recognizing and addressing these difficulties and planning accordingly was essential for the project's success. Besides seeking resources and support, I implemented a modular development plan, enabling me to present the project stages to diverse communities at various international events. These included Ars Electronica 2022, CHI PLAY 2022, SAMIS event at the University of York, and the Fellows' Symposium at the Jefferson Scholars Foundation, among others. Additionally, I showcased the project at several universities, providing opportunities to connect with professionals in the field and gather valuable feedback for timely incorporation into the final experience.

Despite the challenges, solo gamified project development offers several advantages. As the sole creator, I had complete creative control, enabling a cohesive and unified experience. Working independently allowed me to set my own pace and prioritize aspects most crucial to the aesthetic vision. I had the freedom to experiment without concerns about diluting the project's vision or meeting team expectations, which resembled the process of creating a contemporary music piece rather than following a strict video game industry production pipeline.

Developing a gamified project as an "author's piece" presents opportunities to challenge the boundaries of what constitutes a "game" or "video game." Traditional video game definitions usually involve structured, rule-based activities that test players' skills and abilities. Recently, however, there has been a shift towards experimental and artistic game-like experiences that question conventional notions of games. These experiences of-

ten prioritize exploration, immersion, and emotional engagement over traditional gameplay mechanics.

In conclusion, the challenges inherent in solo gamified project development underline the necessity for continued dialogue in both academic and non-academic arenas. While the constraints of solo development might seem formidable, they also open up opportunities for inventive strategies and experimentation. Collaborative efforts and seeking external assistance can widen perspectives and result in more refined, polished projects. As the definition of a video game broadens to include more experimental and artistic experiences, pushing the boundaries of what a game can be remains essential. By exchanging experiences and discussing strategies to overcome challenges, we can cultivate a supportive community that encourages the progression and diversification of gamified projects in all their varied forms.

4.2 Evaluation

While this chapter explores the challenges and potential solutions in evaluating a gamified, narrative-centric endeavor like "Ecstasy / Light / Inertia", it is crucial to clarify from the outset that actual evaluations are beyond the scope of this present study. Instead, this discussion aims to delve into the complexities of performing both qualitative and quantitative assessments for such narrative-centric projects that share characteristics with gaming experiences, and propose prospective strategies for their implementation in future explorations

Evaluating a gamified, narrative-centric endeavor like "Ecstasy / Light / Inertia" presents distinctive challenges. While traditional evaluation tools such as surveys and questionnaires can collect quantitative data effectively, they may fall short in capturing the rich qualitative aspects inherent in the project. This discussion will delve into the complex landscape of performing both qualitative and quantitative assessments of such narrative-centric projects that share characteristics with gaming experiences.

One significant difficulty in appraising artistic narrative-centric projects stems from the inherently subjective and personal nature of the experience. Each individual interacts with

and interprets the narrative and environment uniquely, adding a layer of complexity to any broad-scale effectiveness measurement. As an illustration, the backstory of the character Luz and the environment might resonate differently with each player, resulting in varying degrees of engagement and immersion. Further complicating this issue is the project's interactive nature, as users' choices to engage with certain environmental elements over others can significantly shape their overall experience.

Furthermore, traditional performance metrics such as the amount of time spent in the environment or the number of interactions, may not accurately reflect the quality of the experience. These quantitative measures may overlook emotional and affective responses of the players, failing to represent the full impact of the narrative on the player. For example, a player might spend considerable time exploring the environment but may not engage deeply with the narrative, leading to a diminished emotional impact.

Another significant obstacle that arises when evaluating narrative-centric projects is the absence of standardized assessment methods. Unlike other (perhaps technical) fields, there is no uniform way to evaluate artistic experiences in gamified environments. This absence of standardization not only hampers the comparison of different artistic experiences but also undermines the accuracy and validity of the evaluation process. Therefore, there's an evident need for specific evaluation metrics tailored to narrative-centric projects like "Ecstasy / Light / Inertia".

