

Understanding Metagaming Mechanics in Interactive Storytelling

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Abstract

Understanding Metagaming Mechanics in Interactive Storytelling

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Metagaming, any action taken outside of a game world with the goal of aiding gameplay, has traditionally been discouraged within the genre of interactive storytelling because it breaks immersion. With the development of new forms of narrative games, there are more and more games that use metagaming-based mechanics within the design of the game. However, we currently do not understand the impact that these mechanics have on the player's narrative experience. This project involved the analysis of existing games that utilize a specific metagaming-based mechanic, rewind/redo, in order to develop a formal vocabulary. This vocabulary informed the design of three versions of an experimental game. This game, titled *Rough Draft*, was used in a formal research study that gathered empirical data through qualitative and quantitative results analysis as well as observations of gameplay practices. Significant findings include qualitative response trends that support our theoretical claims as well as results that provide additional insights into best design practices for interactive story games that utilize a rewind/redo mechanic.

1. INTRODUCTION

When we play a game, we bring with us outside knowledge that the characters within the game do not possess, and this knowledge will inevitably have an effect on how we play the game. Metagaming refers to anything that exists outside of the world of the game that is used to aid or progress gameplay, and has always been a part of gameplay. It exists in a number of game genres ranging from online multiplayer games to tabel-top rpgs [5]. Traditionally, game designers disapproved of metagaming because it broke immersion and was considered cheating in many genres. The former is especially true with regard to the genre of interactive storytelling. Scholars have historically believed that interactivity interfered with a good story [1] and metagaming, interactivity which broke the boundaries of the story world, was even worse [10]. Despite this, numerous successful games exist that encourage metagaming [5] and recently, even interactive storytelling games, like *Life is Strange* have begun to incorporate metagaming within the game itself as a core mechanic [10].

Traditionally, the choices given to a player in interactive storytelling were finite. But when players did not like the outcome of a choice they had made, they would often perform actions, such as turning a system off and restarting it to replay from an old save file, in order to remake a past choice. Now, games like *Life is Strange* and *Save the Date* among others have begun to incorporate this practice as a core gameplay mechanic [10]. These games have been incorporating this mechanic as a core part of the game and as something that the player must take advantage of in order to succeed. However, there is very little research on how metagaming impacts player engagement in interactive storytelling, and as a result, game designers do not have the information necessary to maximize its use.

As metagaming becomes a core part of the interactive storytelling experience,

there is a need for reliable research regarding how this mechanic effects player engagement. Our goal is to determine how a specific form of metagaming can impact player engagement within an interactive story and provide empirical data to designers so that they may better utilize this mechanic. We will specifically be focusing on how a player's ability to rewind and redo a past choice effects their engagement with an interactive story.

There has been a fair amount of research on metagaming as a whole, however there is little to none that focuses specifically on interactive storytelling and on the act of rewinding to remake a choice. The existing research focuses on the types of metagaming that exist within game genres, such as using knowledge you possess that your character does not to determine their actions in a table top RPG, or developing new strategies for countering gameplay mechanics in esport games [5]. It has also focused on understanding why players choose to metagame when its considered cheating [6]. However there is very little research on how metagaming impacts gameplay and narrative experience in interactive storytelling and none of the existing research has generated guidelines to provide to designers.

Our project sought to gain an understanding of how metagaming and rewind/redo mechanics function within the genre of interactive storytelling. Through the detailed analysis of existing examples, we developed a formal vocabulary for metagaming and rewind/redo mechanics within the genre, including identifying and defining three rewind designs, the Restricted Rewind, the Unrestricted Rewind and the External Rewind. This vocabulary informed the design of *Rough Draft*, an experimental game. We created three versions of the game, a Restricted Rewind version, an Unrestricted Rewind version and a control version that contained no rewind. We used these games in a formal research study in order to provide designers with empirical data regarding the effects of the rewind on the gameplay experience. Through the results of the study

we have gained quantitative data regarding players' reactions to and feelings towards this mechanic as well as its effects on engagement. Through analysis of qualitative data obtained from participants we have gained further insights into how the gameplay experience is affected by the rewind/redo mechanic. Through this project, we have developed a framework for metagaming mechanics within interactive storytelling that can be provided to designers to help them gain an understanding of how to best design a game with a metagaming mechanic that allows the player to rewind and redo choices as well as an understanding of how the design of one of these mechanics impacts the interactive storytelling experience.

1.1 Research Question

How does the incorporation of metagaming in interactive storytelling, through the design of a rewind/redo mechanic, effect player engagement when compared to traditional interactive storytelling?

2. BACKGROUND

Interactive storytelling gave users the ability to control story progression [15] and evolution through decision making [16], however, many were concerned that increased interactivity would interfere with user immersion [12]. Metagaming elevated the conflict between immersion and interactivity by further breaking the fourth wall, and was therefore frowned upon by designers who sought to prevent it [10].

Non-interactive narrative has experimented with metagaming-esque storylines that feature characters, typically trapped in a time-loop, trying to achieve a goal of some sort and having the ability to go back and retry it over and over. Each time they retry they bring new knowledge of what is to come that allows them to get a little further towards their goal. *Groundhog Day* is a classic example of a character trapped in a time-loop. He relives a single day over and over, taking actions and observing the outcomes but without any long term consequences, and the ability to make a different decision after the reset. Additionally, it features him gaining knowledge with each day that allows him to excel further and further after each rewind. Another example that more directly reflects the spirit of gaming is *Edge of Tomorrow* which features a soldier who is taken back to the day before a massive battle each time he is killed. With each subsequent day he is able to get further and further through the conflict, using knowledge of what happened on his previous attempt. Unlike other stories, these allow their characters and, by proxy, the audience to explore the possibilities and what ifs that come with each decision and cross-roads. And in the case of interactive storytelling, allows the players to take control and explore it all themselves.

2.1 Metagaming and Narrative Immersion

The ability to interact with a narrative brought up a number of questions and concerns. It is mentioned by Bizzocchi et al. [1] and Busselle et al. [4] that traditional linear narrative seeks to achieve narrative immersion through “willing surrender to the flow of the story” and the idea of transportation. The belief is that people will allow the events of the story to carry them along from start to finish and that they would become so absorbed in that progression that they would lose awareness of what is happening around them in the real world, as if they were within the story world itself. Bizzocchi et al. [1] then discusses how this idea conflicts with interactivity. If the user is supposed to allow the story to carry them along then they cannot be actively displaying agency in order to control the flow of the story. And similarly, if they are controlling the progression of the story then they cannot be carried along by it. Bizzocchi [2] revisits this idea that the more interactive a narrative is the harder it is to guarantee its quality, known as the narrative paradox, and defines the ways in which users can become immersed in an interactive narrative: through active engagement with dynamic process. He argues that readers of an interactive narrative become immersed because they are making the choices and controlling the world and therefore still feel that they are a part of it. Additionally, Ryan [20] asserts that players will become more engaged and immersed in an interactive narrative when they take on the role of a character within the story rather than simply observing the events from an outside perspective. In the case of metagaming games, this is still true.

However, metagaming inherently defies the concept of immersion within a story by breaking the fourth wall and allowing the player to use information that their character does not possess. In order to alleviate this, many interactive stories that use metagaming integrate a reason within the plot for the character’s (and player’s)

ability to rewind. This reflects another concept that is stressed by Ryan [19] which is integration of user action within the story, meaning that when the user is prompted to do something, there should be a story appropriate reason for it, or it should be at an appropriate moment within the story. In traditional interactive storytelling this applies to the timing of decision points [19]. This still holds true in an interactive story that incorporates metagaming, but in the latter, the ability to metagame must abide by this as well, by providing a reason and explanation within the story for rewinding.

Another rule that is stressed by Ryan [19] is dynamic creation of story, in other words, the story should change depending on the actions taken by the player, and they should feel that their actions are having an effect. As seen by Milam et al. [13], when the players are prompted to interact but feel like their actions are having no effect on the story or events within the narrative, they will become frustrated. This holds especially true in interactive stories that incorporate metagaming because here, the player can see through illusions of agency. In traditional interactive storytelling, many authors found that they could give the user the illusion of agency, instead of the user's choices effecting the overall progression of the plot, only the reaction of NPCs to a choice would change, but the plot progressed the same no matter what [9]. However, in an interactive story where the player is able to rewind and remake a choice, they will notice if making a different choice has no effect on the progression of the plot.

The implantation of this mechanic brings up some questions regarding the enjoyment of a story when you already know some of what is to come. It is clear that knowing what is to come will affect how players make choices, but Christenfeld et al. [7] discovered that people actually enjoyed spoiled stories more because they knew what was coming. It was believed that the spoilers helped reduce the cognitive load

needed for people to understand the progression of the story and therefore increased enjoyment. Ultimately, metagaming comes from players' desires to replay and retry in the hopes of preventing failure and disaster, which is something that game design has already been accounting for [14]. If the rules and theories of interactive narrative [20] are referenced in the design and implementation of a metagaming mechanic it can be used successfully within an interactive story without breaking story immersion.

2.2 Metagaming as a Practice

The practice of replaying an interactive narrative in order to explore different outcomes sits within a larger category of gameplay practices known as metagaming. Metagaming is a broad term used to refer to the act of letting information from outside of the design and world of the game influence the gameplay [5]. Metagaming comes in many forms and exists within many game genres. While the concept of metagaming is incredibly broad, Carter, Gibbs and Harrop break it down [5] when they discuss three of the most common and well known forms of metagaming and use these examples to develop a more specific vocabulary for what metagaming is and refers to.

According to Carter et al. [5] the most common forms of metagaming are “as a higher strategy”, “a peripheral consideration” and “additional content”. The first form, strategy, refers to the form of metagaming that is seen in online multiplayer and e-sport games. In these games' communities, players figure out the best ways in which to use and counter certain mechanics, typically by taking advantage of designed mechanics in ways that they were not initially intended for and using internet forums to converse with other players to develop strategies. These strategies are often encouraged by the games' designers despite not having been created by them or put into the game itself and are typically referred to by players as “the meta”. The second

form, the peripheral consideration, refers to the metagaming that is seen in tabletop RPG games. Here, a player would often make their character act based on information that the character did not possess within the game world but that the player did. For example, an experienced RPer is playing a new game. From a past experience they know that a stone their character just picked up is probably magical so they try to make their character do something with it despite the fact that their character has had no clues within the game that would indicate magic. This form of metagaming is often considered cheating and discouraged because it breaks the fourth wall of the game world. The final form discussed, the additional content, refers to achievements and similar “bonuses” that are awarded to players for performing specific tasks that are not necessarily a part of the game but exist alongside it. For example, crashing a large number of cars in a racing game in order to get an achievement, even though it makes no sense within the game world to do so. Carter, Gibbs and Harrop use these examples to define metagame as anything that exists outside of the world of the game, and anything that exists within the game is referred to as the orthogame. Finally, they define anything that is peripheral but alongside the game as paragame.

Recently, some games have begun to implement metagaming inspired mechanics into their gameplay [21]. *Braid* is a platformer game that allows the player to rewind time instead of giving them multiple lives but also builds its puzzles and levels with the idea that the player will have to rewind in order to clear them. While the mechanic is incorporated into the gameplay and therefore taking advantage of it may not be partaking in metagaming, it is still something that was inspired by metagaming. When you rewind in *Braid*, you are now able to try and retry with knowledge that you previously did not have, something players used to do manually [17]. Similarly, the RPG *Undertale* allows, and requires the player to restart and replay the game. When they replay, the player can play differently, based on knowledge of the outcomes

of their actions they obtained through their initial playthrough, and will obtain new and important story information. Replaying the game at least once is necessary to experience the entire story of the game but multiple playthroughs with different approaches to gameplay will yield numerous variations of events and story content. Additionally, the narrative of the game will acknowledge this act of restarting and replaying through in game dialogue. These mechanics embrace the metagaming practices of retrying a challenge within a game over and over again, each time learning from mistakes and getting a little further, and restarting to try different options in order to explore all the possible outcomes that you can experience. They fit well into the medium of video games, as time in videogames is, for the most part, nonlinear by nature [17].

2.3 Metagaming and Interactive Storytelling

Interactive stories that incorporate metagaming typically need to build their story in such a way that the player has to rewind and remake choices in order to experience the whole thing, otherwise there is no incentive to using the mechanic. Dickey [8] discusses that there are essentially two kinds of interactive narrative: the kind where people can affect the events that are taking place, and the kind where people can effect the order in which the events are taking place. In the first, people will make choices that determine which events out of a larger pool of events are experienced. In the second, most, if not all, events are experienced, but the choices made by the player determine what order they are experienced in. Metagaming stories tend to fall in to the second category, because the player will ultimately experience every piece of the plot, but will have control over the order that the experience it in.

The act of rewinding while playing an interactive story in order to remake a past choice is far less talked about when compared to the other examples of metagaming

discussed above, but fits within Carter et al.'s definition of a metagaming practice and specifically as a form of peripheral consideration. When a player rewinds to remake a choice, they are remaking this choice based on information that is to come, information that their character does not necessarily possess. Historically, the act of rewinding to remake a choice, like the act of using knowledge you possess to influence a character's actions, was viewed as cheating and frowned upon [10]. But the reasons behind why players would partake in an act viewed as cheating can be informative for game designers trying to understand the player mindset. Consalvo [6] goes into a lot of detail on what players think can be considered cheating, including taking actions outside of the world of the game that gives you an advantage, and why they would partake in such actions. One of the things that the players defined as cheating was "anything other than getting through the game all on your own". Metagaming, which is defined by using external aids, typically in the form of knowledge, to gain an advantage, would fit under this definition. But Consalvo [6] also provides insight into why players would perform such an action if they considered it against the rules. Among the players' reasons that were stated was "because I was stuck"; getting stuck, or simply being displeased with the progression of events was where the act of rewinding and redoing began. If people did not look up guides ahead of time they did not know where the choices they were making would lead. If they did not like the choice or it lead them to a dead end, they would reload old save files and remake that choice with the hopes of gaining a better outcome. Players often justify this strange form of cheating, which is also a form of metagaming, in that it will help them finish and enjoy the game.

