

Reliqua: The Mystery Genre Meets Autonomous Cars by McKenna Gameros

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Abstract

Reliqua is a murder mystery-style video game that explores the site of an autonomous car crash and tasks the player with deciphering what happened the night of the accident. This is facilitated through a non-linear playstyle that encourages the player to search for clues, speak to witnesses, and slowly figure out the mystery alongside the player character. This paper describes the process of creating *Reliqua*, from its initial inception, to the inspiration it draws from similar video games, to the rationale behind its design, to the playtesting and evaluation of the game and whether it accomplished its goals.

Acknowledgments

This project was created in loving memory of Professor Dean O'Donnell, whose lessons are the inspiration behind many of the techniques used in this game to tell an effective story. Thank you for welcoming me into the game design community and encouraging me to push the limits of my writing abilities. May the Force be with you, always.

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1. Introduction

Reliqua is a murder mystery-style game set in a near-future Denver, Colorado. The player is cast in the role of a well-respected detective who is placed on the case of an autonomous car accident that has happened the day the model was released by the manufacturing company, Reliqua. The game aims to provide an entertaining mystery to solve, as well as a look at the dangers of the breakdown of communication between managers and their employees. Reliqua aims to accomplish these goals by drawing inspiration from popular games in the mystery genre, as well as key tropes that make a mystery a mystery. In particular, the game makes use of a notebook that the player can access at any time that contains the player character's observations on collected evidence to help the player piece together the mystery. As the game continues and more evidence is collected, the player character crosses out different hypotheses they had posited earlier until the true story unravels itself. In addition, Reliqua's story focuses particularly on the engineers in Reliqua's headquarters to understand their reasoning behind avoiding communication with their manager.

Reliqua began as an exploration of ethics in the robotics field. The idea was to use a game to improve ethics education for undergraduate engineering students. I myself have a bachelor's degree in computer engineering, and while I have always been interested in the field of ethics, I found the required ethics classes I would take every year of my undergraduate education to be tedious. I remember discussions with my friends about how annoying it was that we had to write another ethics essay, and with all of the projects, tests, and other papers due in classes we all deemed more important, we never really took the time to think critically about these ethical topics. To those

engineering majors who may not be as interested in the field of ethics as I and my classmates were, this lack of critical consideration towards ethics in engineering could cause disasters in the future.

When I decided to switch gears entirely by coming to WPI to study game writing, I found that many of my classes were assigning games so we could better understand the principles we were studying. That giddy feeling I would have when finding out that my homework for the night was to play a video game has never entirely gone away, and I wondered if this feeling could be translated into an ethics game for engineers so they could gain a better understanding of ethics in the field.

To that end, I decided to make a video game that would play with these ethical quandaries. Initially, the game would be about an internal investigation into the crash of an autonomous car. The player would be an engineer within *Reliqua*, and they would be developing this product for release. At the end of the week, the player and their coworkers would test the autonomous car, which would malfunction and kill one of the player's coworkers. Then the game would shift into an investigation, where the player character would need to figure out how the car malfunctioned, while grappling with the fact that one of their coworkers (and possibly their friend) had just died. I especially wanted to invoke a shocked feeling in the player, driving them to solve the mystery and make things right again.



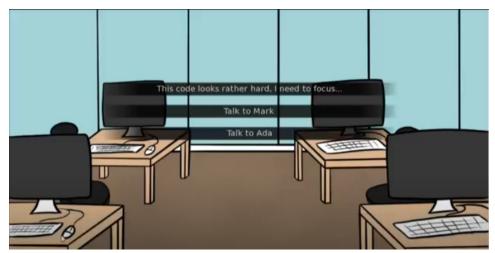
As Mercutio dies, Romeo and the audience realize that things have turned dark fast. Source: UW-Whitewater production of *Romeo and Juliet*, circa 2014

This initial story idea was especially inspired by William Shakespeare's *Romeo and Juliet* and the game *Doki Doki Literature Club* by Team Salvato in that it would start light-hearted and comedic, and then very quickly shift to a darker tone at the death of a central character. I was especially inspired by Mercutio's death in *Romeo and Juliet* because the death of the comic relief character triggers the shift between comedy and tragedy in the play. The audience knows something has gone horribly wrong when the person making funny quips is suddenly not being funny any more, and then dies immediately after.



The player decides who to show their poem to in Doki Doki Literature Club. Source: Screen capture

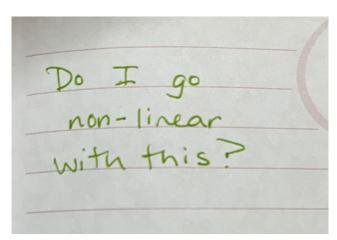
Following the inspiration of *Doki Doki Literature Club* as well as the investigative feel of *Phoenix Wright*, I wanted to make a visual novel using RenPy. Since I had previously made a game before entirely on my own for my application to graduate school, I very proudly wanted to do the same with my master's project, as it would make a perfect end-cap for my graduate education. I felt much more comfortable creating 2D art than 3D art, so this was the other reason I decided to make a 2D visual novel.



The initial formatting for Reliqua, with programming in RenPy and my own artwork for the sprites and background.

Source: Screen capture

The creation of this version of *Reliqua* had many setbacks that ultimately culminated in my completely scrapping this iteration and trying again. First and foremost, I found it incredibly difficult to write multiple days of filler plot before getting to the meat of the accident and investigation. While I had an idea of the actual beats of the story, establishing the status quo and dragging it out for 5 in-game days or so was not going well. Second, after looking at the artwork I had done for the game and the pacing and writing for the story that I had already done, I was not proud of it whatsoever. I went through multiple iterations of flowcharts to try to figure out what I wanted to do with the story. At one point while teaching IMGD 1002 in the spring of 2022, I was trying to figure out the narrative structure for what seemed like the millionth time when one thought came to mind: what if I made this non-linear? That was the push that got the writer's block out of the way.



The moment that shattered the writer's block.

Source: personal notes

From this idea, I decided to change the entire perspective of the story, and instead of an engineer in the company itself, the player character would be an outside viewer, a detective, who is investigating the case after the accident happens. This fixes the

problem of needing to write multiple days of filler dialog, as well as gives a more elegant way to introduce the player to the world of the game.

At this point I also decided to change focus from ethics education to entertainment. Since the inception of *Reliqua*, it had slowly been influenced by my love of puzzles and the mystery genre to become more of a noir-style mystery. While ethics was still at the forefront of my design process throughout the creation of *Reliqua*, its primary goal, to be an educational ethics game, had become slowly less plausible. So instead, I decided to continue forward with a detective game meant for entertainment, leaning on ethics in some places to provide a more realistic story, but not using it as heavily as I had used it in previous versions of the game.

This paper describes the design process, release, and evaluation of *Reliqua*. The Critical Context section describes the games that have especially inspired this project in one way or another, and then explains how *Reliqua* was designed with these games' design principles in mind.

The Design section embodies the meat of the game itself, with my reasoning behind Reliqua's mechanics, narrative, visuals, and music, and how they were implemented in relation to the games described in the Critical Context section.