Navigating through these complexities, I employed a practical adaptive approach during the development of "Ecstasy / Light / Inertia": informal playtesting. Traditionally used in game development, playtesting involves observing the game being played by potential users processing verbally their impressions in an unstructured way, thereby evaluating the functionality, usability, and enjoyability of the project. Though this process doesn't provide the extensive data that more formal evaluation methods might offer, it brings forth invaluable insights into real-world user experiences. By observing how users interacted with and responded to the project's components and gathering their feedback, I could continually refine and enhance the project, ensuring a more engaging and smoother user experience.

Despite the insights provided by playtesting, the impact of contextual factors in the

evaluation of narrative-driven projects cannot be understated. "Ecstasy / Light / Inertia" is influenced by elements such as the artist's intent and cultural background, making it challenging to control or isolate these factors when conducting evaluations. Thus, a comprehensive evaluation of gamified narrative-driven projects must consider such contextual characteristics.

A potential approach to tackling these assessment challenges involves the implementation of mixed-methods research designs, integrating both qualitative and quantitative evaluation strategies. These could include a diverse array of methods adapted from social sciences, game studies, usability testing, and even neurophysiological studies.

On the quantitative front, the implementation of surveys or questionnaires could assemble information related to demographic data and user-perceived experiences. Tracking software could record in-game metrics such as time spent, paths chosen, and interactions made within the virtual environment, allowing for the analysis of behavioral patterns. Simultaneously, more technologically advanced measures, such as eye-tracking studies, could provide insights into visual attention and engagement patterns. Additionally, physiological measures such as heart rate or skin conductance responses could be collected to gain insight into the participant's physical reactions to the virtual environment.

On the qualitative front, focus groups could be employed to delve into group dynamics and shared interpretations of the experience, while in-depth interviews could offer nuanced, personalized insights into individual participants' perceptions and experiences. Observation studies could provide contextual insights into how users navigate the virtual environment and interact with its components. Expert-based evaluation techniques, such as heuristic evaluations or cognitive walkthroughs, could reveal usability issues and shed light on the intuitiveness of the user interface and the experience design.

Furthermore, user-generated content, such as online reviews, social media posts, or forum discussions, can be analyzed using text mining or sentiment analysis techniques to provide additional qualitative insights. This method can help gauge broader audience reception and uncover trends, issues, or features that resonate most with users.

In this way, by converging multiple types of data sources and leveraging an array of methods, it becomes possible to form a broader and more in-depth understanding of the

participant's experience within the gamified artistic environment. However, it is important to carefully select and tailor these methodologies based on the specific characteristics and goals of the project, as well as the resources available.

In light of these challenges, it is crucial to emphasize that the primary intent of this project was to propose and develop a novel, artistic virtual experience in the form of "Ecstasy / Light / Inertia". While the evaluation of such experiences is a valuable and necessary endeavor, it inherently demands a dedicated research effort that extends beyond the scope of the present document. This comprehensive research would require the development of specialized methodologies, distinct from traditional evaluative measures, in order to effectively assess the unique and subjective experiences of participants in artistic gamified environments. As such, future work will focus on this formidable task - the formulation of precise, yet flexible, research designs and methodologies. These should not only accommodate individual experiences but also discern trends and patterns across a broader audience, thereby contributing to the further understanding and evolution of gamified artistic experiences.

Chapter 5

Conclusions

The project "Ecstasy / Light / Inertia" hopes to serve as a testament to the transformative power of gamified design in enhancing music and sound art experiences. By amalgamating a 3D environment with a structured narrative, this project aspires to propose an alternative digital framework to conventional concert settings and sound art galleries. The incorporation of HRTF audio, real-world 3D scans, and postmodern philosophical principles intensifies the immersion, offering a compelling, transportable, and potentially enduring aesthetic encounter.

This exploratory endeavor hopes to inspire other musicians and sound artists to delve into the untapped potential of gamified design. The fusion of game elements into artistic frameworks cultivates a more dynamic and captivating connection between the audience and the content. This can facilitate a profound understanding and appreciation of the sonic material, fostering an emotionally charged experience. Furthermore, digital platforms for creation and distribution democratize art access, extending reach, and promoting inclusivity and diversity.