Designers would go to great lengths, implementing systems such as auto-saves, to try and prevent this practice [10]. But recently, some narrative game designers have embraced this practice rather than shunning it. Games are starting to appear

on the market where the ability to rewind and remake a past decision is a part of the design or the key mechanic required to complete the game. *Life is Strange* features a teenaged girl who gains the ability to rewind time and begins using it to try and prevent the negative outcomes of an increasingly dangerous events that start to take place around her. It allows the player to remake the last choice or two they made, which in turn gives players the ability to explore multiple immediate outcomes before choosing and also features choices where the correct answer is not available on the first try but can only be acquired after making the wrong choice and rewinding. This can be seen in Figure 2.1.



Figure 2.1: *Life is Strange* gameplay depicting the same choice before and after a rewind unlocks the “correct” answer (the underlined one).

Zero Escape: Virtue’s Last Reward is about a group of people trapped in a mysterious building with no knowledge of how they got there or what is going on outside, who are then forced to play a dangerous game together. The protagonist has the ability to move between different parallel timelines and the player is able to revisit any choice in the branching narrative that they have previously made. In order to obtain the game’s true ending, the player must use this rewind to explore all of the

branches and obtain information that will allow them to progress.

Save the Date is a visual novel about taking your girlfriend out on a date where, for some reason, she keeps dying. The goal of the player is to try and prevent this and the game allows the player to save whenever they like, then reload an old save file. Similar to *Life is Strange*, in order to proceed past decision points, the player will typically have to make multiple “wrong” choices in order to unlock the “right” choice and proceed. A sample of gameplay from *Save the Date* can be seen below in Figure 2.2.

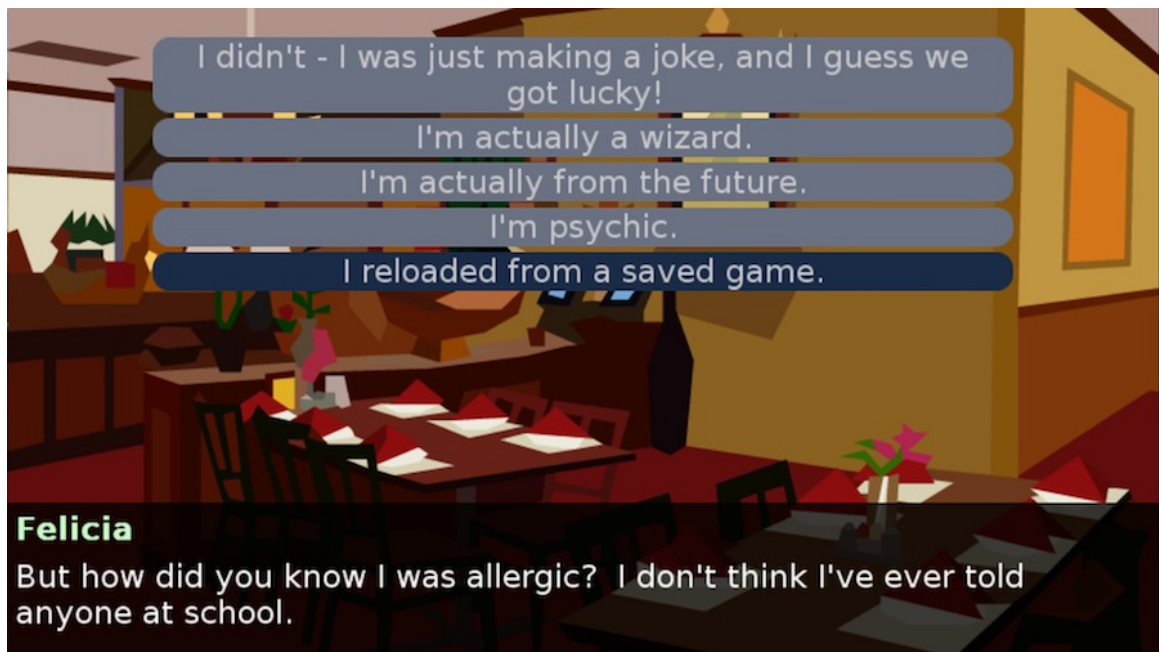


Figure 2.2: Screenshot of *Save the Date* gameplay.

The Stanley Parable is designed around the idea of the player replaying the game from the beginning multiple times in order to make different choices and experience different branches of the story. *The Stanley Parable* has a heavily branching narrative and numerous choices and endings, the goal of the game is to keep replaying it and

trying different choices to see where they lead you. All of these games display a different kind of narrative structure from that of traditional interactive narrative; one in which every branch of the story can be explored to some degree, and the key to success lies in that exploration of all the branches. The games also feature a setup where there is only a single good ending that can be achieved through the use of the mechanic. This is illustrated well by *Virtue's Last Reward's* story map (see Figure 2.3), where you can see a heavily branching story tree, darker green icons indicating “lock” points and numerous endings but only a single true ending. In order to proceed to the true ending the player will need to explore every branch of the story and obtain information that will undo the “locks” allowing them to continue. This tree can be accessed in game at any moment and is what facilitates the player’s ability to rewind to any previously made choice.

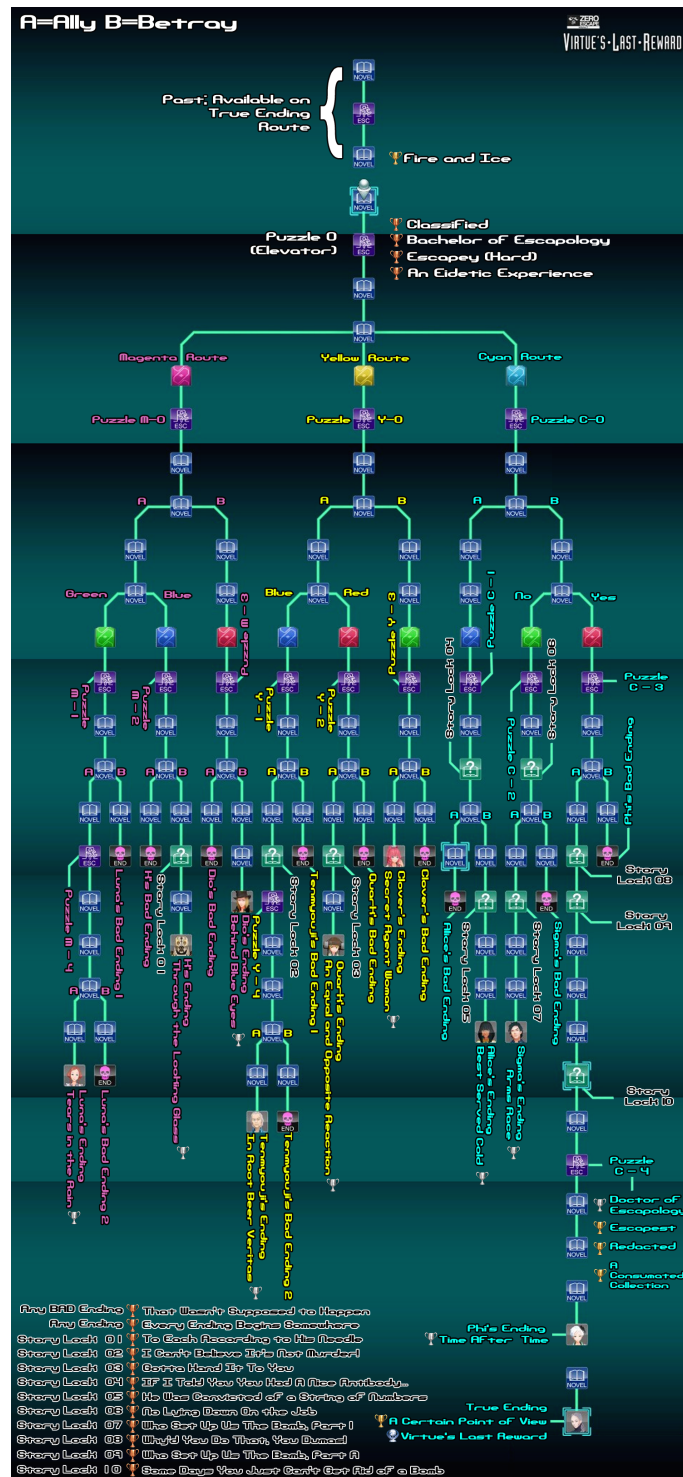


Figure 2.3: The story map for *Zero Escape: Virtue's Last Reward*.

3. DEFINING METAGAMING MECHANICS

The analysis of existing games that use rewind/redo as a core mechanic has been used to inform the development of a formal vocabulary and theoretical framework regarding metagaming and metagaming based mechanics within the genre of interactive storytelling.

3.1 A Formal Vocabulary

Metagaming traditionally refers to any action taken outside of the world or design of game, however the mechanics that we are discussing are a key part of the games' designs. As such they are not metagaming in the traditional sense, and we instead define them as "Metagaming Mechanics". By "Metagaming Mechanic" we refer to a mechanic that is based off of traditional metagaming practices but has been adapted as a core mechanic within the design of the game. By core mechanic we mean a mechanic that is necessary to use in order to experience or beat the game in its entirety. So while metagaming typically refers to something that is not a part of the design of the game, a metagaming mechanic is a part of the design of the game, but is based on an action that traditionally was not.

An example of a metagaming mechanic outside of Interactive Storytelling would be *Braid's* time reversal mechanic. Inspired by platformer players' need to restart or replay upon failure, the rewind not only allows players to avoid death but is necessary to clear obstacles and puzzles within the game. Another example, from the RPG *Undertale*, is having the player restart the game and play differently in order to experience the rest of the game's story. This restarting and replaying is necessary if the player wishes to have a complete understanding of the story's events, otherwise

they will likely be confused and unsatisfied. In the case of *Undertale*, the events that reveal the most important part of the game's story cannot be experienced until the player replays at least once.

In the case of Interactive Storytelling, which is the focus of this thesis, the rewind/redo mechanic has been identified as a "Metagaming Mechanic". It should be noted that this is different than a game that is designed to be replayed, in that the rewind is a core part of the gameplay, and that the game cannot be fully completed or experienced without using it. The rewind is the game's core mechanic, it is a primary part of how the player is able to interact with the story and experience agency. As opposed to a game narrative that features a time leap into the past but otherwise follows a single linear route, the metagaming mechanic grants the player the ability to explore significantly different events and parts of the story through drastically different gameplay choices. It is also something that the player has some degree of control over, with the nature of that control varying depending on the design.

We define a story that properly incorporates the "Metagaming Mechanic" as the "Metagaming Plot". A proper "Metagaming Plot" will feature an in story explanation for the ability to rewind and will be structured in such a way that it cannot be fully experienced or understood without use of the rewind mechanic.

A proper "Metagaming Plot" will properly incorporate the abilities that the mechanic grants to character and player. If the plot fails to properly explain why the character, and player, is able to go back and remake a choice, then the player will become disoriented and disengaged with the story, as the interaction does not make sense. The most popular explanation for why a character is able to "rewind" is time travel. *Life is Strange* and *Zero Escape* both feature characters who possess some sort of ability to travel back in time, and both stories focus heavily on theories of the butterfly effect and branching timelines. The time travel story format is a popular

one that predates games and can also be seen in non interactive storytelling. The previously mentioned films *Groundhog Day* and *Edge of Tomorrow* also feature characters who use time travel in some way to redo events over and over until they get them right.

While this is the most popular explanation for a character or player's ability to rewind and redo, it is not the only one. *The Stanley Parable* and *Save the Date* break the fourth wall by acknowledging that they are just a game and that you are simply replaying or reloading an old save. Interactive storytelling must strive for the integration of user actions within the story. As such, the player of a game with a rewind mechanic cannot simply be given the ability to go back and redo a choice without any narrative explanation, or narrative immersion will be broken [18]. An example of how the plot of *Save the Date* incorporates the mechanic, through acknowledgement of the fact that it's a game, can be seen in Figure 3.1.



Figure 3.1: The plot of *Save the Date* recognizes that it is a game and calls the player out on the act of rewinding.

Additionally, a proper “Metagaming Plot” will be structured in such a way that use of the rewind is rewarded with story content. The narrative is structured so that the entirety of story cannot be experienced without utilizing the rewind mechanic. By rewinding, the player is not simple experiencing *more* story they are experiencing *the rest* of the story. As opposed to a game where you can replay it and maybe get some bonus info that is not integral to understanding the story or events, the rewind grants you access to significant amounts of key information necessary to fully understanding and experiencing the story and game. And you experience these events and acquire this information by making very different gameplay choices. Without rewinding, it

may be possible to complete the game, depending on how the rewind is designed, but the story will not be completed and the experience will likely be confusing and unsatisfactory. Through this design, story both integrates the rewind mechanic and rewards and justifies its use.

Most existing interactive stories that utilize a form of rewind mechanic, as well as non-interactive stories that experiment with storytelling based off of the concept of rewinding and redoing, follow a common structure. They typically feature a protagonist on a quest to save a person or people by preventing a horrible disaster one that they know is coming because they have already experienced it and have now come back to prevent it. In essence, these stories follow the structure of the epic plot, which lends itself well to game design [18]. Through the use of their “rewind power” the protagonist is able to progress a little further on their quest each time they rewind, and try again each time they fail. However this plot structure is not how a “Metagaming Plot” has to be set up. The key aspect is that the character has a distinct goal and that the events they experience threaten their ability to reach that goal. The rewind is used by the character (and player) to “navigate” around these events and progress.

3.2 The Structure of the Rewind

By analyzing existing interactive stories that incorporate “Metagaming Mechanics”, in the form of a rewind/redo mechanic, we have identified and defined three distinct types of rewind design.

The first design, which is displayed by *Zero Escape*, is the “Unrestricted Rewind”. This design allows players to revisit any choice they have previously made and remake it. In this design, the player will eventually reach a block in the story where the correct answer or choice will only be available after information has been collected

from elsewhere in the story tree. This requires the player to explore all of the story branches in their entirety, searching for this information, in order to complete the game.

The second design is the “Restricted Rewind” which is displayed by *Life is Strange*. In which the player can only go back to the last choice they’ve made. This design requires the player to make different choices at a single choice point over and over, each time observing the immediate outcome of their choice and then going back to try another one. They do this until they unlock the correct answer or until they have experienced all of the outcomes and are ready to choose the one they wish to proceed with, but will be unable to revisit this choice once they’ve moved to the next one.