The Evaluation section describes the process of which I operationalized the success of the game by providing charts and data from playtesting. Alongside this, I interpret these charts and data to explain how the game succeeded or failed at its goals.

Finally, the Conclusion wraps up the document by describing the strengths and weaknesses of the current game iteration, as well as plans for future game builds and why I believe these changes will improve the game as a whole.

2. Critical Context

In the time since *Reliqua*'s inception, many games have contributed to its playstyle, narrative, and UI design. This section describes the most influential games to this project, and describes the pieces of each game that especially inspired my design process for this game.

Detroit: Become Human has been an influence on the narrative structure and overall theming since the beginning of this project. Reliqua has always been about automation and the possible ethical considerations that need to take place before these devices can be implemented in society. The branch of Detroit that focuses on Connor specifically inspired this game, as Connor spends much of the game searching through crime scenes to discover the reason behind androids becoming sentient and disobeying their owners. However, the methodologies surrounding branching narrative and soundtrack composition also had an impact on my design process.

Phoenix Wright: Ace Attorney has been another influence on Reliqua for a while. However, this game in particular inspired the investigation aspect, as well as how these items influenced each other and the case as a whole. While Phoenix Wright is a fairly linear narrative, the player still has agency through the selection of evidence through the trial phase of the game, and it remains a strong reference point for investigation mechanics as well as player involvement.

Telling Lies was the main springboard from which the idea of a non-linear story came from. This game was an assignment for a class I took in the fall of 2021, and its

approach to evidence collection and storytelling influenced a lot of *Reliqua*'s final goals and plotline.

When first coming up with the concept of a notebook mechanic for evidence,

Phasmophobia's journal system came to mind immediately. The way the journal creates a tactile experience through the selection of evidence and allows the player to feel more involved in the story inspired me tremendously when creating *Reliqua*. While this is the only piece of *Phasmophobia* that especially interested me in relation to this project, the layout of the journal's menus, as well as the visual and audio cues for each player input, all had a lasting impact on the way I created *Reliqua*'s menus.

2.1. Detroit: Become Human



Promotional art for *Detroit: Become Human*. Source: Quantic Dream

Released in 2018 for the PlayStation 4 and later for PC by Quantic Dream, *Detroit* follows the storyline of three android characters in a futuristic Detroit, Michigan, where androids have become fully integrated into society as servants of humanity. The game's focus switches between Connor, a detective android tasked with figuring out why androids are ignoring their programming and seemingly gaining sentience, Kara, a housekeeper android who breaks her programming to remove a little girl from the home of her abusive father, and Marcus, a prototype caretaker android who is discarded and begins a revolution with a group of other sentient androids. The player's choices in each of these storylines affects the others, along with the world as a whole, culminating in 85 different game endings.

In an interview with Playstation, Adam Williams, *Detroit's* lead writer, explains that the design process of the game was intended to be collaborative. While the concept and initial story was created by Quantic Dream founder David Cage, Adam himself was "brought in to help him finish and elaborate on the story" (Brotherson). However, the

writers were not the only members of the team giving input to the script and overall storyline. In particular, the game's composers wanted the game's soundtrack to inform the emotional context of the scene. In many ways, the narrative and music worked closely together to create an immersive experience. "We're inviting the player into the writing room and asking them to tell us what happens. Our role is to pose questions and allow the player to answer them in a way which lets them think about the themes in an organic way" (Brotherson).



Connor decides how best to approach a conversation with his human partner Hank. Source: Screen capture

The music itself drew from many points of inspiration, but especially Detroit's musical history. "Detroit is the home of Motown," Adam explains. "So there are funk, brass and blues influences in the soundtrack, while the three main characters each have a different composer to create very distinct musical vibes" (Brotherson). While Connor's theme is upbeat, energetic, and urgent, relying heavily on synths and bass, Kara's theme is melodic and ballad-like, highlighting a simple, mournful melody, and Marcus' theme invokes curiosity and thoughtfulness, focusing especially on piano.

Connor's story in particular follows the android as he explores different crime scenes relating to androids that have gained sentience. The player is allowed to explore the crime scene as they wish, and the evidence doesn't need to be discovered in any particular order. This non-linearity, while not inspired directly by this game, was a key piece of what I wanted to do with the evidence collection in *Reliqua*.

2.2. Phoenix Wright: Ace Attorney



Promotional art for *Phoenix Wright: Ace Attorney Trilogy*.
Source: Capcom

Phoenix Wright is a series of games whose first installment, Phoenix Wright: Ace

Attorney, was initially released in Japan in 2001 for the GameBoy Advance by Capcom.

The player takes on the role of the titular character Phoenix Wright, a newly hired

defense attorney in an imagined future Los Angeles where criminals are given only
three days to prove their innocence and the justice system follows Japanese trial laws

more closely. The game has two modes of gameplay, the investigation and the trial.

During the investigation, Phoenix explores the crime scene, interviews witnesses, and

collects evidence with the intent of proving his client innocent. Once all evidence has
been collected, the game shifts to the trial. During the trial, the player chooses the

correct evidence to poke holes in the witness' testimonies and uncover the truth.



A crime scene from *Phoenix Wright: Ace Attorney*Source: Screen capture

The investigation section of Phoenix Wright sets up for the trial well by slowly revealing bits of the story through the collection of evidence and the conversations with witnesses. Many times, the player will need to return to witnesses multiple times with different pieces of evidence to unravel the whole case. Much of the investigation phase is non-linear as well, as the player can find multiple pieces of evidence at any point in time. Only when all the relevant evidence has been collected will the game move forward.

Future installments of Phoenix Wright also introduce mini-games for evidence collection, such as Psyche Locks and Fingerprinting, that allow the player a more tactile puzzle-solving experience while uncovering evidence. However, even the original trilogy provides limited interactivity in the form of searching the crime scene with the cursor to find pieces of physical evidence. A combination of the use of the cursor to physically search for evidence and the selection of dialog options to decide which line of questioning to pursue allows the player to immerse themself in the investigative role.

2.3. Telling Lies



Promotional art for *Telling Lies*. Source: Annapurna Interactive

Released in 2019 for most gaming platforms by Annapurna Interactive. Follows an undercover FBI agent, David, in his interactions with three women and a group the FBI considers to be an ecoterrorist organization. The story is told through video chat clips between David and the three women that the player can unlock through searching for different keywords in a database. While the story is linear, focusing on the pre-recorded video calls rather than any player input, the ending that is shown is based on what clips the player focuses on: David's wife Emma, his pregnant girlfriend Ava, or his cam-girl mistress Maxine. Depending on whose story the player watches the most of, they will see what happens to that woman after the events of the tapes.

Sam Barlow, the creator of *Telling Lies* and its spiritual predecessor, *Her Story*, describes his design process as follows:

"When I design, I start with two touchstones - first (1) a feeling I want to communicate to the player, then (2) I try to latch onto a metaphor that captures and creates that feeling. The metaphor is where the game mechanics and the

player's imagination meet - it describes the role or action they will perform. Sometimes the metaphor becomes more or less literal, and stops being a metaphor. With Telling Lies, the feeling was that of holding onto memories of a failed relationship, the mush of sensory and emotional beats wrapped up in hindsight. The metaphor was that of a surveillance job, the kind where the surveiller is so immersed in the private everyday of the target's life that they feel like they know them intimately" (Barlow).