"Ecstasy / Light / Inertia" aims to exemplify the emotional richness of narrative-centric design in interactive settings. Utilizing a narrative arc to navigate the player through various levels and sonic content, the project offers more than a mere assortment of tracks or ambient sounds. It imparts a sense of purpose and agency, as the player, through Luz's story, unravels the past and present against the backdrop of a snow-laden Nordic landscape. Themes of identity, self-discovery, sacrifice, loss, light, and darkness

enrich the narrative, offering depth and significance to the journey.

While narrative-driven design in interactive experiences is not novel, its potential is continually unfolding. As technology evolves and media boundaries blur, fresh opportunities arise for crafting immersive and emotionally engaging artworks. Interactive media, from video games to VR experiences, offer personalized narrative approaches, empowering the user to influence the storyline and experience outcome. This sense of agency cultivates a deeper user-content bond.

As we continue to explore the emotional depths of narrative-driven design in interactive experiences, we encounter new challenges and prospects. While game mechanics and interactive elements can amplify the narrative's emotional impact, they might also introduce distractions and disharmony if not tactfully utilized. Balancing interactivity and immersion, agency and direction, requires a delicate touch, careful consideration, and a willingness to experiment. Integrating real-life 3D scans and HRTF audio enhances realism and immersion, but demands substantial resource and technical expertise investment.

In spite of these challenges, the untapped potential of gamified design and narrative-centric interactive experiences is clear. As digitalization and global interconnectivity continue to advance, the appetite for innovative and immersive art forms will intensify. "Ecstasy / Light / Inertia" aims to imagine a glimpse into this future, showcasing the fusion of music, narrative, and gamified interactivity to create meaningful digital experiences. As the author, I am honored to contribute to this emerging field, and I eagerly await what lies ahead in the confluence of art, video game design, and contemporary music.

Appendix A

Interactive Script

ECSTASY/LIGHT/INERTIA GAME SCRIPT

01) PROLOGUE: MY RAIN SONG

[SETTING: Opening chords of THE RAIN SONG COLLAGE begin playing as THE APARTMENT comes into view. A large window displays a sunset throwing shades of light across the room. A record player is shown to be the music source.]

LUZ is standing, eyes closed. There's a book close by. The book's title is shown briefly: ART AND FEAR BY PAUL VIRILIO.

The music softens as LUZ begins to narrate.]

LUZ: I remember that day. The sunset strummed her brilliant tune across the darkening sky, throwing hues of golden-orange, crimson red, and pastel pink through the window. The book in my hand was a candle flame, warming my palms. My father cued "Rain Song" upon the record player, and all was still aside from this angelic play of light and sound, for a moment at least. Then he took my hand. We danced together in the dying of the sunset's glory, our feet tracing a primal pattern across the carpet.

This was a magical, golden bubble of time. These were the moments that defined the word "nostalgia".

[A loud sound is heard, a crash from the kitchen, that finally interrupts the reverie. The camera approaches a guitar pick laying on a coffee table.]

LUZ: A memory is a shimmering drop of nostalgic sunshine, the torch we all must hold.

[The music swells again briefly, completing the unfinished "Rain Song" piece, and the scene fades to black. There is a momentary pause to orient the viewer, then the title of the project is displayed.]

ECSTASY/LIGHT/INERTIA

[Text fades to black.]

END OF PROLOGUE

2) CHAPTER ONE: THE SILENCE OF STORMS

[Chapter title is shown]

CHAPTER ONE: THE SILENCE OF STORMS

*There's a certain Slant of light,
Winter Afternoons –
That oppresses, like the Heft
Of Cathedral Tunes –*

*When it comes, the Landscape listens –
Shadows – hold their breath –
When it goes, 'tis like the Distance
On the look of Death –*

–Emily Dickinson

[A snowy sky is seen in the first person before LUZ closes her eyes. We open to blackness after the intro.]

LUZ: *(confused)* Um... am I blind?

[Still, in first-person view, LUZ stands up with effort. Another camera pans the environment and the sphere.]

LUZ: *(Sounds of standing up with effort. Standing shocked, looking a little dazed)* What the... How in the world did I get here?