The final design type is the “External Rewind”, displayed by *The Stanley Parable*, where the game is designed around the idea that the player will replay the game from the beginning over and over in order to explore different choices. These games feature branching story trees that can be completed from beginning to end in a single play-through, but, similar to the “Unrestricted Rewind”, the story can only be experienced and enjoyed in its entirety if you explore every branch by restarting after completion and making different choices. As was discussed previously, the player doesn’t just get *more* story when they restart and make new choices, they get the *rest* of the story. Unlike a game designed for replaying which may only grant minimal additional content, the story acquired through replaying and making different choices is a part of the overall story of the game necessary to experience it properly. Another aspect of the “External Rewind” that separates it from simply replaying is the amount of agency the player has. The player has the ability to replay the game, make different choices, and drastically change the events they experience or the ways that they take place. As opposed to replaying a game and experiencing the same story and events with only minor differences, or experiencing only a single, small amount of different

events that is merely a continuation of an already experienced linear story. Having high amounts of agency to change things and explore options as well as high amounts of variation to the events is the key to the “External Rewind” design.

All three design strategies are built around the idea that the player must take advantage of the rewind mechanic in order to complete the game in its entirety, however the scope of the rewind drastically changes the gameplay experience. In a game where the player can revisit any past choice, they will be revisiting them with far more information regarding the outcomes and far more freedom than in a game where they can only revisit their last choice. However, in a game where they must revisit their last choice and remake it numerous times in order to unlock the correct answer, they may be rewinding more frequently.

Because the experience is significantly different between designs we have decided to use different rewind designs in my study, the “Restricted” and “Unrestricted” Rewind, and compare them to each other as well as a traditional control. we have chosen to exclude the “External” Rewind from my study in order to keep the scope of my project within reason. While the “Restricted“ and “Unrestricted” rewinds both feature in game controls for the rewind, the “External” Rewind design does not involve the player rewinding during a single play-through, but instead, restarting after completion. As such it is notably different in implementation than the other designs, and was the one we chose to exclude.

4. PROJECT DESIGN

We created a single story that was used for three different versions of an interactive narrative game. One of the games featured an unrestricted rewind, a second featured a restricted rewind and the final acted as a control with no rewind mechanic. The design of the game strived to adhere to applicable rules of interactive narrative, such as user action integration within the story and dynamic creation of story [19]. The goal was to conduct a test that would measure player engagement in games designed around a rewind mechanic and compare it to engagement in a traditional interactive storytelling game. In doing so, we hope to gain insight into the impact of metagaming on interactive storytelling that could be provided to designers so that they may better utilize the mechanic.

In the two versions with the rewinds, the player had to use the rewind mechanic in order to complete the game, this allowed us to observe how interaction and engagement changed based on the design of the mechanic. In order to ensure that the story was largely the same between the three versions, plot points were moved around and choices were altered slightly to ensure that the same events would be experienced in every version, the only thing that changed was the order they were experienced in. This was to minimize differences in the narrative from becoming a variable in the study. All of the versions of the game, titled *Rough Draft*, were plotted out initially using the Twine software and then created using the Ren'Py visual novel software and designed to resemble an author typing a story on a typewriter. The author's voice was present via text on the bottom of the screen, where she would react to her own writing and voice her opinions or frustration, this was to help remind the player of their position in relation to the story. This can be seen in Figure 4.1; the text for the story is displayed in the upper portion of the screen while Denise's voice is on the

bottom portion reacting to her own writing.

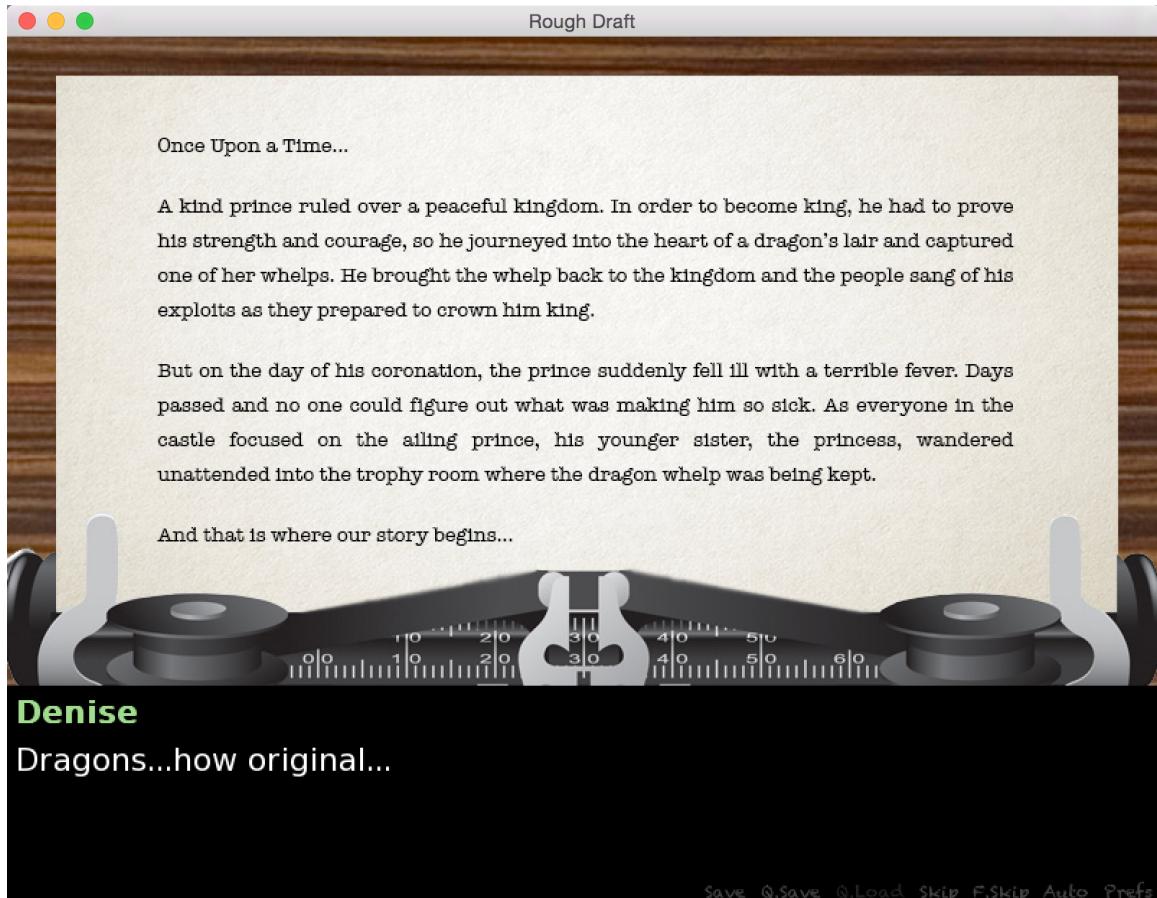


Figure 4.1: An example of how text is presented in *Rough Draft*

4.1 Story Design

Rough Draft is about Denise, an author who is trying to write a children's book. However, her deadline is fast approaching and she has written barely anything. As the player, you take control of Denise and help her guide her characters and her story towards a conclusion by making decisions at choice points, an example of which can be seen in Figure 4.2.

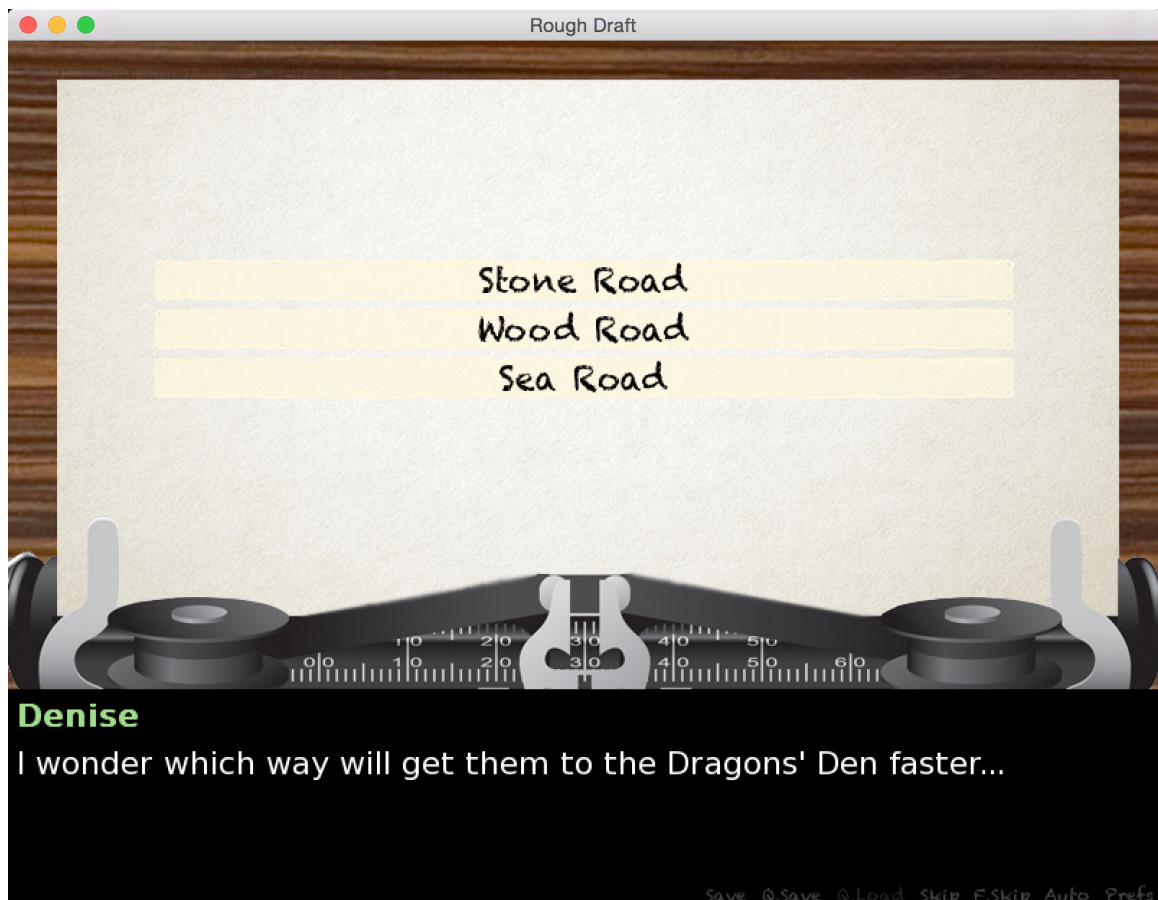


Figure 4.2: An example of a choice point in *Rough Draft*.

Denise's story is about a young princess, Reina, whose older brother abducted a young dragon and was subsequently cursed by its mother. Reina has taken the young dragon, Lyre, and the pair is traveling across a fantastical land in order to return him to his mother in the hopes that she will lift the curse. Along the way they encounter a number of characters and obstacles that either help them or impede their journey. The goal of the player is to help Denise complete the story by guiding Reina and Lyre towards their destination. However, in the two rewind versions, some decisions can get the characters stuck in bad situations that will require the player to go back and remake a choice.

In the design of our story, we have chosen to try and break away from the time travel framework discussed in the previous chapter. Additionally, in order to try and create something a little different, we've also chosen not to use the format that "it is a game". Instead we used the format of an author writing a story. Because she is in the process of writing, and because a lot of the story is still in her head, she is able to go back and change things. This provides an explanation for why the player, who is playing as the author, is able to go back and remake a choice when things do not go as planned. Additionally, most of the existing stories are about a hero trying to avoid failure, however the other side of that coin is trying to achieve success, which is one of the motivations behind the action of metagaming. As such, Denise's story is about a hero trying to achieve a goal, and avoid failure on the way.

4.2 Denise's Story

In a small kingdom, the prince was ready to ascend the throne and become king. However, he first had to prove his strength. In order to do this he journeyed into the heart of a dragon's lair and captured one of her whelps (a baby dragon). He brought the whelp back to his kingdom and the people prepared to crown him king. However, on the day of his coronation, the prince fell ill and no one could figure out why. Among this chaos, the prince's younger sister, Reina learned that her brother's illness was probably the result of a curse cast by the dragon whelp's mother. She snuck into the trophy room and made a deal with the captured whelp, that she would return him to his mother in exchange for curing her brother. Reina and the whelp, Lyre, set out from the castle and come to a crossroads. They can follow the Sea Road along the coast, the Wood Road through the forest or the Stone Road through the mountains. (In the Restricted and Control versions only the Sea and Stone Roads were available at this first choice.

On the Sea Road, Reina and Lyre would hitch a ride on a pirate ship, which would subsequently be attacked by sirens. With the sirens' song pulling the ship towards a rocky shore, Reina has two options, she can try to help the pirates or escape the ship. The nature of the next series of choices varied slightly depending on the version, but in all versions the player would ultimately be forced to escape the ship and meet the mermaid. The mermaid would tell Reina about the flowers that grow in the forest as well as how to drown out the sirens' song by playing an instrument. Reina would then return to the ship and locate a lyre that she could play to drown out the song. Upon trying to play the lyre, Reina would realize it was too quiet and locate a trumpet to play instead. With this she is able to drown out the song and save the pirates from the sirens. In exchange for her aid, the pirates return her to shore and give her the dragon's bane potion and information about the tunnels under the Dragons' Den.

On the Stone Road, Reina and Lyre would follow the road into the mountains. After a while, a troll would start chasing them forcing Reina to run along the narrow path. Ultimately, Reina would slip off the edge of the cliff and be hanging on the edge with the choice of either letting go or continuing to hang on. Hanging on leads to Reina being saved from the troll by a group of satyrs who live in the mountains, but ultimately tied up and imprisoned in their village as a punishment for waking the troll. While in the village, Reina learns that a satyr child has eaten a poisonous plant and is able to treat them in exchange for her and Lyre's freedom. The chief gives her a burn ointment as thanks as well. Letting go causes Reina and Lyre to fall into the forest. Reina passes out on the landing but later wakes up beside a campfire and a centaur. The centaur takes her to a tree with a Phoenix nest in it, where he asks her to retrieve an egg. The ordeal is a test and the correct answer is for Reina to leave the egg in the nest, where it belongs. As a gift for passing the test, the centaur gives Reina an ornate knife that can be used to slay dragons.