With these two touchstones in mind, Barlow decided to combine the intrusive nature of 21st century surveillance and the tactile nature of old-fashioned spying to create an experience where the player would be emotionally and intellectually invested. To do this, he used a scrubbing mechanic: the player can search for videos through the main interface, and then scrub through the entire video using the arrow keys to fast forward or rewind. They can slow it down to see certain expressions and speed it up to get to other parts of the video, which adds this tactile piece to these videos.



The console view that serves as the main user interface for *Telling Lies*.

Source: Screen Capture

Barlow makes use of the literary concept *in media res*, Latin for "in the middle of things," in that the player can be dropped into a scene at any part of the video. "This would communicate the sense of the world happening around you, of being the surveiller who overhears or glimpses something that happens on its own timescale, not put on for your benefit," he explains (Barlow). In addition, the player immediately has more layers of information to figure out, who is talking to whom, where does this happen in the story, why is this conversation taking place, etc.

Telling Lies is especially interesting in its non-linear nature. While there are specific beats that drive the story forward, caused by certain phrases or pieces of information being found, the player can find the videos, and, by extension, the evidence, in any order they so desire. The videos can be found and accessed in any order, and thus the player is given a lot of control over the story and how it plays out.

2.4. Phasmophobia



Promotional art for *Phasmophobia*. Source: Kinetic Games

Released on Steam in 2020 by Kinetic Games, a first-person horror game that allows players to connect to a maximum of three other players to investigate a haunted building. The players must collect evidence through various devices to figure out what kind of ghost is haunting the area before the ghost is angered and hunts them all down.

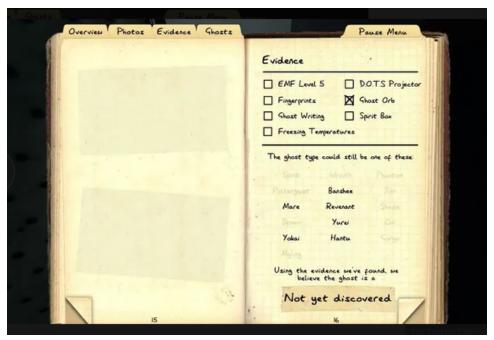
The gameplay and plot of *Phasmophobia* is almost entirely player-driven, with the system responding to both the actions and the voices of the players to provide knowledge about the ghost and its whereabouts. The ghost notebook serves as a tool for the players to both gather evidence of ghost activity and learn about different ghost types and how they interact with the environment. Each investigation tool, such as the EMF reader, spirit box, and DOTS projector, require that the players follow certain actions to cause the ghost to respond to that tool, if that ghost type uses that kind of evidence.



The Overview section of *Phasmophobia*'s journal. Source: User Skaijie on Phasmopedia

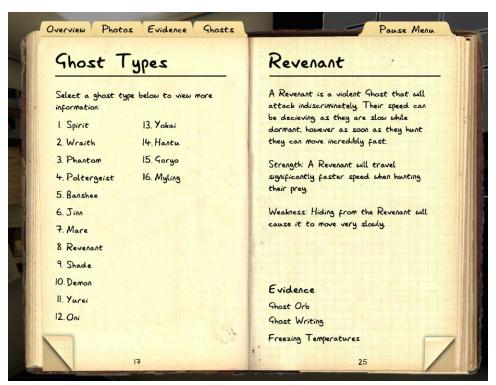
While the journal in *Phasmophobia* contains multiple useful pages for hunting ghosts, the most relevant to *Reliqua* are the Overview, Ghosts, and Evidence sections.

As the name implies, the Overview section of the journal provides an overview of the case. It shows a photo of the area to be investigated, provides the name of the ghost, how it best appears, and any optional objectives for the mission. It also includes some ideas on the other side written from the perspective of the player character. While this information is also available in the player spawn point of the game, this menu is useful for the player to reference these objectives during the mission itself, especially because the initial spawn point is sometimes difficult to return to while hunting ghosts.



The Evidence section of *Phasmophobia*'s journal, with Ghost Orb selected as evidence. Source: Gfinity Sports

The most interesting piece of the journal, at least in relation to *Reliqua*, is the Evidence section. This is an interactive section of the menu that allows the player to select what pieces of ghost evidence they have collected, and the options for types of ghost will dwindle with each piece selected until one will remain at 3 pieces of evidence collected. The player can also cross out ghost types themself or circle the one they think it is at any point in time. The players will be rewarded at the end of the mission if they select the correct ghost type in their evidence journal.



The Ghosts section of *Phasmophobia*'s journal, with Revenant selected. Source: u/lciestSwift on Reddit

The final section of note in the journal, at least in relation to *Reliqua*, is the Ghosts section. This section lists all of the known ghost types. When one is selected, the page on the right shows the information about that type: how it acts, where it comes from, its strengths and weaknesses, and what evidence would denote that the ghost is of this type. This section is especially useful when trying to avoid being hunted by the ghost, as it will tell the player how best to avoid its ire.

The journal also has sections for photos taken with a camera and to pause the game and access options or exit the game. All of these sections are shown as tabs at the top of the page, with the journal mechanic items on the left and the pause menu on the right.

2.6. Reliqua

Much of *Reliqua* draws inspiration from these four games. The most obvious inspiration comes from the investigative style of *Detroit* and *Phoenix Wright*. By the simple fact that it is a 3D game, the physical search for evidence itself takes a lot of cues from *Detroit* in that the player has to physically wander around the level to find the evidence scattered around the area. However, since the level is so much smaller than those in *Detroit* and the game is much shorter overall, there is no guide in the UI to find pieces of evidence like there is in *Detroit*, besides the prompt to press "E" when the player approaches said evidence. While the physical evidence is inspired heavily by *Detroit*, the dialog and testimonies are inspired heavily by those in *Phoenix Wright*. While both games give the player options when interacting with other characters, the interactions in *Reliqua* are not timed like in *Detroit*. The ability for the player to unlock certain dialog options by collecting pieces of physical evidence to present to the witness was particularly inspired by *Phoenix Wright*. Overall, both *Detroit* and *Phoenix Wright* had a strong impact on the collection of evidence in the game.

Similarly to *Telling Lies*, *Reliqua* begins *in media res*, after the accident has occurred, and the goal of the player is to piece together what happened the night before. The non-linear nature of *Reliqua* is inspired especially by *Telling Lies*, since it was one of the games studied in a unit on non-linear narratives in IMGD 5300, Design of Interactive Experiences, in the fall of 2021. This class, and the assignment on non-linear narratives, had a strong impact on me, and so when I decided to make *Reliqua* non-linear, this unit, and by extension, *Telling Lies*, came to mind. The format of evidence collection and story beats when certain pieces are collected is heavily inspired

by *Telling Lies*, though the story is less interpretable by the player than *Telling Lies*' story is.