[LUZ looks around, orienting herself in her new environment. It's hard to make much out through the storm, but she appears to be in a harsh and unforgiving landscape covered in giant rock formations.]

LUZ: What is this place? Even in Buffalo, I never saw anything like this... *(sighs)* It seems like the snow follows me wherever I go. *(LUZ looks at a floating sphere in close to her)* And what's this here?

[LUZ turns in a circle and suddenly sees a liquid, translucent sphere against the rocks. As Luz begins to progress forward towards the sphere, she speaks.]

LUZ: (hesitantly, but a little relieved) Hey there, little guy.

[The sphere makes a stange, discordant sound in response.]

LUZ: (to herself) Hmm... I guess wandering snow-covered wastelands gets to a little guy, huh?

[The sphere turns abruptly and moves towards the mouth of the ice cave.]

LUZ: Where are you going? Was it something I said? I was just joking, wait a second!

[Luz starts following the sphere, which waits for her to do so. Once Luz is close, the sphere makes a noise that sounds almost like garbled human speech.]

LUZ: Can you speak? I wonder what strange stories he'd have to tell me if I could understand you.

[Player gains control. As the player gets closer or further from the sphere, the droning changes in tone and pitch. Once the ice cave is reached, LUZ speaks.]

LUZ: A cave looks like a good way out of the storm, but the entrance is blocked. I should find a way to open this door. Maybe there's a lock or something somewhere.

[The sphere moves away from LUZ, towards the puzzle, doubling back on itself and then continuing towards the ring of pillars to demonstrate to LUZ that she should follow.]

LUZ: What is that over there?

LUZ: [approaching the puzzle] Looks like some kind of weird ritual spot.

[Player examines the puzzle.]

LUZ: Hmm... the person in this scrambled image looks familiar. I feel like I know him from somewhere... And these sounds, they seem to line up with the photo in some strange way. Maybe if I solve the puzzle, it'll make more sense.

[The puzzle is solved.]

LUZ: Whoa, it looks like solving the puzzle opened the door. And the man in this photo, I recognize him now—he's a philosopher that my dad loved, Paul Virilio. Virilio always talked about the ever-increasing speed of society, and these sounds seem to be speeding up... Perhaps the puzzle could be connected to these strange sounds? Maybe I should go back to the ice cave and see if I can go inside... but these odd noises are interesting, I could stay and listen to them for a moment too.

[The player goes back towards the ice cave.]

LUZ: Okay, what is that raised platform? It looks like there's something on it...

[LUZ finds the guitar pick on the altar.]

LUZ: (shocked) How did this get here? This does not belong here, it was in my wallet, I know it was last time I checked! What is going on?!?! I'm going to keep a closer eye on this from now on and make sure I take it back where it belongs.

[The lighting changes and music flares to signal the narration of a flashback.]

LUZ: I was fourteen when my father gave me our only family heirloom: Jimmy Page's guitar pick. He carried it in his wallet for three decades, stuffed between a picture of me and a signed photo of him with his Led Zeppelin idol.

The two most important people in his life, he always joked. He folded it into my palm, this tiny triangle-shaped torch, days before his final breath escaped his body.

I can still hear his voice and his music, pumping like the beat of his heart. These sounds are my birthright, and they thrum through my bloodstream like the tidal pulling of the moon.

[LUZ pockets the guitar pick. The player enters the ice cave.]

LUZ: I'm definitely not in Buffalo anymore.

[The player begins exploring the ice cave.]

LUZ: This is like nothing I've ever seen. What beautiful spheres these are! At least they have the company of one another in this lonely place. There are wonders here, I can feel it in my bones.

[The player comes close to the first sphere.]

LUZ: This whole place is so weird, full of all these objects and formations. I don't know what to think... That first sphere may have been all alone, but he was friendly, at least.

[The player steps continues towards the second set of spheres, which are multiplying.]

LUZ: These spheres are making strange sounds, just like the last place. And there's a few more this time! I wish I could decipher what they are saying. I should go on, but something about this place is soothing... Maybe I should stay a moment and catch my breath.