On the Wood Road, Reina and Lyre come to a witch's cottage amidst the trees. When Reina knocks on the door, a young boy answers but immediately slams the door when he sees Lyre. The pair realize that there is a grave next the cottage and determine that the boy probably lost someone to the dragons. Reina decides to find the flowers that the mermaid spoke of to pay respects at the grave. After watching this, the boy lets the pair into his home. He introduces himself as Kyle and tried to discourage Reina from traveling to the Dragons' Den, as it is no place for humans. Reina begs Kyle to show her where the den is and ultimately trades him the potion and the knife she received in exchange for the information. Kyle leads them to the den but leaves them at the entrance.

At the Dragons' Den, Reina can either sneak in through the tunnels that the pirate told her about or try to talk her way in through the main entrance. Entering the tunnels would lead to the pair being chased by an enraged dragon and forced to hide in a small cavern. Here, they meet Ysa, Lyre's sister, who is hiding from a group of satyrs who've been harassing her. Reina reassures and encourages Ysa, and in return, Ysa tells Reina that she'll find their mother in the nesting chambers above. At the entrance, Reina learns that a whelp was injured during her brother's venture into the lair. She offers to use the satyrs' burn ointment to heal the injured whelp and is allowed in. After witnessing healing the whelp, one of the dragons tells her to ask their mother about the woman with the strings, believing it may help Reina's cause.

In the Nesting Chambers, Reina meets Lyre's mother, who thanks her for returning her son but refuses to lift her curse on the prince. However, when Reina asks about the woman with the strings she learns that ages ago, the dragon mistakenly killed a man, widowing his young wife. She explains that the woman forgave her for her mistakes, but always played a sad song on a string instrument, which Lyre was

named after. Remembering the forgiveness she experienced and that she was able to learn from her mistakes, the mother releases the curse from Reina's brother, on the condition that no human enter the den uninvited again. Reina promises to use her power as the princess to make this so. A dragon flies Reina back to her kingdom where she sees that her brother has recovered from his mysterious illness, and he is soon crowned king.

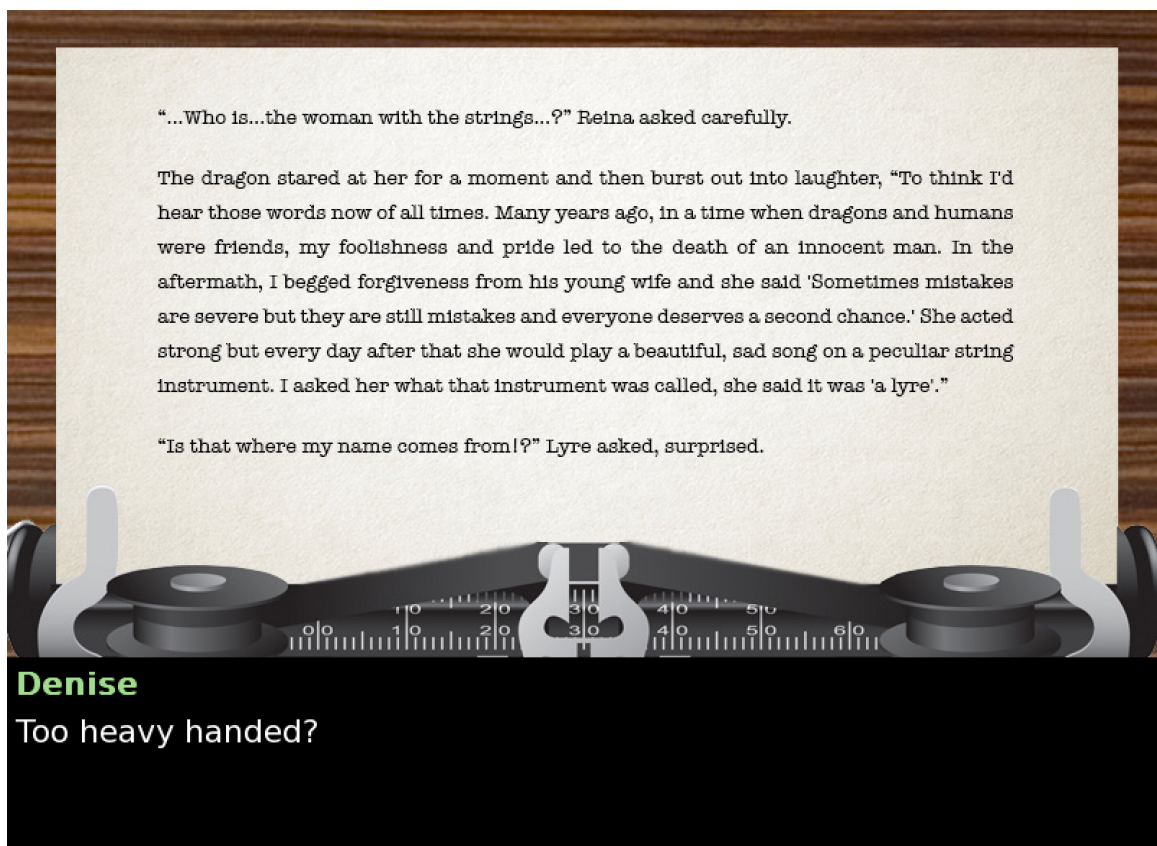


Figure 4.3: A sample of writing from *Rough Draft*.

For the sake of the study, the story experience needed to be kept short and therefore the story needed to be kept simple. As a result, it was decided that Denise was

writing a children's book and the narrative arc and plot progression were written to resemble one. A sample of the writing from the end of the story can be seen above in Figure 4.3 and an additional example can be seen earlier in this chapter in Figure 4.1.

4.3 Adapting the Story to the Rewind Structure

This story was applied to all three versions of the game that were used in the test. In order to ensure consistency the story was adapted so that all events were experienced in every version and differences between choices were minimal so that they do not skew the test results. In Figure 4.4 the flow charts for all three versions of the game can be seen side by side. The green nodes indicate story content that can only be reached by unlocking an option that will lead to it. The blue arrows indicate which white nodes contain key items or information that unlock those options and allow the player to reach the green node. In both rewind versions, the player would need to make choices in order to obtain the key items or information and then rewind in order to use it to unlock the choice that would allow them to proceed.

The story featured four main events that occurred, the events of the sea road, the events of the stone road, the events of the wood road and in the events of the dragons' den. In the unrestricted version (center) the first choice made by the player would cause the story to go down one of three branches (either the sea, stone or wood road). Each branch of the story was a different event, with the fourth event (the dragons' den) taking place after the initial three branches were completed. Because the player could return to any previously made choice, they could easily explore all of these branches by revisiting and remaking the initial choice.

In the restricted version (left), where the player could only return to the last choice they had made, the events were structured to occur one after another, and the order

they would take place in was determined by which route the player chose to explore at the initial choice. For example, if the player chose to go down the sea road in the restricted version instead of the stone road, they would still experience the events of the stone road, but they would happen after they completed the sea road. If they chose to take the stone road at the first choice then the sea road would come later.

The control (right) was structured similarly, with events taking place one after another and the order being determined by what the player chose to explore first. In order to ensure that all events would take place even without a rewind, the control version featured a lot of illusion of choice, ensuring that the players choices would guide them in the right direction and no events would be missed. Because the game was only used for the study, and players were not permitted to replay it, and therefore they were unaware of this illusion of choice.

In all versions, the player's choices brought about different resulting events and changed the progression of the story. By ensuring that different choices would bring about different events, and that the story could only be experienced in its entirety by witnessing all events, use of the rewind mechanic was justified.

Although the designs of the structures of the three games were different due to the way the rewind mechanic functioned in each version (or did not in the case of the control) the same story was able to be applied to all three versions. The exact number of and nature of choices had to vary slightly from version to version but the story content was largely the same. The main difference was how much story content was presented to the player between choice points, which varied from version to version depending on the rewind design and resulting story structure. In our case, this was done for the sake of the study to ensure that all participants would experience largely the same story regardless of which version they played. Links to all three versions of the game can be found in Appendix A.

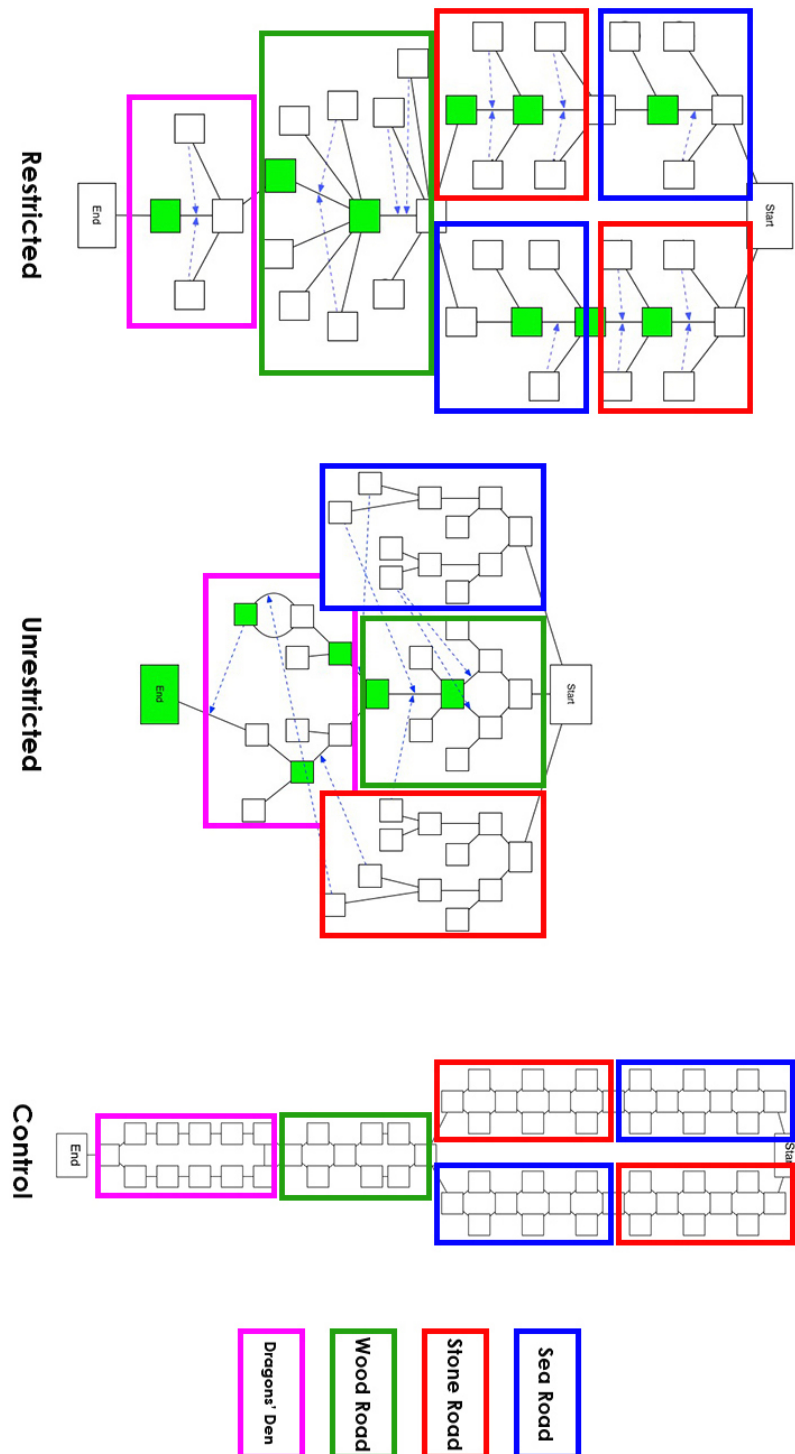


Figure 4.4: All three layouts, color-coded to show when the different events occur in each version. More detailed diagrams of each individual version can be seen later in this chapter

4.4 Unrestricted Rewind

The Unrestricted Rewind version of *Rough Draft* allowed the player to return to any previously made choice. This could be done by selecting the “Rewrite Something” option at choice points. This can be seen below in Figure 4.5.

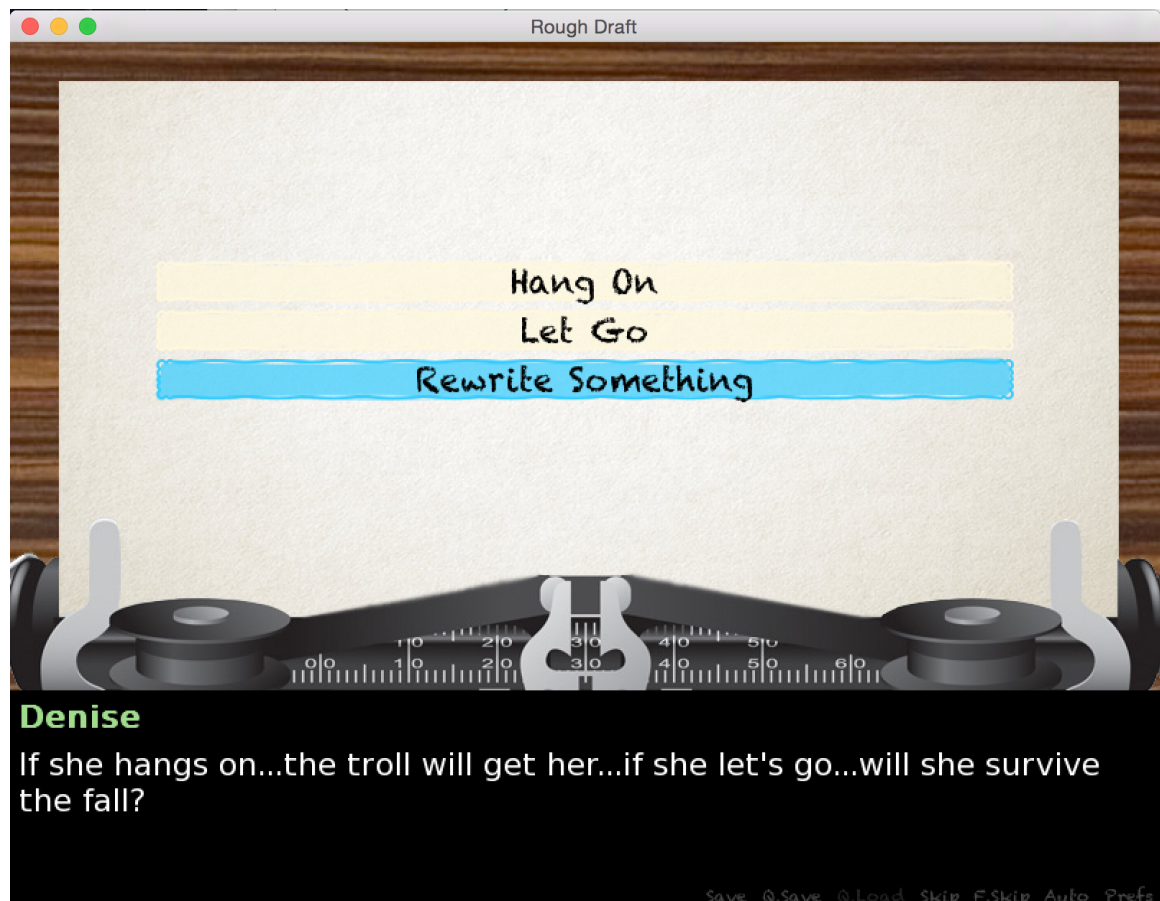


Figure 4.5: An example of the “Rewrite Something” choice in the Unrestricted version of *Rough Draft* which could be used to rewind to past choices.