Finally, the notebook mechanic took a lot of inspiration from *Phasmophobia*, especially the Evidence section. The idea of using the evidence area as a puzzle to figure out the kind of ghost that is haunting the area was intriguing to me, and gave the player agency in a way that I hadn't seen in many other investigative-style games. While the final form of *Reliqua*'s notebook was much more static than *Phasmophobia*'s, the initial intent was always to have that puzzle aspect to allow the player to feel involved in the story.

3. Design

The game begins with a menu explaining the main controls of the game, as well as introducing the player's position as a detective at the Denver police department. The player walks up to the police chief, who explains that they have received word about an accident that has occurred the same evening as the release of a new autonomous car. They have called the player character into the office from their vacation because they need their best detectives on the case. After being given the assignment, the player is told how to access the various menus. From here, the player can go either to the crash site or the hospital.

At the crash site there are 3 pieces of evidence to be collected and 1 NPC testimony to hear. There is a downed street sign, a dropped smartphone, and the crashed car itself to take a look at. The field officer will give the player an autopsy report once the player has collected the logs from the vehicle. The autopsy report and vehicle logs show that the victim died from a faulty airbag causing a broken spinal cord. The officer seems confused about how an accident was able to happen so quickly after the vehicle's release, but mentions that while the accident caused one fatality, the other three passengers in the car only sustained minor injuries.

At the hospital, the player can speak to the victim's family: their husband David and daughters Amelia and Charlotte. David shares that he tried to stop the car when he noticed the sign had fallen down, but the car wasn't responding. Charlotte says she and Amelia tried shouting at the car when David's command didn't work, but it seemed to freeze up and wouldn't work. Amelia will provide testimony once she has her phone

back, which has been dropped at the crash site. She shows a video on her phone that she accidentally recorded that shows the car malfunctioning while the girls shout at the console.

Once all evidence has been collected at the crash site and the hospital, the police chief will ask the player to return to the station. Upon returning to the station, the chief explains that they have spoken to the engineers at Reliqua and want the player to investigate there. At this point, the option to go to the engineers' office at Reliqua's headquarters opens up.

At the headquarters, the project manager Mark says that he's not sure how the car was able to malfunction the way it did, and why there was a faulty air bag. He suggests the player speak to the senior engineers, Ada and Brett. Ada seems really nervous, and she says that they conducted tests beforehand to make sure the car was working properly before shipping it out. She asks the player to find the footage from the crash tests on her computer. Brett is also confused by how this was able to happen, but says that he can take a look at the code if the player can grab a copy of it from his computer. Both Ada and Brett seem extremely tired, almost like they've been overworked, and Mark seems concerned about how they are doing.

Upon finding the crash test footage, the player can return to Ada and ask her why they performed only one test. She is extremely apologetic, and tells the player that everything went well, so they decided to ship it out on time since nothing was going wrong. She mentions that she's worried that Mark will try to find someone to peg this all on, and is willing to take the blame for the entire thing. When presenting the code to

Brett, they find an error in the code. He explains that they had not accounted for multiple people in the car when programming the software. They, too, are concerned about Mark trying to pin this on someone, and so he decides to take the fall for the rest of the engineers. When the player returns to Mark, he is shocked to find that the engineers were rushed and thus had made mistakes in their work. He had asked them if the current deadline was okay, and they had said yes. He was concerned about their well-being, but decided not to push the issue any further. However, since the engineers were nervous about telling Mark about needing more time, they didn't tell him and just kept working under too tight of deadlines. Mark thanks the player for figuring out what happened, and assures them that he and the team will take care of it from here. He suggests the player return to the station to let the chief know what is going on.

At the station, the player tells the chief everything that happened in regards to the accident as part of a final puzzle to piece everything together. After this, the credits roll, saying that Reliqua pulled the vehicle from the market for a year to work out any errors in the construction, and were very careful about testing the product before releasing it again. Reliqua also donated a part of the proceeds of the vehicle's sales to a college fund they have set up for Amelia and Charlotte. The victim's family is doing well, and they keep their memory alive through stories and jokes.

The game itself is meant to be short, between 15 and 45 minutes. In this section I will be going into detail about the different design elements of the game and my reasoning behind implementing these specific elements.

3.1. Game Mechanics

Reliqua follows a first-person perspective, with standard WASD/arrow key movement controls and camera movement using the mouse. The player can interact with people and objects using the "E" key. There are three menus in the game: the evidence notebook, the navigation notebook, and the game menu.

The evidence notebook is mapped to the "tab" key, and shows the player the current notes that the player character has written about currently collected evidence. Each time a new piece of evidence or testimony has been collected, the notebook is updated to reflect new information. The evidence notebook is meant as a sort of recap for the player to access at any time, as well as a clarification point in case dialog or evidence descriptions caused any confusion about the relevance of certain pieces of evidence. Each page of the notebook begins with some general notes written in black. The player character adds speculations and ideas, and as more evidence is collected, the player character notes changes or narrows down options by writing them in blue.

The navigation notebook is mapped to the "Q" key, and provides an interface for traveling to the different locations in the game. Initially, it only shows three locations: the police station, the crash site, and the hospital. Once all evidence has been collected in these three locations, the final location, the engineers' office at Reliqua's headquarters, comes available. This menu also opens when the player interacts with the doors in each location.

Finally, the game menu is mapped to both the "escape" and "R" keys. This menu has the volume controls for the game as well as a button to exit the game.

I wanted the mechanics of the game to be as simple as possible so the player could focus more on the story and the mystery. Movement mechanics are intuitive for anyone who has played a Windows game before, and all other buttons are either prompted on the screen or explained in the beginning tutorial.

In the future, I would like to take more inspiration from *Phasmophobia* by making the notebook one large menu with tabs to view the navigation menu and game menu. I would also like to change the evidence portion of the notebook to be some form of puzzle or tactile mechanic so the player feels more immersed in the game.

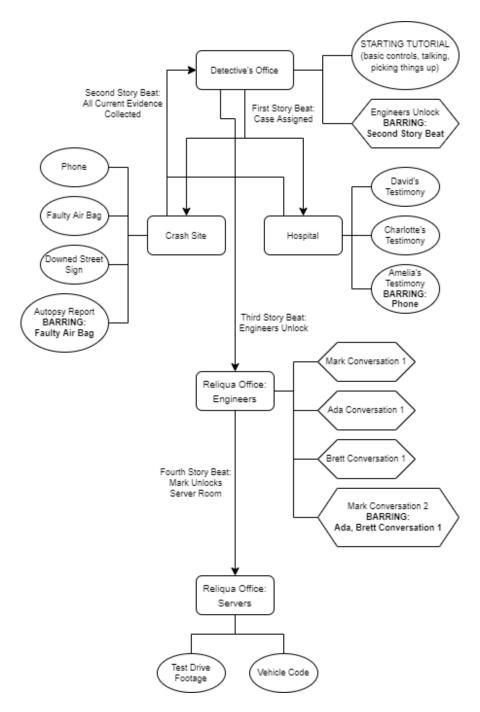
3.2. Narrative

The narrative structure of *Reliqua* is non-linear, with story beats driving the plot forward at certain milestones. The player is free to wander the crime scene and interview the witnesses at the hospital as they will, and once all evidence has been collected in both places, the engineers' office is unlocked. After the player arrives at the office, they speak to the project manager, Mark, and then the two engineers, Ada and Brett. The player can then collect evidence at Ada and Brett's desk, speak to them again, then speak to Mark again, before returning to the police station and finishing out the story.