[The player reaches the third set of spheres.]

LUZ: The light around them—it's pulsating in time to the noises! It's like a society of shapes and songs.

[The player continues forward, coming across more spheres and lights along the soundscape.]

LUZ: This cave reminds me of an art installation. An artistic soundscape, yeah. Perhaps I should listen for a bit longer...

[The player continues towards the next set of spheres.]

LUZ: Everything is interconnected, the lights and the music and the otherworldly ice shapes. But where did it all come from? And why does the number of spheres keep growing?

[The player reaches the puzzle.]

LUZ: Another picture puzzle. The mechanism of this puzzle looks different from the first, however. Let's try it out and see who this photo is.

[The player solves the puzzle.]

LUZ: Aha, Louise Nevelson! I saw some of her sculptures during my travels and she's fascinated me ever since.

"Art is a living thing," she said, and I feel as though these pillars must be alive in some sense to react in this way. These pools of light and sounds—they are finite, just as I am. And yet it seems there are countless ways they can reconfigure themselves.

I have seen many relics of my past and self in this world. But it is all... fractured. Reflections of memories and dream-like simulacra, all woven together with the thread of my strange life.

Whatever mysteries this snowy land holds, it is my duty to discover. This world is made of me, after all. I must step into its facets, both terrifying and awe-inspiring. They are nothing new. Just me. Just me.

[LUZ exits the ice cave.]

END OF CHAPTER ONE

3) CHAPTER TWO: STAIRWAY TO HEAVEN

[Chapter title is shown.]

CHAPTER TWO: STAIRWAY TO HEAVEN

[Scene opens with an overview of the forest, staircase, and church with gentle music playing.]

LUZ: From the deepest reaches of the earth to the highest of heights we go, I guess. And now the sun has gone down, leaving me in darkness. Will this journey ever end? And if it does, where will it lead me?

[Luz begins climbing up the stairs towards the building and a cutscene is triggered.]

LUZ: The shadows held their breath the day my father's soul slipped away from his body. Life became a poor imitation of itself—a simulacrum of existence.

I rode trains in the shape of silver bullets in Japan. I stood in awe of the glittering fuchsia sunsets over the Atlantic in Colombia. I climbed the misty mountains of my ancestors in China. I witnessed the dancing ribbons of the aurora borealis during the never-ending darkness of a Finland winter.

And in Iceland, [camera fixes on the towering building] I saw the most powerful sight of all: a towering church whose single, haunting spire formed a staircase leading straight to heaven.

This is how I found myself again. This is how I found a way out.

[Luz continues her climb, and stops for a moment to admire the scene of the Northern Lights juxtaposed against the church, along with the spheres wandering about.]

LUZ: My father told me stories of the Northern Lights. They were the spirits of our ancestors dancing across the skies, feet creating ribbons of light in their wake. In that great city in the sky, I imagine that he and I already trip the light fantastic together, creating our own patterns with the otherworldly glow.

[Spheres are shown moving about.]

Ah, would you look at those spheres flying about! Perhaps they are like me, wandering about, trying to find their way in the world. Coming back to familiar places and reliving the moments that defined them. Like coming back to my mother, to Buffalo, after all this time.

But where is this journey taking me?

[Luz arrives at the top of the staircase, but the door to the church is locked.]

LUZ: Perhaps I need a key of some sort? I wonder where I could find a key in a place like this. All of the clues so far are related to my life, so this must be as well. Wait... what about my dad's guitar pick?

[LUZ fits the guitar pick into the central lock and the door opens. The interior is obscured in blinding white light that spills over the threshold.]

LUZ: Everything in this strange world seems like my life was its blueprint. I hope I can unravel some of these mysteries—my head is spinning. [sighs] The only way out is through.

[LUZ enters the building and the screen fades to white.]

3) CHAPTER THREE: THROUGH THE LOOKING GLASS

[Chapter title is shown.]

CHAPTER THREE: THROUGH THE LOOKING GLASS

[Still in whiteness, LUZ speaks.]

LUZ: I'd love to have a roaring fireplace and a hot bath awaiting me here, but things are not so simple. [Cutscene showing interior of building begins.] What really has been simple in my life?