The design of this version of the game was referenced largely from *Zero Escape* which facilitated its unrestricted rewind through the use of an interactive story map. As a result, this version of the game featured a series of charts that outlined the

events of the story and filled in as the player made choices. In Figure 4.6 we can see how the overall story map changed as the player proceeded through the game. In the map on the left the player has only made choices on the Sea Road, the other routes are blank to indicate that they have not been explored. The map on the right would be from later in the game, after the player has explored all three routes, they are now all filled in to indicate such.

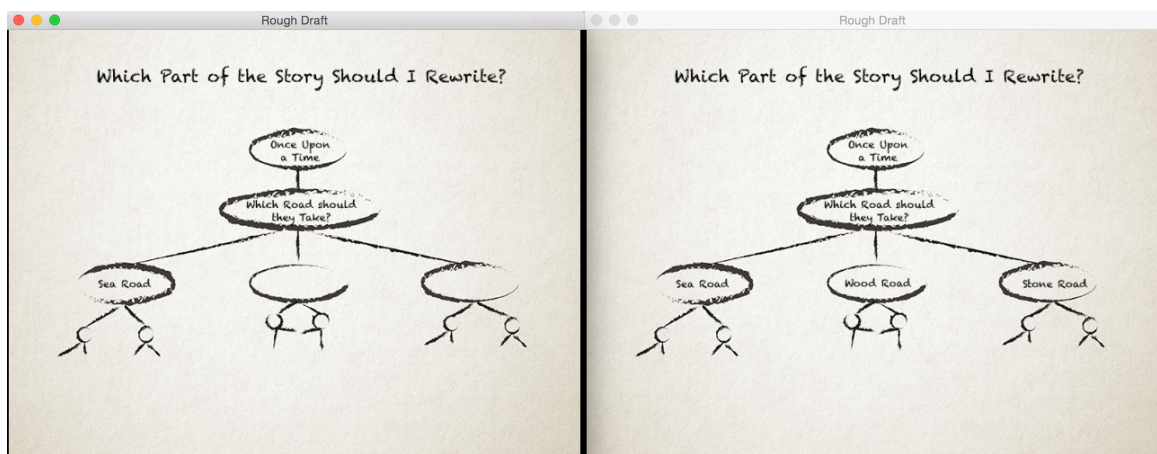


Figure 4.6: The story map fills in as the player makes choices and explores the story

It was through these charts that the player was able to return to past choices and keep track of which choices they had made. Through playtesting, it was determined that the unrestricted rewind could not function properly without the flow charts, as players would lose track of where they were in the overall narrative's structure. Visually, the charts in *Rough Draft* were designed to resemble hand drawn story maps that an author would be creating as they were working on a story. This was to maintain the visual feel of the game.

Taking queues from the existing examples, and refining them through playtesting, the charts were designed so that they would initially be blank. As players made

choices, the nodes on the charts would fill in with text that stated what choice was being made at that point of the story. Filled in nodes indicated choices that players had already made. Players could return to previously made choices by selecting on of these nodes. Dead ends were marked on the map by an “X” over the node to indicate that the player had already experienced that outcome and that it was the wrong one. This can be seen on the left in Figure 4.7.

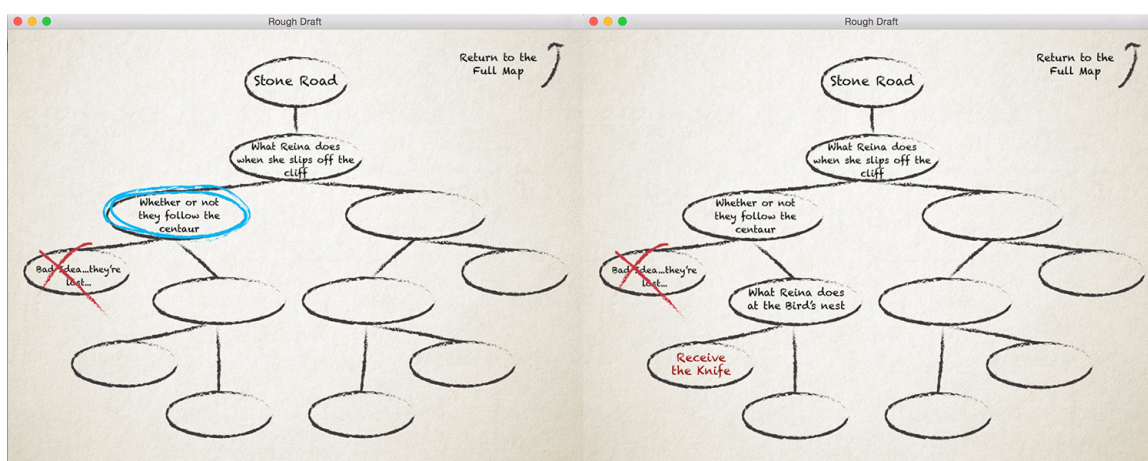


Figure 4.7: The specific map for the Stone Road story branch in *Rough Draft*

The overall story map featured the three main branches of the story and each of these branches led to a more detailed map of the events of the specific branch. Like the overall map, the detailed maps would also fill in as the player made choices and when a player made a choice that led to a bad end it would be marked on the map. In order to progress through this version of the game, the player would have to seek out key items or information that would unlock previously unavailable choices in other parts of the story. When one of these key points was discovered it would be marked on the map in red text which can be seen on the right in Figure 4.7 above.

Similar to *Zero Escape*, in the unrestricted rewind version of the game, the player

would need to explore every branch of the story in order to find the key items and information that would unlock the choices that led to the ending. In order to explore all of the branches, the player would have to go back and make other decisions at choice points. Not all choices were mandatory to complete the game, however at least one choice at every choice point did have to be made. In this way, use of the rewind mechanic, which allowed the player to revisit any past choice, was necessary in order to complete this task and win the game. The flow chart for the Unrestricted Version of the story can be seen below in Figure 4.8, green blocks indicate key items or information and green lines indicate a choice that can be unlocked using those items and information. The blue arrows indicate which key item or information would unlock which choice. Through use of the rewind mechanic the player would rewind and explore all of the branches, collecting the key items, unlocking choices and proceeding to the end of the game.

at every choice point, in this version the option was only presented to the player after they had reached a bad end as a result of making the wrong choice, this can be seen in Figure 4.9 below.

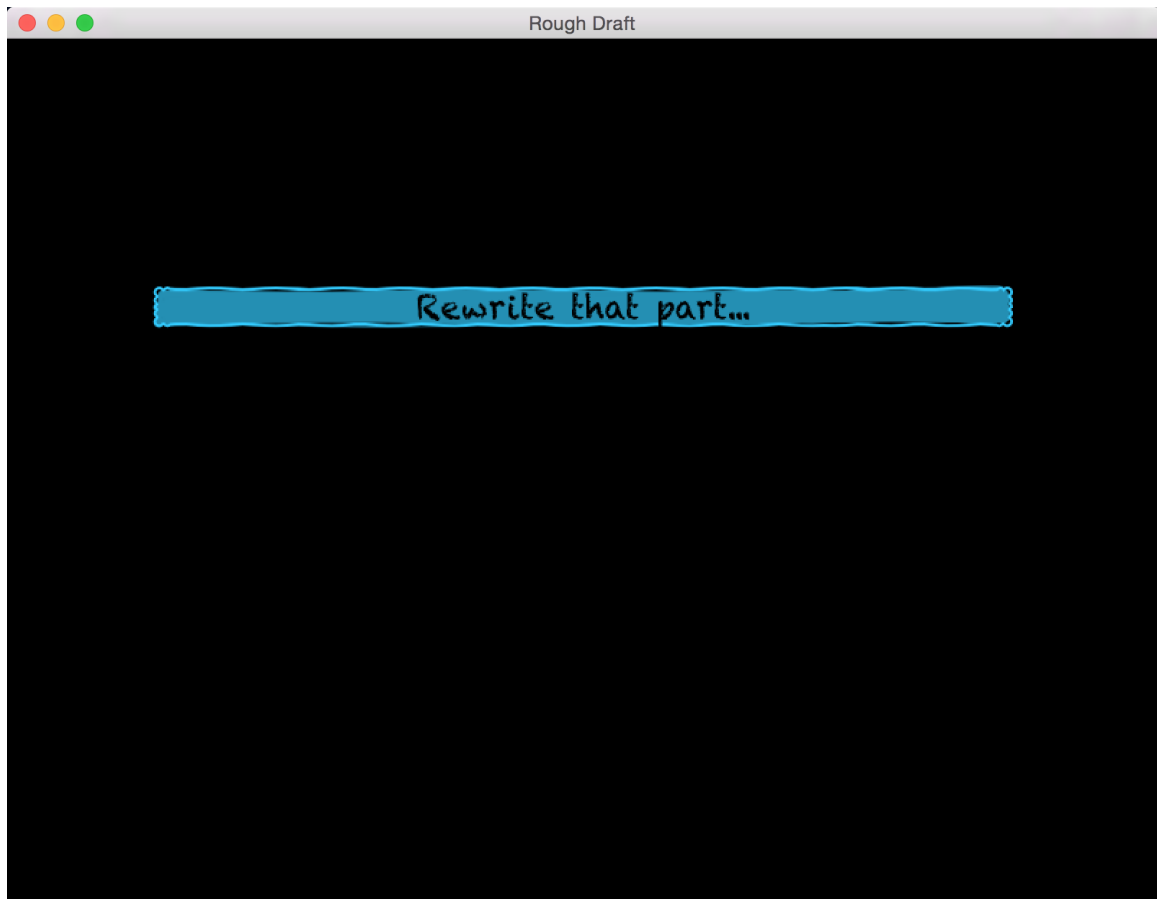


Figure 4.9: An example of the “Rewrite That Part” choice in the Restricted version

Life is Strange and *Save the Date* were referenced during the design process for this version. The first game allows the player to only go back one or two choices while the second version allows the player to return to their last save point but can be played like a restricted rewind if the player saves before every choice. In this version of the game, the player would arrive at choice points where the “correct” answer was

typically not initially available. Any choices that the player was allowed to make would lead to a bad end but at least one of them would give the player information that would unlock the “correct” choice. After hitting the bad end, the player would be allowed to return to the choice they had just made by using the “Rewrite That Part” option. After rewinding, a new option, typically the “correct” one, would be available for the player to choose. This can be seen in Figure 4.10, on the left is the choice before rewinding, here the “correct” answer is not available but after obtaining information through an “incorrect” answer, the player can rewind and the new choice will be the correct one (right).

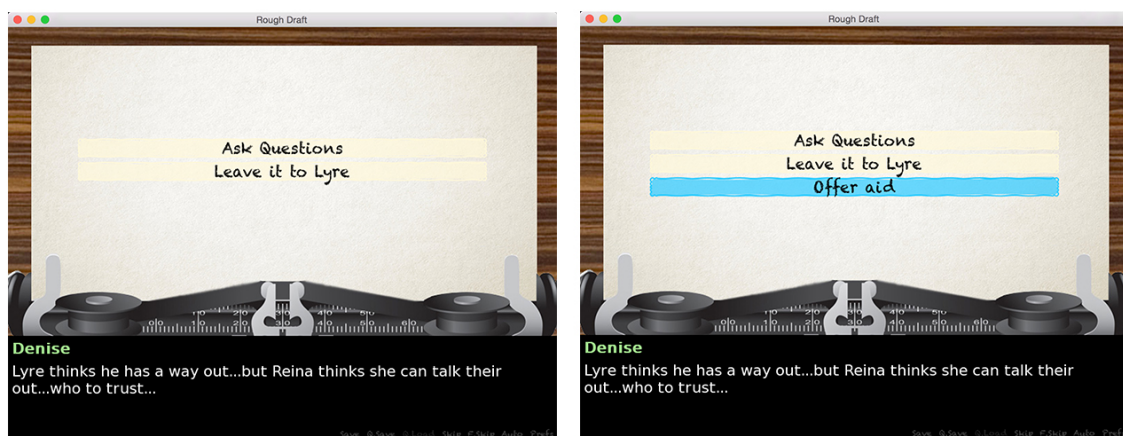


Figure 4.10: A typical choice point in the Restricted Version

This version of the game did not feature flow charts like the Unrestricted one. Instead it made full use of the menus and choices within the Ren’Py interface. *Save the Date*, which was made in Ren’Py, was heavily referenced for the interface design on this version of the game. Through playtesting it was determined that flow charts were not needed as people were easily able to keep track of the events using only the

menus.