The narrative went through multiple iterations in the process of creating *Reliqua*. At first, it was going to be completely linear, with branching paths causing three endings depending on the player's decisions. I personally like making games where the player's choices matter in some way, even in a miniscule capacity, and so this form of narrative structure came second-nature to me. However, when I decided to make the move to non-linearity, I found that it would be difficult to implement these multiple endings in the time I had remaining in my project. I was also concerned about multiple endings meaning that one or many of them would not be satisfying, and while I enjoy covering hard topics in my work. I find it important to have a satisfying, and most of the time, at least marginally happy ending. Many would argue that things rarely work out so well in the real world. However, I find that imagining and telling these endings in my stories, or as the Broadway musical *Hadestown* puts it, "seeing the world, not for what it is, but for what it could be," provides the hope and the strength to continue in a harsh reality. And thus, I wanted to make sure Reliqua had some form of a satisfying ending, and a happy one, if at all possible.

In the future, I may like to combine the two forms of narrative I used to implement *Reliqua*'s story. Make it non-linear in the player's ability to collect evidence and speak to people in whatever order they would like, to encourage player agency, but then allow the player's choices in dialog and evidence collection to have a meaningful impact on the story. That way, the player can feel like they are the detective, and can affect the world of *Reliqua* in a tangible way.

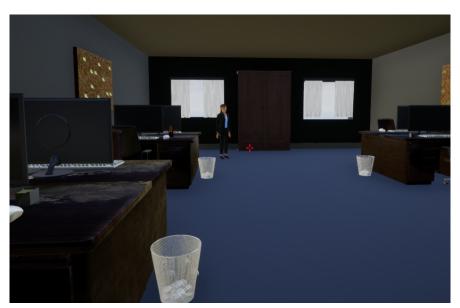
In future versions of *Reliqua* I would also like to get into the worldbuilding of this sci-fi society a little more. I had come up with the idea that this is a world where oceans have risen enough that the setting of Denver, Colorado is now extremely close to the coastline, and this background information was mentioned in early forms of the narrative. However, this bit of worldbuilding isn't mentioned in the final product as I felt it was too extraneous of information for the scope of the project. In the future, I would like to revisit this and other worldbuilding ideas for the America shown in *Reliqua* in order to drop bits of lore in the dialog periodically and to provide a living, breathing setting for the events of *Reliqua* to take place in.



The final flowchart for Reliqua's narrative structure. Source: Personal notes.

3.3. Art

Reliqua's art is entirely 3D, with assets purchased or found for free on the Unreal Marketplace or CGTrader. These assets were then loaded into Unreal Engine 4, with some assets being edited through Blender before being moved into UE4. While I had wanted to create this game entirely on my own, I found as I was going from 2D art to 3D that I did not feel comfortable with creating 3D assets myself. Since I was barely comfortable making 2D assets, I decided instead to download models from other sources for use in my game. I learned through my transfer from 2D to 3D that it is important to know your own strengths and weaknesses and when to search for external means of achieving your goals.



The police station where the player begins the game. Source: Screen capture

I focused mostly on low-poly assets for the people and the props in the world. My reasoning for this was two-fold: I personally like the style of low-poly assets and thought

it fit the style of the game fairly well, and I thought that it would make things easier to modify if I needed to, since I have rudimentary knowledge of Blender and its uses.



The office at Reliqua's headquarters where the player can find the engineers and project manager.

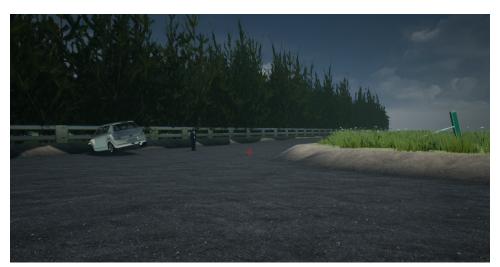
Source: Screen capture

While the models I purchased for the non-playable characters included animations, none of them really fit the general feel of the scene the characters were in, so I decided not to add animations to these characters. I could have made new animations myself, but this would have taken a lot more time for me to figure out how to do this, time of which I was not sure I had in the scope of this project. Perhaps in the future I'll add animations to make the world feel more alive.



A wide view of the hospital where the victim's family can be found and questioned. Source: Screen capture

When looking for environmental assets, I wanted to make it as realistic as possible. UE4 is the engine to use if you want well-rendered and realistic maps, and so I wanted to use it to its full potential. However, when looking for character assets, I went for more simplistic and blocky, much like the style of *That Dragon, Cancer*, to avoid needing to animate smaller details.



Wide shot of the area where the autonomous car crashed. Source: Screen capture

In hindsight and on further consideration, it is possible that the low-poly characters and the high-poly environment pieces clash with one another and cause a somewhat confusing experience. The artwork itself lacks a cohesiveness to it that I was trying to create in the other pieces of the game. In future iterations I may decide to adjust the artwork so it is all low-poly and stylized to create that cohesive feeling I was looking for in these other aspects of the game.

3.4. Music

The music of Reliqua was all created in Garageband on my iPad Pro. All four songs in the soundtrack have the same melody, and are all played in the key of F minor. Three out of the four songs are made using a swing rhythm, with two eighth notes taking up the same amount of time as a triplet would in normal orchestral music. This style is commonly used for jazz music, and many investigative tunes use this rhythm as well. These three pieces are also played in 4/4 time at a rate of 80 bpm. The final song on the soundtrack, the hospital theme, returns to a straight rhythm, with the melody's pacing drawing out more and becoming more ballad-like. The song is still in 4/4 time, but slows to a rate of 60 bpm to maintain that ballad-like style.

The main theme and the track heard in the police station both carry the main melody on the marimba, with a high-hat playing a casual swung rhythm in the background. The main theme also includes a tambourine and a cabasa playing different rhythms at the same time as the hi hat, and it also has a brass ensemble playing a short echo between melodic statements to provide emphasis and fill the space. In contrast, the police station track is only the melody and the hi-hat, to create a more ambient track that still provides cohesivity while allowing the player to tune it out more easily since there's less going on.

The track heard in the engineers' office uses a synth and a more metallic hi-hat to provide a more "techie" feel. The synth's more plucky sound provides the added effect of something feeling off, with that quirkiness that characterizes engineers in many ways shining through in the differently orchestrated piece. This version of the melody is more

noticeable than the other songs on the soundtrack, a decision that I will probably change in future iterations of the game.

Finally, the song played in the hospital sees the melody playing on a grand piano, with no other instruments accompanying it in the background. The idea was to utilize the silence to provide the feeling that something is missing (in this case, the victim) while also fixing the concern I had early on that a soundtrack usually found in investigative settings wouldn't sound quite right around the grieving family of the victim.

Accompanying the music are a few sound effects, as well. At the crash site, there is no music, in an attempt to expand upon that feeling of something missing in the hospital. Instead, all that plays is the sound of the wind in the crash site, the remnants of the storm that knocked down the street sign at the site. There are a few UI sounds as well, namely a page turning when the player opens up a menu and a scribbling sound when the evidence notebook is updated.