[The player explores the space. When LUZ comes closer to the portals, dialogue is triggered.]

LUZ: I wonder what these could be... Perhaps this room is the culmination of those voices I've heard. It certainly seems grand enough to be a gathering place of sorts. There are several of these unfamiliar pillars, arrayed around the room. Maybe I should try to interact with one and see what happens?

[The player gains control. If they reach the first portal (China-inspired) and interact, they will be transported to another space.]

TEXT: *A Chinese Tryptich*

LUZ: This realm reminds me of somewhere I've been... Ah yes, the rural landscapes of China have similar structures to this. They were so starkly beautiful, especially compared to the rainbow-hued technological wonderlands of the modern cities there! I was so overwhelmed at the glitter and glow—it all felt futuristic, and yet not nearly as real as the slow and peaceful way of life in the countryside.

[The player can stay and listen by doing nothing or press "E" to leave the space. If they choose to stay and listen, they will be transported back to the portal room at the end of the piece.]

[Player is teleported back to the hub. If they approach another portal, dialogue is triggered.]

LUZ: Perhaps I should look at these other portals.

[If the player uses the second pillar, they are transported to a Japan-inspired space and the title appears.]

TEXT: *Mono no Aware*

LUZ: This reminds me of a museum I came across in Japan, with an exhibit very similar to this pool. I was entranced by it for hours, imagining cherry blossoms falling onto the surface of the water until the sun said its bittersweet farewell, casting rose-gold hues upon the still and reflective pool. While I awaited my train that night, the soothing noise of the train station around me became warped and surreal—I could no longer identify the difference between the music of the station and the music of mind. Reality shifted and cracked, like a shattered windowpane, and I was untethered from its strangling hold for one blissful instant.

[The player can stay and listen by doing nothing or press “E” to be transported back to the portal room. If they choose to stay, they will be transported back to the portal room at the end of the piece.]

[If they interact with the third portal (Finland-inspired), they will be transported to this space and the title will appear.]

TEXT: *Generative Sibelius*

LUZ: I once spent a frozen and dark December in Finland. I became an animal, locked in the dark cave of my room, hiding away forever in a suspended hibernation that became deeper as the ice grew thicker.

But one day, in the gloom of my own winter, a hymn made of pure light began to hum through my blood, as if calling me back from the darkness. When I followed it to its source, I stood in the town square, surrounded by the vibrating light of hundreds of human voices, all lifted together as one, the words of Jean Sibelius’ “Finlandia” calling through Senate Square. My blood called back in response as the torchlight of sound filled me and overwhelmed me and swept me away from emptiness. This song and its sorrow... they remind me of that day, when my fire burst again to flame.

[The player can stay and watch by doing nothing or press “E” to leave the space. If they choose to stay, they will be transported back to the portal room at the end of the piece.]

[If the player interacts with the fourth portal, they enter a dark and foggy space, with nothing to be found.]

LUZ: What is this darkness? All of the other portals have taken me into my past, but this... is empty of anything like a memory. Or maybe not empty—just without visuals or sounds? But then, is it even a memory? [breathes in] I can smell the lushness of the flora, an otherworldly perfume, and feel soft jungle dirt beneath my feet, but nothing else. It’s like that saying, “You forget what you want to remember and remember what you want to forget.” If only I could see... but this space is locked tight, and I do not have the key to my own memories. Maybe it is for my own safety...

[LUZ is teleported back to the main hub.]

After LUZ has interacted with all four portals, an underground passage opens up. When the player approaches it, LUZ speaks again.]

LUZ: Is that another doorway? Instead of up, now I'm heading to the depths below. There has to be an end to this walk into mystery. This place is woven of relics from my past, and yet I still have no idea what my purpose here is. All I have are wild guesses as to how these wonders formed. But this space is connected to me, somehow—there is too much of me in its warped sounds. Blueprinted from my bones and sinew, sewn together with my veins and the fragile strings of my nerves. Is this the end, or the beginning?

4) CHAPTER 4: SOLVING THE MYSTERY OF THE QUOTIENT

[Chapter title is shown.]