The only way to proceed through the restricted version of the game was to try the different options and explore their immediate outcomes until the correct answer was unlocked and the player was allowed to proceed. Similar to the Unrestricted version, not every choice had to be made, how many times the player needed to rewind at a choice point or whether a rewind was required at that choice point at all varied depending on the part of the story and whether or not the player made the right choice on the first attempt. In Figure 4.11 below, the flow chart for the story in the restricted version can be seen. Again, the green squares indicate key items and information, the green lines are unlock-able choices and the blue lines indicate what information is necessary to unlock choices.

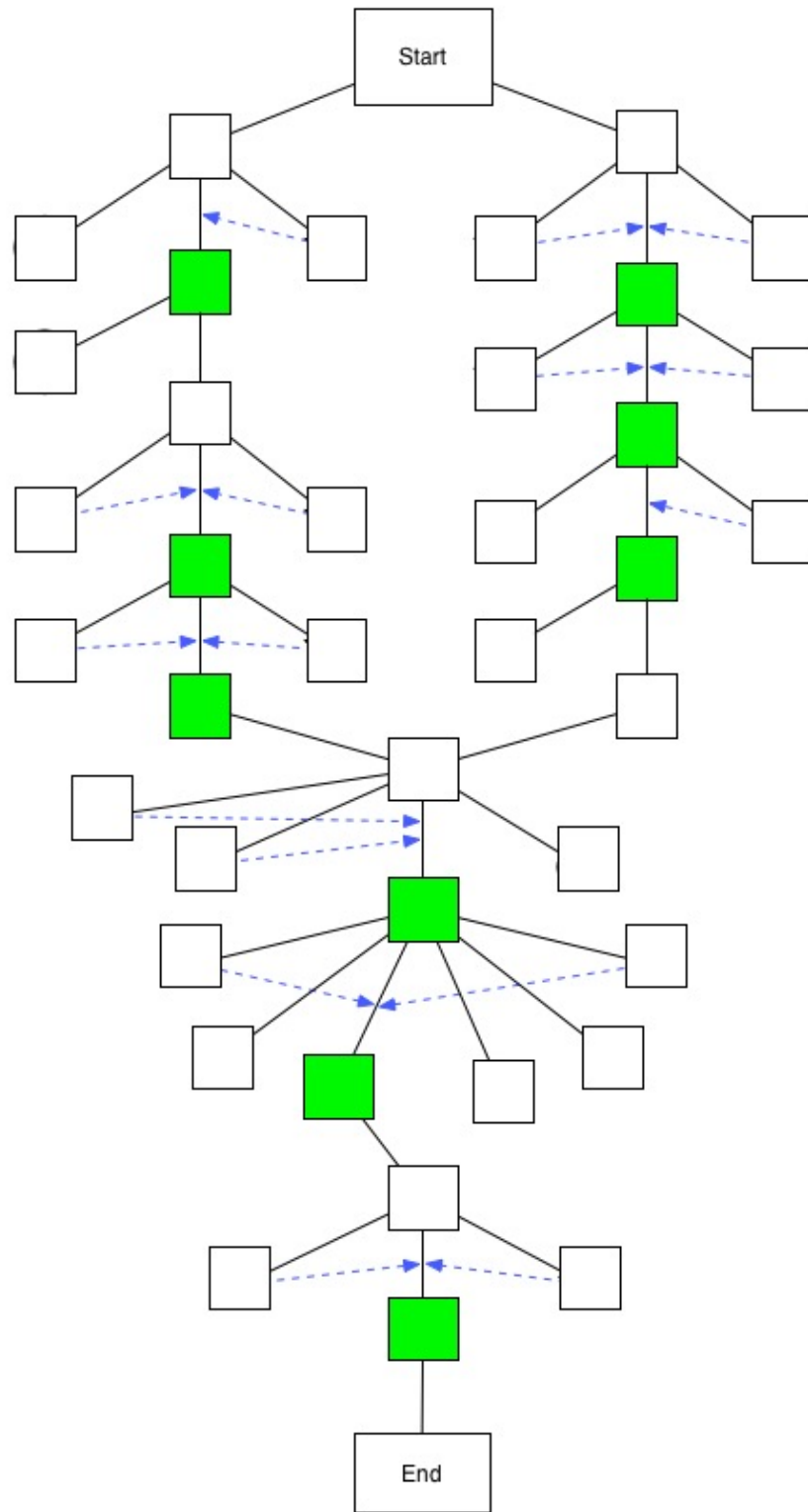


Figure 4.11: The flow chart for the story in the Restricted Version

4.6 No Rewind (Control)

The No Rewind version of the game was a traditional interactive narrative game that featured no rewind mechanic. The purpose of this version was to serve as a control so that the two different kinds of rewind mechanics could be compared to a traditional interactive story format. In order to ensure that the story in this version would be largely the same, this version featured a lot of illusion of choice. Many choices led to the same outcome in order to ensure that the player witnessed all of the events in the same way that the players of the other two games would. The flow chart for the story in this version can be seen in Figure 4.12. The visual design of this version was identical to the previous two, and like the Restricted version, it did not feature flowcharts. Players of this version of the game still made choices, but there was no rewind. Instead they would proceed through the story from the beginning to the end in a traditional manner, by reading text, making choices and experiencing the outcomes of their choices.

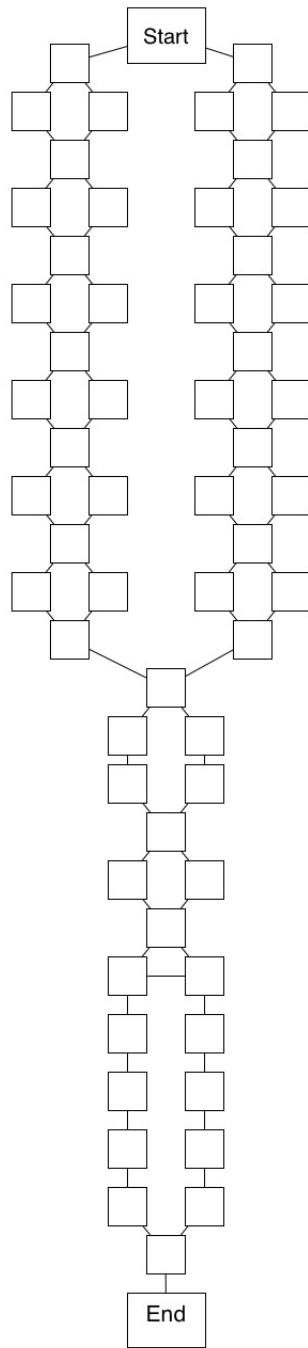


Figure 4.12: The flow chart for the story in the Control Version of the game

5. METHODOLOGY

Participants were recruited via email, flyer and word of mouth. They all filled out a demographic survey prior to the test in which they were asked to provide demographic data including age, first language, any past experiences with interactive narrative, interest in narrative and video games and whether they have ever played *Life is Strange*, *Virtue's Last Reward*, *Save the Date* or *The Stanley Parable*. Each participant was then randomly assigned to play one of the games, either one of the rewind ones or the control. 20 people played each game, during which time the screen was recorded and gameplay was timed.

After completing the game, all 60 participants filled out a questionnaire that consisted of Brockmyer et al.'s Game Engagement Questionnaire [3] (19 items using a 3 point scale) and Busselle et al.'s Narrative Engagement Questionnaire [4] (12 items using a 7 point scale) in their entirety as well as three items from Green et al.'s narrative transportation questionnaire [11] (also using a 7 point scale. These items can be seen in the appropriately labeled Tables in the results chapter. The participants who played the rewind versions of the game (both restricted and unrestricted) also answered five items that specifically addressed the rewind mechanic (using a 5 point scale), these items can be seen in the appropriately labeled table in the Results chapter. Of the 5 items addressing the rewind, the first 3 also asked for elaboration in the form of a short written answer, in order to obtain qualitative data regarding players' feelings towards the mechanic. After testing was completed, we compared the answers to the questionnaire between the different designs as well as analyzed the screen recordings to obtain data on differences in gameplay practices.

6. RESULTS

60 participants were recruited, IRB approval and certification were completed prior to the testing period in accordance with university policy on testing with human subjects. Each participant was assigned a random identification number at the beginning of the test and no information that could connect a subject's identity to the research was collected.

Of the 60 participants, 24 identified as female, 34 identified as male and 2 identified as another gender identity (gender breakdown for each version can be seen in Figure 6.1). 80 % were familiar with branching narratives and 75 % had played games with stories. Only about 58.3 % had ever used a choose your own adventure book. 38 people had played none of the games mentioned in the previous paragraph. Of the remaining 22 people, 21 had played *The Stanley Parable*, 3 had played *Virtue's last Reward*, 10 had played *Life is Strange* and none had played *Save the Date*.

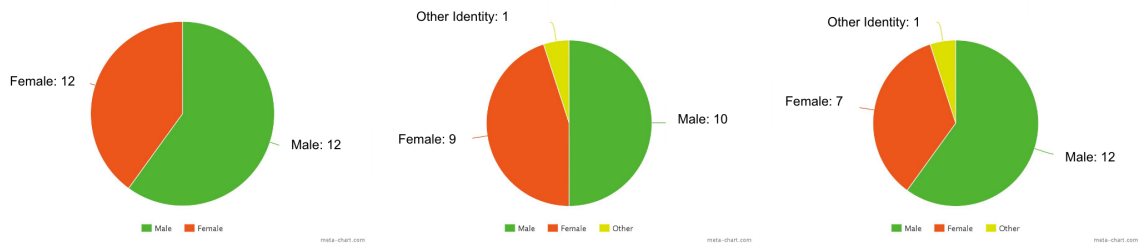


Figure 6.1: Gender breakdown of participants for each version of the game

Players were given as much time as they needed to complete the game. The average completion times were 27.28 minutes for the Unrestricted condition, 20.77 minutes for the restricted condition and 17.77 minutes for the control condition. However it

should be noted that individual completion times varied greatly within each condition, largely due to the speed the participant could read, Figure 6.2 displays the playtime breakdown for each version.

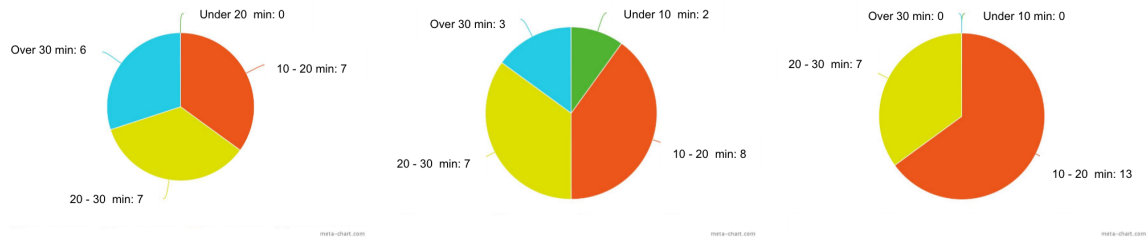


Figure 6.2: Breakdown of gameplay times for each version of the game

6.1 GEQ Results

After completion, participants filled out the likert scale questionnaire discussed in the previous section. The first part of the questionnaire was The Game Engagement Questionnaire (GEQ), which featured 19 items that used a 3 point scale. Each addressed one of four factors related to engagement, absorption, flow, presence, and immersion. The results to this portion of the questionnaire can be seen in Table 6.1.

Table 6.1: Results of the Game Engagement Questionnaire

Game Engagement Questionnaire (GEQ) (3 Point Scale)

#	Item	Unrestricted		Restricted		Control		P Value		
		M	SD	M	SD	M	SD	U to C	R to C	U to R
	Absorption	1.64	.72	1.9	.86	1.57	.76	.5	.004	.021
1	I felt scared	1.05	.22	1.15	.37	1.2	.52	.246	.728	.304
2	I lost track of where I was	1.6	.68	1.9	.85	1.25	.55	.082	.007	.226
3	I felt different	1.65	.67	1.95	.83	1.55	.69	.644	.104	.215
4	Time seemed to kind of stand still or stop	1.95	.69	2.2	.83	1.85	.75	.661	.17	.307
5	I felt spaced out	1.95	.83	2.3	.86	2	.92	.857	.294	.198
	Flow	2.02	.83	2.12	.81	1.82	.85	.15	.01	.249
6	I wouldn't have answered if someone talked to me	1.5	.83	1.8	.7	1.35	.67	.533	.044	.222
7	I couldn't tell if I was getting tired	1.8	.83	1.85	.75	1.65	.81	.569	.422	.843
8	If someone had talked to me I don't think I would have heard them	1.75	.79	2	.73	1.5	.61	.267	.023	.303
9	I felt like I just couldn't stop playing	1.9	.72	2.15	.81	1.6	.75	.205	.033	.309
10	The game felt real	2.05	.76	1.9	.85	1.65	.75	.101	.33	.56
11	I got wound up	1.75	.77	1.75	.85	1.75	.79	1	1	1
12	Playing seemed automatic	2.25	.79	2.45	.69	2.5	.83	.333	.836	.397
13	I played without thinking about how to play	2.65	.59	2.5	.89	2.7	.66	.801	.424	.533
14	Playing made me feel calm	2.5	.76	2.65	.59	2.3	.73	.402	.104	.489
	Presence	2.15	.76	2.28	.73	2.14	.82	.921	.265	.291
15	Things seemed to happen automatically	1.95	.69	2.25	.64	2.55	.6	.006	.135	.161
16	My thoughts went fast	2.5	.61	2.7	.57	2.4	.75	.647	.165	.29
17	I played longer than I meant to	1.85	.81	1.7	.73	1.55	.83	.254	.547	.543
18	I lost track of time	2.3	.8	2.45	.6	2.05	.76	.318	.074	.508
	Immersion	2.2	.41	2.5	.69	2.15	.75	.794	.131	.102
19	I really got into the game	2.2	.41	2.5	.69	2.15	.75	.794	.131	.102
	Overall Scale Score	1.96	.79	2.11	.82	1.87	.84	.155	6.05	.007

U = Unrestricted Rewind, R = Restricted Rewind, C = Control

Overall there was an increase in the mean between the control and the two rewind versions for every section of the questionnaire as well as for the questionnaire as a whole. As can be seen in Table 6.1 There was a statistically significant increase in absorption between the Restricted Rewind design and the control (from 1.57 to 1.9 with a p value of .005). There was also a statistically significant increase in absorption from the Unrestricted Rewind design to the Restricted Rewind design (from 1.64 to 1.9 with a p value of .021). There was also an observable increase in mean from the control to the Unrestricted Rewind design (1.57 to 1.64) however, according to the p value (.5), it was not statistically significant.