While I liked using the different instruments I did to portray different feelings at each location, I feel the engineers' office track needs to be toned down in order to maintain that confusion and quirkiness while also not distracting the player while they are trying to play the game. A soundtrack should act as an embellishment upon everything else, and not permeate through the rest of the game so it is hard to concentrate on the tasks set forth in the game itself. If the player wanted to just listen to the music, they would be on Spotify right now, not trying to play a video game.

4. Evaluation

In order to evaluate the success of *Reliqua*, I needed to conduct playtesting to hear other people's voices besides my own. While I knew exactly where to go in each level, other gamers would not. While I knew how to make the game work perfectly for me, other gamers did not. And I wanted to make sure that they tried their absolute hardest to break my game so I knew how to build it back up.

The survey was distributed alongside the itch.io page where the players could download the game primarily through Discord. The choice to use Discord over email was made in order to cater to the desired age group better: very few college-age students check their emails, but most of them at least glance at their Discord notifications from time to time. The use of pings (@everyone or @here) were avoided if at all possible so as to remain approachable to potential playtesters, as many find these pings annoying, especially for something that they would probably consider unimportant in many ways.

The message was formatted in the following way, though depending on the audience the wording was sometimes changed slightly:

"Hello all! In case you don't know me, my name is McKenna Gameros, and for my MS project I created a mystery game for Windows. If you have the time, could you please play through it and give me your thoughts through the attached survey? It would really help me figure out how well I accomplished my goals. Please answer as many questions as you can, as your feedback will help me improve the game and will greatly assist my research, but don't worry if you can't

answer everything. You can just skip the question or put N/A in the field. Thanks so much for your time, you're helping my research a lot!

CONTENT WARNING: This game is a murder mystery, and it covers themes of death, loss, and injury. There is no graphic imagery in the game, but if the discussion of any of these themes may upset you, please don't play my game. You are under no obligation to play the game or complete the survey; you can leave either at any time.

https://mgameros.itch.io/reliqua

https://forms.gle/M43cxNhpwqzyJyDn9"

In order to operationalize the opinions of my playtesters, I decided to create a Google Form to ask about different pieces of the game. The survey consists of mostly ranked agree/disagree questions, with a few free-form writing, multiple choice, or "select all that apply" questions as needed. The agree/disagree questions go on a scale of 1 to 6 so the playtester cannot stay neutral on any question. In all of these ranked questions, a lower number denotes that the player disagrees with the question more, whereas a higher number denotes that the player agrees with the question more. Playtesters were surveyed on the following subjects:

Section 1: Demographics

The playtester's major field of study and experience with the mystery genre. None of these questions are able to identify the playtester specifically. These questions are

generally to see trends for different groups of people: do engineers enjoy this game more than non-engineers, can the story be followed by people not accustomed to a mystery format, etc.

Section 2: Playability

Can the game be played from beginning to end? Is there anything causing unnecessary difficulty to the player? Does the player feel like they understand where to go without being completely railroaded to the next goal? Without a playable game, the story cannot be truly effective.

Section 3: Story Comprehension

Did the player understand why the car crashed? Did it make sense? This game aims to provide a realistic scenario for the player to explore so it can allow them to connect the story in the game to real life. If the player has trouble understanding what happened, then it was not fully explained and cannot properly get its point across. This section also asks questions about the message of the game and its clarity. Did the player actually learn anything from this at all? While the game is mostly made for entertainment, I want to see if my message on the importance of communication came across to the player at all.

Section 4: Key Components of a Mystery

In my studies on the mystery genre while creating this project, I found there were 7 key features of a mystery that I wanted to use in my game:

• A Strong Hook: get the player invested in the mystery immediately.

- Player Involvement: allow the player to piece together the mystery themselves.
- Narrative Momentum: making sure the story keeps going at a good pace
- Foreshadowing: hint at future elements in the story.
- Red Herrings: avoid making the solution too obvious by making something more important than it actually is.
- Suspenseful Dialog: have witnesses omit information, lie, or just not have the whole picture.
- A Satisfying Conclusion: make all the player's work worth it by tying up all the loose ends in a satisfying way. Doesn't necessarily have to be happy, though I personally prefer happy endings.

While most of these techniques could be measured with one or two questions, I found foreshadowing, red herrings, and suspenseful dialog to be difficult to quantify; all three of them are writing techniques that the player shouldn't be aware of while playing.

Instead, I decided to ask if there were any parts of the mystery that the player didn't expect, since all three of those techniques could fall under that umbrella.

Section 5: Suggestions for Improvement

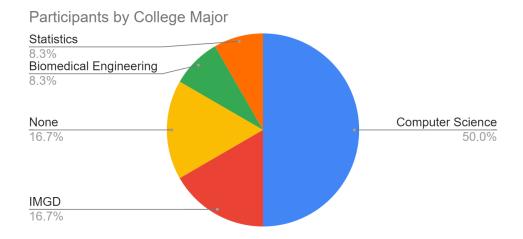
These questions ask the player about what they would think about if certain features were added, and if the player had any suggestions for any other features. In particular, this game was meant to have a puzzle aspect when solving the case, and the survey asks if this puzzle aspect would add to the experience in any way. Since creating the survey itself I did add a portion of dialog to the end of the game that allows the player to go through the details of the case to provide a puzzle aspect to the game. However, the

nature of this question was to gauge if the player would prefer a more tactile experience of solving a puzzle in the game.

Finally, at the end of the survey, there is an optional question for the player to provide their email address if they need playtesting credit. This information is only visible by me, and it will not be published or shared anywhere else.

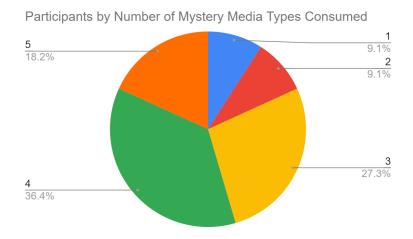
As of June 17, 2022, 11 playtesters have answered the survey. While I had planned for a sample size around 25, much of the player base I sampled are either experienced in game design practices or are a part of my desired demographic, which are people who enjoy the mystery genre.

4.1. Demographics

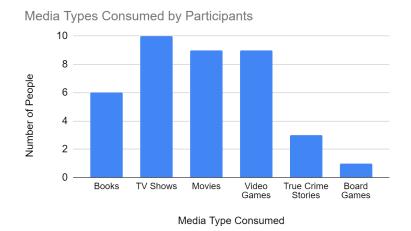


Because many of the servers I sent Discord messages to were mostly populated by either current or former technical students, the demographics of this playtest is heavily skewed towards these technical fields. I am curious as to how a group of students who majored in more artistic subjects, such as English or Fine Arts, would respond to this

survey. It may be something I would be interested in testing in the future, after the scope of this project.