CHAPTER FOUR: SOLVING THE MYSTERY OF THE QUOTIENT

[LUZ enters a large, spherical room. At the center, a final translucent sphere confronts her, and speaks in an artificial-sounding voice.]

SPHERE: Welcome, torch-bearer.

LUZ: [startled] You can speak?!?

SPHERE: Many voices inhabit me. I speak in all tongues, always.

LUZ: I just want to know what I'm doing here, please. I want to know what has happened to me, and my memory, and how I came to be here. I have wandered for so long, I just want some answers finally.

SPHERE: It is up to you. What would you trade to find out the truth, torch-bearer?

LUZ: I don't know... I don't have anything else left to sacrifice. I don't even have all of my memories!

SPHERE: Here is your choice, little lamplighter. Choose wisely, as you will not return here again.

[Player can choose between the two options. Each will lead to a different ending.]

[E] Abandon all ties in exchange for a glimpse of the Truth.

or

[Q] Hold onto the aural anchor of your past.

[If player chooses E, the following ending will result.]

SPHERE: You have chosen the unwalked path, torch-bearer. Keep your light, but I would take your treasure in return to spread that torchlight over all.

LUZ: I have no treasure, but I do have one thing left. [takes the guitar pick out of her pocket] This was given to me by the greatest man I've ever known. [emotional] It is yours now.

[Luz steps forward and presents the pick to the sphere. It absorbs the relic into its large translucent body.]

LUZ: I have given up my greatest gift. Why am I here? Why do you call me, "torch-bearer"?

SPHERE: You are the light, Luz of the Rain Song. The reason for your journey was to remind you of who you are, beneath the layers of skin and bone and thought and memory. To show you that within you lies the strength of lightning, unbound. But lightning does not strike alone, and nor will you, forevermore.

All who come to this place have a choice. Those who have come before you and chosen to share their light as you have—you have met them already, in shapes and forms you did not recognize. This world is crafted from the shine of their souls and skins, and also from the sunshine of your own. To know is to illuminate, and with the surrender of your greatest treasure, you have passed our final test of lightbringing.

Now, you will become a part of this world, and guide as we have, in forms as yet unknown. Light the path forward and carry the fire for those who come after, with us All.

[As the sphere reaches the end of its speech, we see an overview/montage of the wonders that have come before. LUZ steps into the sphere and disintegrates. A second later, a small sphere appears, and as it moves, we hear a riff of "Rain Song"/her imprint. Credits roll.]

[If player chooses Q, the following ending will result.]

SPHERE: There is nothing but empathy in your choice—only some crave the weighty answers to unasked queries. Return to your family's memory, unburdened by the flame of knowledge.

LUZ: Yes... [Takes out guitar pick] This is the only thing left of him that I still have. I would never give it up, not for anything.

SPHERE: How brightly your love glows, an undying flame you carry for your father that bridges across worlds and dimensions. Though you are not willing to give up all ties to discover the truth of your path, you will not be punished for your unforgetting nature. Comfort will find you, as you so crave.

When you are gone, Luz of Nostalgia, your journey here will be erased from your psyche and you will be transported back to a chosen place and time from your past to stay forever.

Manipulate this memory any way you wish as there are no limitations. Fear not the subtle and surreal strangeness you may encounter

Enter the portal and carry this fire back to bygone days, where it will burn forevermore. Dwell in memory, and ignore the shadows that cast their tendrils upon you...

[A portal appears, shimmering. Within its bounds, the APARTMENT can be seen, and the soft sounds of "Rain Song" spill over the glitched portal boundaries. LUZ enters the portal, and the APARTMENT comes into fuller view. It looks as it did in the initial cutscene, but in almost complete darkness. A single ray of light coming from a desk lamp illuminates the record player, and the guitar pick on the table beside it.]

LUZ: All I wanted was a shimmering drop of nostalgic sunshine. Please, shadows, hold your breath...

[The light starts to flicker, until it finally goes dark. As the scene fades to black, the record player scratches and repeats a part of Rain Song. Credits roll.]

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