In addition, there was a statistically significant increase in flow from the control to the Restricted Rewind design (1.82 to 2.12 with a p value of .01) as can be seen in

Table 6.1. Again, there was an observable increase in mean from the control to the Unrestricted Rewind design (1.82 to 2.02) but according to the p value (.15) it was not statistically significant. There was an increase in mean from the Unrestricted Rewind design to the Restricted Rewind design (2.02 to 2.12) but it was also no statistically significant according to the p value (.249).

The same trend, an increase in mean from the control to the Unrestricted Rewind and a greater increase in mean from the control to the Restricted Rewind, was present for both presence and immersion as well, however these changes were not statistically significant. These results can be seen in Table 6.1.

Overall, there was an observable increase in engagement from the control condition to both rewind designs. (1.87 to 1.96 for the Unrestricted and 2.11 for the Restricted) however these were not statistically significant overall. However the increase in engagement from the Unrestricted to the Restricted (1.96 to 2.11) was statistically significant according to its p value (.007). These can be seen in Table 6.1.

6.2 NEQ Results

The second portion of the questionnaire was The Narrative Engagement Questionnaire (NEQ), which featured 12 items that addressed Narrative Understanding, Attentional Focus, Narrative Presence and Emotional Engagement. Each section contained 3 items using a 7 point scale. The results for this section can be seen in Table 6.2. The scores for the first 6 items were measured in reverse and flipped for analysis.

Table 6.2: Results of the Narrative Engagement Questionnaire

Narrative Engagement Questionnaire (NEQ) (7 Point Scale)

#	Item	Unrestricted		Restricted		Control		P Value		
		M	SD	M	SD	M	SD	U to C	R to C	U to R
	Narrative Understanding	5.9	1.08	5.45	1.6	5.63	1.58	.284	.529	.073
1	At points, I had a hard time making sense of what was going on in the game	5.85	.75	5.2	1.58	5.65	1.53	.602	.366	.104
2	My understanding of the characters is unclear	5.9	1.25	5.45	1.54	5.45	1.64	.335	1	.317
3	I had a hard time recognizing the thread of the story	5.95	1.23	5.7	1.72	5.8	1.64	.746	.852	.6
	Attentional Focus	5.45	1.35	5.65	1.64	5.1	2.02	.245	.105	.505
4	I found my mind wandering while I played the game	4.65	1.57	5.3	2.03	4.9	2.02	.665	.536	.264
5	While playing the game, I found myself thinking about other things	5.75	1.12	5.6	1.54	5.1	2.07	.225	.392	.726
6	I had a hard time keeping my mind on the game	6	.918	6.05	1.28	5.3	2.05	.172	.174	.888
	Narrative Presence	4.45	1.74	4.55	1.73	4.52	1.81	.837	.918	.753
7	During gameplay, my body was in the room but my mind was inside the world created by the story	4.5	1.73	4.8	1.88	4.75	1.52	.63	.927	.603
8	The game created a new world and then that world suddenly disappeared when the game ended	4.5	1.76	4.95	1.43	4.65	2.08	.807	.599	.381
9	At times during gameplay, the story world was closer to me than the real world	4.35	1.81	3.9	1.74	4.15	1.81	.729	.659	.429
	Emotional Engagement	3.42	1.66	3.6	1.89	3.77	1.85	.278	.627	.573
10	The story affected me emotionally	3	1.65	3.15	1.79	3.1	1.65	.849	.927	.784
11	During gameplay, when a character succeeded I felt happy and when they suffered I felt sad	3.75	1.62	3.9	1.77	4.25	1.97	.386	.558	.781
12	I felt sorry for some of the characters in the game	3.5	1.7	3.75	2.1	3.95	1.82	.424	.749	.681
	Overall Scale Score	4.81	1.76	4.81	1.89	4.75	1.94	.749	.739	.98

U = Unrestricted Rewind, R = Restricted Rewind, C = Control

The Unrestricted Rewind design scored best for narrative understanding (with a mean score of 5.9 as opposed to 5.45 for the Restricted Rewind design and 5.63 for the control). The Restricted Rewind scored best for attentional focus and narrative presence (with means of 5.65 and 4.55 respectively). There was also an increase in attentional focus between the control and the Unrestricted Rewind design but a decrease between those two for narrative presence. The control scored highest for emotional engagement (with a mean of 3.77 as opposed to 3.6 for the Restricted and 3.42 for the Unrestricted).

Although there were observed changes in mean across all sections, with the means for Unrestricted Rewind indicating higher narrative understanding, the means for the Restricted Rewind indicating higher narrative presence and attentional focus and the means for the control condition indicating higher emotional engagement, the p values for the items on this questionnaire do not indicate statistical significance. These

numbers can be seen in Table 6.2.

6.3 Additional Results

The next portion of the questionnaire featured the 3 additional items from Green et al.'s questionnaire, which also used a 7 point scale. The results for these items can be seen in Table 6.3.

Table 6.3: Results of the Additional Items

Additional Items (Green et al.'s Questionnaire) (7 point Scale)

#	Item	Unrestricted		Restricted		Control		P Value		
		M	SD	M	SD	M	SD	U to C	R to C	U to R
1	I found myself thinking of ways the narrative could have turned out differently	4.95	1.67	5.25	1.77	5	1.84	.929	.664	.585
2	I had a vivid mental image of Reina	4.5	1.5	4.6	1.5	3.95	1.88	.313	.234	.834
3	I had a vivid mental image of Lyre	4.45	1.6	5	1.52	4.7	2	.666	.597	.273
	Overall Score	4.63	1.58	4.95	1.6	4.55	1.93	.796	.218	.278

U = Unrestricted Rewind, R = Restricted Rewind, C = Control

Overall, the Restricted scored best on these items. On the first item, (*I found myself thinking of ways the narrative could have turned out differently*), The Unrestricted had a mean of 4.95, while the Restricted had a mean of 5.25 and the Control had a mean of 5. This indicates that people were thinking of other ways the narrative could have gone least after playing the Unrestricted Rewind version of the game and the most after playing the Restricted Rewind version. As can be seen in Table 6.3, for the other two items, participants indicated more vivid mental images of the characters after playing the Restricted Rewind version of the game. However, according to the P Values for these items seen in Table 6.3, these answers are not statistically significant.

6.4 Rewind Specific Results

Participants who played one of the two rewind design games also responded to 5 items that addressed the rewind mechanic and its use specifically (these used a 5 point scale). The results to these items can be seen in Table 6.4. The first item was measured in reverse and flipped for analysis.

Table 6.4: Results of the Rewind Specific Items

Rewind Specific Items (5 Point Scale)

#	Item	Unrestricted		Restricted		P Value U to R
		M	SD	M	SD	
1	I felt like the ability to rewind was pulling me out of the story	3.55	1.1	3.1	1.45	.275
2	I felt like the ability to rewind added a new understanding to the events of the story	3.6	1.1	3.65	1.09	.886
3	The ability to rewind made the story more interesting than it would have been without it	4.15	.67	3.6	1.23	.087
4	The ability to rewind felt natural	3.9	1.21	3.7	1.22	.605
5	I had fun using the rewind	4.15	.93	3.7	1.34	.226
	Overall Score	3.87	1.03	3.55	1.27	.051

U = Unrestricted Rewind, R = Restricted Rewind

Answers to these items were mostly positive, with the Unrestricted Rewind condition scoring best overall. The numerical results for these items can be seen in Table 6.4. Of the 40 people who tested one of the rewind conditions, 17 answered on the first rewind specific item (*I felt like the rewind was pulling me out of the story*) that they agreed with this statement to some degree. Of those 17, 11 still answered positively on the majority of the other 4 items that addressed the rewind, indicating that they agreed to some degree that the rewind added a new understanding to the events, made the game more interesting, felt natural and was fun to use.

Although there were observed differences in mean for all of these items between the versions, the p values determine that they are not statistically significant.

6.5 Qualitative Trends

In addition to the numerical scale for the 5 rewind specific items, participants were asked to elaborate on their answers to the first 3 items addressing the rewind mechanic; 1 (*I felt like the ability to Rewind was pulling me out of the story.*) 2 (*I felt like the ability to Rewind added a new understanding to the events of the story.*) 3 (*The ability to rewind made the story more interesting than it would have been without it.*). Grounded theory was used to classify the answers to each item into trends.

Table 6.5 shows the observed trends for item 1 and how many participants' answers they were observed in for each rewind design. Notable trends included 30 % of participants in the Unrestricted Rewind condition and 15 % in the Restricted Rewind design indicating that the mechanic did not pull them out of the narrative, while 20 % of Unrestricted and 25 % of Restricted participants indicated that it did. Additionally, 20 % of the Unrestricted participants and 25 % of the Restricted indicated recognition that they were playing as the author, and not the characters she was writing about.

This was typically indicated in connection to the participant feeling that they were not being pulled out of the story by the rewind mechanic; an example of this can be seen in this quote from a participant: "...It served to remind the player that their original objective was to help the author. So it did not completely pull you out of the story being fabricated, it just reminded the player of their initial objective." It can also be seen in these quotes from a participants; "It pulled me out of the story of Reina and Lyre, but not out of the story of Denise writing the story. It helped that story flow," and "Generally with these games I feel that the ability to rewind takes me out of the story but the additional theme being a writer and creating a solid and cohesive story made this rewind ability more logical. Being able to go back and edit previous decisions helped support this idea." This trend was present in answers from participants who played both Rewind designs, and was a commonly occurring trend

among answers to all three items, as can be seen in the tables.

This trend was apparent in answers to all of the items (as can be seen in Table 6.6 and Table 6.7), with participants stating that the rewind made sense because they were playing as an author or that they enjoyed it because it made them feel more like an author or reminded them of this fact. An example of this can be seen in this quote from a participant that was their answer to the second item: “As a game that allows the player to rewind along with the thoughts of the writer, it teaches the player how writers think, and how making mistakes often leads to better outcomes.” While most players recognized that they were playing as the author and gave positive responses that reflected this fact, there was a small number (see Table 6.5) who reacted more negatively to the rewind who, based on their answers, did not seem to realize that they were playing as the author. This was very clearly pointed out in this quote from a participant from their answer to item 1: “I’m not quite sure what role I’m playing, the writer or the protagonist.”

There was also a trend among answers to the first 2 items (see Table 6.5 and Table 6.6) where people’s answers indicated that they enjoyed the mechanic but were confused by it in some way at some point. This can be seen in this quote that was a participant’s response to the item 1: “I was admittedly lost as to what the rewinding was trying to accomplish, but once I realized each path had significance in completing the story, it made sense and worked pretty well.”

Table 6.5: Trends for participants' answers to item 1

Item 1: "I felt like the Ability to Rewind was pulling me out of the story...Please Elaborate..."

# Of Participants (Unrestricted)	# Of Participants (Restricted)	Trends
6 (30%)	3 (15%)	The rewind did not pull me out of the story
4 (20%)	5 (25%)	I recognized that I was playing as the author, and therefore it made sense/worked
3 (15%)		I liked the mechanic but was confused about where key items/info were coming from
2 (10%)		Didn't seem to realize they were playing as the author.
2 (10%)	5 (25%)	The rewind pulled me out of the story at some point
1 (5%)		I enjoyed the mechanic, but was confused at some point, I ultimately figured it out.
1 (5%)		I couldn't keep track of story or events
1 (5%)		I didn't feel like I had much of a choice
	2 (10%)	I already did this in other games (even when it's not a part of the design)
	2 (10%)	It felt like the right choice was obvious
	1 (5%)	Being able to rewind told me more about the characters/story/world
	1 (5%)	I think the mechanic made it more interesting
	1 (5%)	I just couldn't get attached to the characters

Table 6.6 shows the observed trends for item 2. Many trends were similar to those observed among answers to the first item, including people recognizing that they were playing as the author. Another trend was players stating that they felt the rewind was telling them more about the characters, story or world; with 50 % of Unrestricted participants mentioning it and 45 % of Restricted participants mentioning it. This trend was present among answers to all of the items but was particularly common among answers to item 2. An example of this trend can be seen in this answer: "Rewinding the story made it so that I can see the different layers of each character story or trait that they share. It also helped me understand how the author came up with ideas along the way and recreate the world to find a solution." It can also be seen in this answer to item 3; "Without the rewind, the story would be like a story I would have just read at a library, a plain old book. However, with the rewinds, understanding the characters and what other ways the situation would have done differently, getting an understanding what they are all thinking is interesting and fun."

A trend that can be seen in answers to all three items was; participants recognized that they were playing as the author and understood and enjoyed the mechanic, but were confused when a key item or piece of information was used to unlock a choice (as is discussed in chapter 4). An example of this trend can be seen in this answer from a participant; “I really enjoyed the ability to rewind, but it WAS jarring to have a Reina talk about things another Reina experienced. Unlike ‘Virtue’s Last Reward’, the link isn’t really explained here. It just makes Denise come off like a bad writer.” This trend was mostly observed in answers of people who played the Unrestricted Rewind design (see Table 6.5, Table 6.6, Table 6.7).

Table 6.6: Trends for participants’ answers to item 2

Item 2: “I felt like the Ability to Rewind added a new understanding to the events of the story...Please Elaborate...”

# Of Participants (Unrestricted)	# Of Participants (Restricted)	Trends
10 (50%)	9 (45%)	Being able to rewind told me more about the characters/story/world
2 (10%)	3 (15%)	I don't think the mechanic added anything
2 (10%)	1 (5%)	I liked the mechanic but was confused about where key items/info were coming from
1 (5%)		It Reminded me of another game
1 (5%)		I would have liked more visuals
1 (5%)		I enjoyed the mechanic, but was confused at some point, I ultimately figured it out.
1 (5%)		The rewind worked
1 (5%)		I thought the story was very simple
1 (5%)	6 (30%)	Recognized that they were playing as the author
	1 (5%)	I liked that I could change my mind

Table 6.7 shows the observed trends for item 3. Again, many trends were similar to those observed among answers to the first two items and discussed above. Additional trends included 20 % of players of the Unrestricted Rewind saying that they enjoyed being able to explore other choices. An example of this trend can be seen in this quote from a participant “It is interesting to be able to make decisions for someone else. I purposely picked every choice just to see what would happen.”