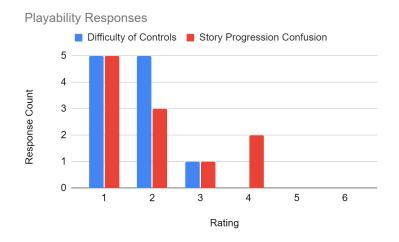


For this question, my main goal was to learn how much mystery media these playtesters consumed. In hindsight, it may have been better to ask how often they consumed this media as well, but I thought, the more diverse the media types a playtester consumed, the more likely they are to enjoy mysteries. In this instance, about 82% of these playtesters consume at least % of the listed types. One person even filled in an extra type, the mystery board game, which I had forgotten about when filling out the survey, but considering how popular games such as Clue are, perhaps I should have put this among the options to select.



I also thought it would be interesting to see what types of mystery media are most popular, especially to see if a mystery video game would actually be worthwhile in terms of consumer interest. While almost everyone (about 91% of playtesters) noted that they watched television shows like BBC's Sherlock or NCIS, movies and video games were not far behind, tying for second place with about 82% of the group.

4.2. Playability



There were two scaled questions on playability:

1. How difficult was it to understand the controls of the game?

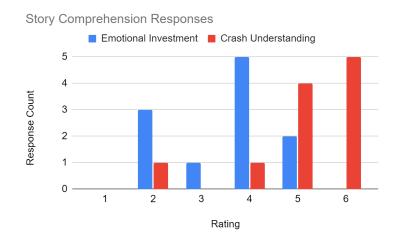
2. Were you ever confused as to where to go next?

For both questions, most of the answers favored more towards lower numbers. On the first question, nobody answered above a 3, indicating that the controls of the game were very easy to understand. On the second question, nobody answered above a 4, indicating that while there were a few people who had some difficulty finding where to go, most everyone was able to find their way through the levels fairly well.

Upon looking at the free-form questions about control schemes, something I noticed is that the players would have preferred the menus open and close with the same button, as well as that they would have liked the notebook to be one menu instead of three for evidence, navigation, and game options. In addition, a few people suggested the controls be posted on the screen so the player can reference it while playing. However, if the menus were all combined into one button, it probably wouldn't be a problem, since the only controls that would be different from normal controls would be the menu button and the interact button.

The answers about player guidance were mixed. Some people said they got lost in certain places, while others said they thought that there was too much guidance over where to go. It is possible I could rework pieces of both to make sure there's more guidance in the places that people struggled to find things and less in places where it's clear where to go.

4.3. Story Comprehension



There were two ranked questions in the story comprehension/narrative section of the survey:

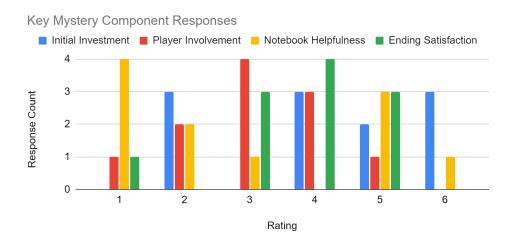
- 1. Did you feel emotionally invested in the lives of any of the characters?
- 2. Did you clearly understand what caused the car crash?

For the first question, while the answers were mixed, overall they trended towards the middle rather than to either extreme. This denotes that, rather than feeling either extreme for these characters, either strongly caring about their lives or strongly not caring, they felt mostly ambivalent towards the characters. This means that, while the characters may have been interesting or not necessarily unfavorable, I could have done a better job at describing the characters and making them seem more like living, breathing human beings living in this world. In many people's explanations in the free-form question following this one, they suggested increasing the length of the game to allow the player to get to know the characters better, creating more varied dialog

opportunities between the player and the characters, and possibly adding animations to the characters to make them seem more alive.

For the second question, almost everyone responded with an answer above 4, meaning that they very clearly understood why the crash happened. Most playtesters also noted that the causes were very realistic for an autonomous car crash. However, a few people suggested adding further twists to the causes themselves to allow for more mystery regarding the incident.

4.4. Key Mystery Components



There were four ranked questions regarding key mystery components in this survey:

- 1. How invested did you feel about the incident upon first hearing about it?
- 2. How involved did you feel in the unraveling of the mystery? Did you feel like an outside observer or an active participant in the investigation?
- 3. How helpful did you find the notebook mechanic when piecing together the mystery?
- 4. How satisfying did you find the ending to be?

Most players answered above a 4 when asked about their initial investment in the incident. This shows that the players were hooked by the premise well.

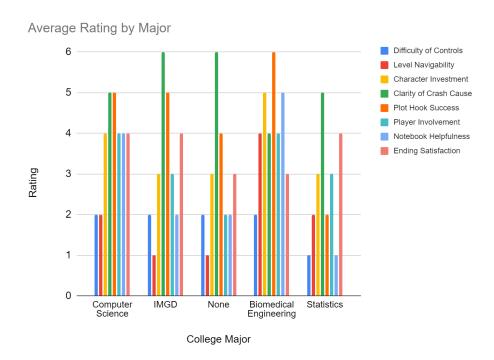
While the answers about how involved players were in the unraveling of the mystery varied between 1 and 5, the largest number of people answered either 3 or 4, with most of the answers skewed towards feeling like an outside observer rather than an active participant. This shows that even those who felt like active participants in the story felt fairly ambivalent about it, meaning that the notebook mechanic was not enough to allow the players to feel like they were actively solving the mystery themselves.

When asked about how helpful the players found the notebook, their answers were extremely varied. However, the largest number of players answered somewhere between 1 and 3, meaning that the notebook was not helpful to them when trying to solve the mystery. When asked what they would change about it, some people said they completely forgot about the evidence notebook or didn't seem to know it existed, while others suggested more interactivity or navigability within the menu. It does seem like the evidence notebook left much to be desired when it came to helping solve the mystery.

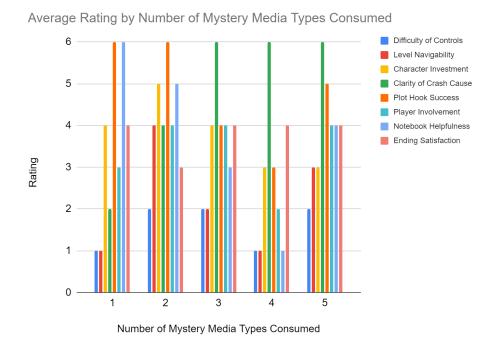
When asked about ending satisfaction, the players mostly answered between 3 and 5. While it seems that players were at least somewhat satisfied by the game's ending, the trend towards 3 or 4 means that most people were ambivalent towards the ending. Upon hearing from playtesters in more free-form questions, they noted that the second half of the game, when the player is discussing the incident with the engineers, is weaker than the first half, and the dialog and gameplay of this part could definitely be reworked to make the story more engaging and the ending more satisfying. Playtesters

also suggested that the game perhaps include multiple accidents that happened within the same period of time to add to the chaos of the incident and to allow the player more areas to investigate.

4.5. General Observations



Since the largest number of participants studied computer science, their average responses are more reflective of a larger group of playtesters. The responses of this group trend favorably for the game (ie, the controls are easy to understand, the notebook is helpful, the ending is satisfying). Answers to the more free-form questions about the game were more focused on the playability of the game, preferred control schemes, and suggested streamlining of the game's mechanics. I noticed people studying more technical fields were more satisfied with the game as a whole.



As expected, more of the people who responded to this survey consume 3-5 types of mystery media than 1-2. This makes sense because this game would be more intriguing to people who enjoy more mystery media. While there wasn't much in the way of a trend towards any of the ranked questions, as shown in the graph above, I noticed that people who consumed more mystery media had more suggestions for how to improve the narrative to make it more intriguing. Players who were more familiar with the mystery genre suggested an addition of red herrings, more conversations with certain characters, or the addition of an executive at Reliqua that is trying to cover up the entire situation.

Overall, I noticed that playtesters were especially satisfied with the pacing and playability of the game. Many had suggestions about adjusting the menus in a way that would make it more user friendly, and while they felt the story was well-paced, not many playtesters were surprised by anything in the mystery itself. It seems in the future I'll

want to change pieces of the narrative, especially the second half, if I want the game to be a satisfying mystery.

While I didn't receive as many playtesters as I had set out to find, the feedback I received from these players is invaluable to my evaluation of this game and my future plans for improvement. It was interesting to see how the players' fields of study and enjoyment of the genre affected how they viewed the game, and I would like to take these thoughts into account when making adjustments to the game in the future.

5. Conclusion

Reliqua takes inspiration from multiple well-made games, from the interactivity and evidence collection of *Detroit: Become Human* to the dialog and intrigue of Phoenix Wright to the non-linearity of Telling Lies to the notebook design of Phasmophobia. While Reliqua draws inspiration from each of these games, it seeks to create an experience from that inspiration that is unique and entertaining in its own right.

The design of the various pieces of the game all seek to add to the experience of the game in one way or another, whether it be the non-linear structure of the narrative, the stylized design of the models, or the swung rhythm of the music. Each piece of the game, like a well-made puzzle, seeks to fit together to create an experience where each part of the design informs the other and creates a strong narrative.

While the playtesters agreed that the game's pacing was good, the controls were easy to understand, and the ending was fairly satisfying, they all had suggestions for how to improve the game and make the mystery more enjoyable. In future iterations of the game, I would like to combine all the menus into one large notebook with tabs to take the player to the different menus. I would also like to expand upon the engineer characters, as well as rewrite the second half of the story and possibly lengthen the entire thing to create more mystery and make things a little less straightforward. In addition, while not mentioned in the playtesting feedback, I would like to replace the more realistic scenery with more low-poly and stylized models to create a cohesiveness to the scenery.

Overall, the experience of creating this project has been extremely educational and invaluable to my growth as a writer and as a game designer. While there are still many pieces of the game left to be desired, it was a great start for an interesting game that can be improved upon later to create a portfolio piece that will truly impress future employers.

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Appendix A: Player Survey

1110	ank you for playing Reliqua! Please let me know what you thought of the game.
Wh	at is your major field of study?
0	IMGD
0	Engineering
0	Computer Science
0	Other:
Wh	ich forms of mystery media do you enjoy? (check all that apply)
	Books (ie, Sherlock Holmes, Agatha Christie, Nancy Drew)
	TV shows (ie, BBC's Sherlock, NCIS)
	Movies (ie, Murder on the Orient Express)
	Video Games (ie, Nancy Drew, Phoenix Wright, Professor Layton)
	True Crime Stories (ie, Buzzfeed Unsolved, Morning Cup of Murder) Other:

These questions all have to do with how well the game plays mechanically.
How long did you play the game for?
< 5 minutes
5-15 minutes
15-30 minutes
30-45 minutes
45 minutes - 1 hour
> 1 hour
Did you finish the game?
○ Yes
○ No
◯ It was unclear
If you didn't finish the game, why didn't you?
There was an error preventing me from continuing
○ I got bored
I didn't understand what to do next
Other:

How difficult was it to understand the controls of the game?
1 2 3 4 5 6 Very easy to understand O O O O Very difficult to understand
Is there a control scheme you would have liked to have used, but were unable to? Your answer
Do you have any additional comments about the controls? Your answer
Were you ever confused as to where to go next?
I was never confused O O O O I was frequently confused
Do you have any suggestions about guiding the player where they need to go? Your answer

Narrative	
These questions how well you und	all have to do with the narrative of the game: your thoughts on the story, erstood it, etc.
Did you feel en	notionally invested in the lives of any of the characters?
l wasn't at all i	1 2 3 4 5 6 nvested O O O O I was extremely invested
Was there anyt	hing that would have made you more invested in any of the
Your answer	
Did you clearly	understand what caused the car crash?
	1 2 3 4 5 6 That was going OOOO I knew exactly what was
I had no idea w o	1 2 3 4 5 6 That was going OOOO I knew exactly what was
I had no idea wo	1 2 3 4 5 6 That was going OOO OOO I knew exactly what was going on
I had no idea w	1 2 3 4 5 6 that was going OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
What went wro	1 2 3 4 5 6 that was going OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
What went wro	1 2 3 4 5 6 That was going O O O O I knew exactly what was going on ong that caused the car crash? (Select all that apply) crashed the car deliberately was impaired by a substance ze up rakes were cut
What went wro	1 2 3 4 5 6 that was going OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO

Were the reasons the car crashed realistic?									
Your answer									
Do you have any suggestions for alternate reasons for the	crash?								
Your answer									
To the best of your knowledge, did the game have a clear m	nessage?								
○ Yes									
○ No ○ I don't know									
How do you think the addition of an evidence puzzle would experience of the game?	improve the overall								
Your answer									
The Mystery									
These questions all have to do with techniques specific to the my	stery genre.								
How invested did you feel about the incident upon first hearing about it?									
1 2 3 4 5	6								
Not interested at all	\sim								

	1	2	3	4	5	6		
Outside observer	0	0	0	0	0	0	Ad	ctive participant
How helpful did you mystery?	find the	notebo	ook med	:hanic \	when p	piecin	ıg toge	ether the
	1	2	3	4	5	5	6	
Not helpful at all	\circ	\circ	0	0			0	Very helpful
	t would	have m	nade the	e noteb	ook m	necha		ore helpful to
Is there anything tha you? Your answer	t would	have n	nade the	e noteb	ook m	necha		ore helpful to
you?	t would	have m	nade the	e noteb	ook m	necha		ore helpful to
you? Your answer				e noteb	ook m	necha		ore helpful to
ou? our answer				e noteb	ook m	necha		ore helpful to
you? Your answer Did you feel the stor				e noteb	ook m	echa		ore helpful to
you? Your answer Did you feel the story Yes				e noteb	ook m	necha		ore helpful to

Were there any revelations in the mystery you didn't expect? Yes No										
If so, what didn't	you expe	ect?								
How satisfying (did you fir	nd the end	ling to be	?						
	1	2	3	4	5	6				
Not at all	0	0	0	0	0	0	Very			
Suggestions for Improvement I would love to hear your feedback about your thoughts on the game! Anything that wasn't covered previously that you'd like to let me know, or any elaborations you didn't get to put in previous questions. Player feedback is very important to me!										
If you could remove one thing from the game, what would it be? Your answer										
Do you have any Your answer	further si	uggestion	ns to imp	rove this	game?					