In addition to the trends discussed above, there were a fair number of answers (see Table 6.5, Table 6.6, Table 6.7) that simply stated that the mechanic worked, was interesting or made the game more interesting, or that it pulled them out of the story, did not add anything to the experience and did not make it more interesting, but did not offer further elaboration. There was also an answer to item 3 from a participant who played the Restricted Rewind that seemed to indicate that they would have preferred an Unrestricted Rewind. This can be seen here: “Mistakes are interesting, and so are fixing your mistakes. Now, if you could mess up like 7 different times in a row, and that point have to go back, that could be fun. The game was leading you on to think you were doing good, but ultimate popback in the timeline, and you realize the story just has a better way to go than what the player expected.”

Table 6.7: Trends for participants’ answers to item 3

Item 3: “I felt like the Ability to Rewind made the story more interesting than it would have been without it...Please Elaborate...”

# Of Participants (Unrestricted)	# Of Participants (Restricted)	Trends
4 (20%)	7 (35%)	I think the mechanic made it more interesting
3 (15%)	3 (15%)	Being able to rewind told me more about the characters/story/world
2 (10%)	3 (15%)	I don't think the rewind made it more interesting
	2 (10%)	I recognized that I was playing as the author, and therefore it made sense/worked
	1 (5%)	I thought the rewind was interesting
	1 (5%)	I think the mechanic felt simple
	1 (5%)	I didn't feel like their choices had an effect
	1 (5%)	I would've preferred a different rewind design
1 (5%)	1 (5%)	I don't think the mechanic added anything
4 (20%)		I enjoyed being able to make other choices
3 (15%)		I would have liked more visuals
1 (5%)		It Reminded me of another game
1 (5%)		I liked the mechanic but was confused about where key items/info were coming from
1 (5%)		I felt like it made decision making more important

As can be seen in the above tables, several participants felt that the game or story were too simple or that the right choice was obvious (only present in responses to the Restricted Rewind, see Table 6.5). Additionally, several participants indicated that

they would have liked art.

An additional trend that was observed was that participants who answered on the first item that they felt like the rewind was pulling them out of the story would then go on to answer positively to the other items, indicating that they still enjoyed the mechanic. The example discussed above (the participant who wasn't sure if they were the writer or the protagonist) answered on the first item that they felt the rewind was pulling them out of the story but still gave positive responses to the rest of the items. This indicates that, while a rewind redo mechanic may pull the player out of the story itself, they will not necessarily dislike the game, story or mechanic. This reflected the trend that was observed in the numerical answers discussed in the previous section.

6.6 Observations

While participants played the game, the screen was recorded in order to track gameplay trends and patterns. While playing the Unrestricted Rewind design, a majority of players would keep progressing forward until they reached a lock or end point and could not proceed anymore, then they would use the rewind mechanic to go back and try other options. They tended to go back one choice point at a time, choosing to first explore the other options on the choice point they had just visited, then the previously visited choice and so on. They would do this until they had tried every option in the branch that they were on, which they could observe via the in game story chart, and then would return to the full map to try a different route. This is demonstrated in Figure 6.3, players would explore a single branch until their chart (for the branch of the story they were on) resembled the one on the left, they would then return to earlier choice point and try a different branch of the story (via the overall story map that can be seen on the right).

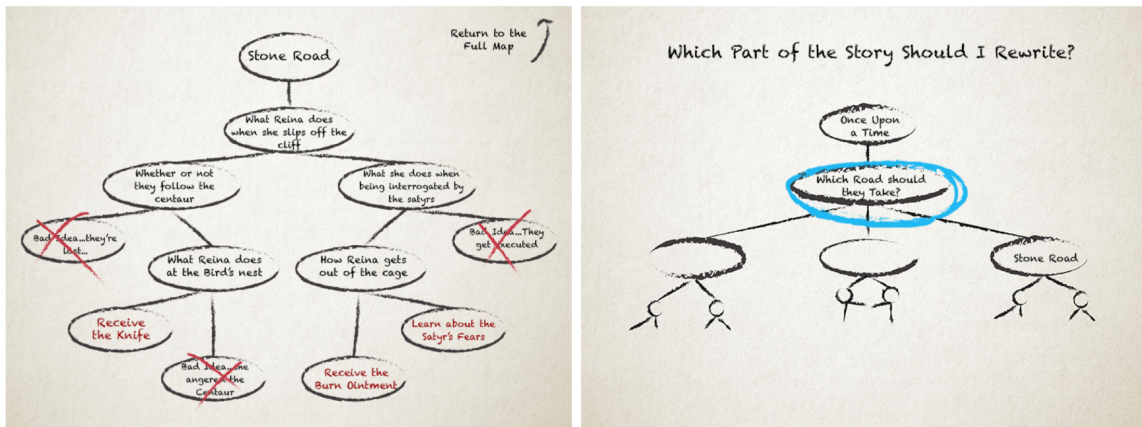


Figure 6.3: Players would explore every option in a specific route before exploring another route

In the Restricted Rewind condition, as soon as a choice was unlocked (as was discussed in chapter 4), a majority of players would select it even if they had not tried all of the previously available options. For example, in the choice shown in Figure 6.4, trying to offer the knife and the potion separately (left) unlocks the choice where you can offer both together (right), which is the correct option in order to proceed with the game. Players would choose to offer both as soon as they had successfully unlocked it, even if they had not tried the other options. This trend was observed in most participants' gameplay though not all. Those who did not exhibit this trend would attempt to make every choice available when they were able to.

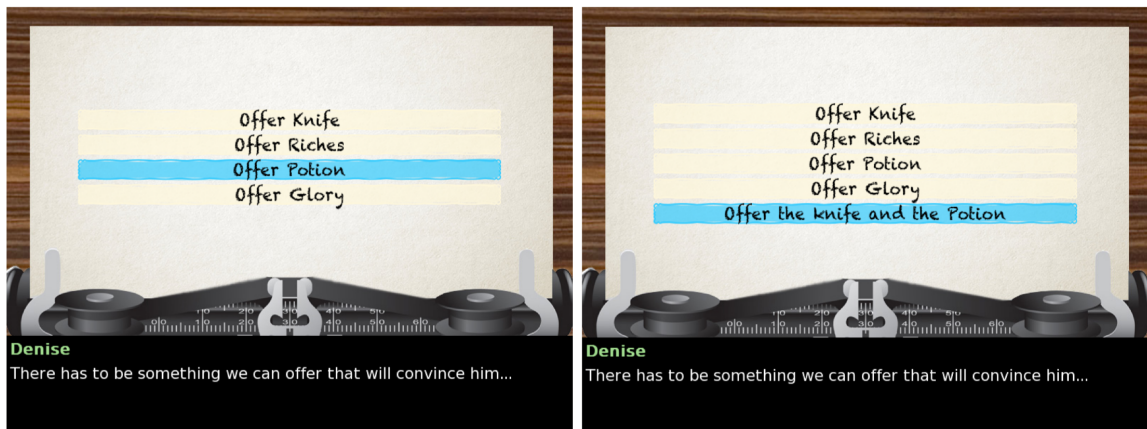


Figure 6.4: Players would select the unlocked choice as soon as it became available

While there were no observable trends in the gameplay of those who played the Control condition, there was an observable trend in items and comments they offered after gameplay. Upon completing the test and questionnaires, participants were informed that they were done and that if they had any other items, comments or concerns I could address them now. Approximately half of the participants who played the Control condition, which had no rewind, tended to want to know if something different would have happened if they had made a different choice. Despite the fact that they were not permitted to go back and explore other options, nor were they allowed to replay the game, they still expressed a desire to explore the outcomes of other options.

6.7 Discussion

Based on the results of the Game Engagement Questionnaire, it seems that a Restricted Rewind design may be able to increase aspects of engagement such as flow and absorption. On the Narrative Engagement Questionnaire, based on the means, it appeared that there were aspects of narrative engagement that could be affected

by the design of a rewind mechanic, however the p values do not indicate statistical significance.

Although the p values do not indicate statistical significance, the means indicate that there appears to be some degree of greater emotional engagement in a game with no rewind mechanic. Emotional engagement seems to be heavily tied to one's ability to be invested in the struggles and fates of a story's characters. In a narrative setup where you can rewind and undo mistakes, it seems natural that one would be less concerned about the fate of a character. Because there is less concern or fear for a character, it is natural that one would be less emotionally involved. Similarly there seems to be an increase in narrative understanding in a game that uses an Unrestricted Rewind design as it grants the player the most freedom to explore every branch of a narrative.

When asked directly about the rewind mechanic it was seen that players, overall, enjoyed being able to go back and remake choices, however they seemed to enjoy it more and thought it added more to the game when it was an Unrestricted design (based on the answers to the rewind specific items). This is most likely due to the freedom it afforded in exploring the game and all its choices at one's own discretion and lack of a sense of "obvious" answers.

Based on qualitative trends, it can be reaffirmed that there has to be an explanation for the rewind. Players who were unable to recognize that they were playing as the author had difficulty understanding why they were able to rewind and reacted worse to it overall than those who recognized this fact. Additionally, those who recognized this fact thought it felt natural to be able to go back and remake choices. The claim that the story must be structured in such a way that the only way to explore it all is through use of the rewind is supported by our results; as another qualitative trend was players stating that they enjoyed using the rewind since it let them learn

more about the characters and explore the rest of the story.

It can also be observed that, especially in an Unrestricted Rewind design, the characters or narrative must acknowledge where they acquired the key items or information that they obtained in another route and are now using. In other words, the narrative must acknowledge the player's use of the mechanic in some way. If they fail to do this, the player will become confused regarding the flow of time within the narrative. This can be observed in the qualitative trend discussed in the previous section where participants stated that they liked the mechanic but were confused about where the key items and info were coming from. Additionally, if one is to design a game with a Restricted Rewind structure, they should ensure that the "correct" answer is not too obvious to players as was observed among the qualitative trends. Ways to do this could be to have the "correct" answer not always be the one that is unlocked or have more than one unlockable answer.

Based on our observations of gameplay, it seems that the Unrestricted Rewind appeared to foster a desire to explore as much of the story as possible, as we saw most players explore every possible option in a given story branch before moving to another. It appears that the Restricted Rewind condition did not foster the same desire, probably because (as we can see in the qualitative trends discussed previously) people felt that the correct choice was too obvious and instead felt a desire to progress through the game as quickly as possible instead of exploring the story. However, there was a group of participants who played the Restricted Rewind who did appear to possess the same desire to explore as those who played the Unrestricted, observed through their tendency to make every option available when they could before moving on. Participants who played the control condition, and were not able to use a rewind, expressed a desire to explore other options that they could have made, reflecting the desire among most gamers that led to this particular practice of metagaming.

7. CONCLUSION

Metagaming, a practice that has traditionally been frowned upon within certain game genres, has begun to become integrated into game design as a core mechanic. There are already several successful interactive storytelling games that have incorporated metagaming in the form of a core mechanic that allows the player to rewind and redo past choices. By analyzing *Life is Strange*, *Save the Date*, *Virtue's Last Reward* and *The Stanley Parable*, we were able to identify and define core concepts of metagaming within the interactive storytelling genre; including “Metagaming Mechanics” (A core gameplay mechanic based off of an act that has traditionally been a part of metagaming, in this case the rewind) and the “Metagaming Plot” (The story that is written and structured to incorporate, justify, encourage and reward the use of the mechanic). Additionally we were able to identify and define three different rewind designs; the “Unrestricted Rewind”, which allows the player to return to any previously made choice, the “Restricted Rewind”, which allows them to return to only the last choice and the “External Rewind” which requires them to rewind and replay from the beginning after completing a playthrough.

In order to obtain empirical data regarding how the design of the rewind affects players, we designed three versions of an experimental interactive story game and a research study to observe differences in engagement between two of the rewind designs, the Unrestricted and Restricted, and a traditional interactive story (a branching narrative with no rewind). The story of the game was written and structured to incorporate the Metagaming Mechanic and adjusted to accommodate the different rewind designs. There were observable increases in both game and narrative engagement for both rewind designs with the Restricted Rewind having more statistically significant changes overall.

The qualitative trends and observed gameplay practices indicate that players respond mostly positively to Metagaming Mechanics and the agency that they bring. They may feel that the mechanic is pulling them out of the story but this does not necessarily mean that they will dislike it. We also observed a desire to go back and explore other options among those who were not permitted to do so within the study (the players of the control condition). The trends reaffirmed previous statements (regarding the nature of the “Metagaming Plot”) and provided insight into how to further improve the designs. Our observations of gameplay indicate that different rewind designs will result in different approaches to gameplay.

If one is to use one of these “Metagaming Mechanics” within their own game, we suggest that the narrative be structured to support it. Specifically, the narrative must use a framework that naturally incorporates the player’s and character’s abilities to rewind, be it time travel or something else. The story must be structured in such a way that it supports and rewards use of the rewind by granting the player with the rest of the story content when they make a different choice after rewinding. In this way the players will feel as though there is a reason to rewind and will enjoy using it more as it increases their understanding of the narrative. Additionally, the characters and narrative must acknowledge the player’s use of the rewind in order to avoid confusing the player on the progression of time within the story.

Ultimately, people enjoy being able to explore all parts of the narrative through the use of a “Metagaming Mechanic” that allows them to rewind and redo past choices. It is something that they feel a desire to do anyway, and given the proper framework and execution, it will feel like a natural part of the game to them. Execution is key and we suggest following the insights discussed in this thesis to ensure a more favorable experience for players.

7.1 Limitations and Future Work

We were only able to recruit and test 60 people for our study. While this was a good number for obtaining results and insight, testing on a larger population may result in a more statistically significant change in engagement for both game and narrative. It would be worthwhile to conduct a study with a larger population in order to confirm these findings.

Additionally, we were only able to create and test a single game. The game we created was all text with very simple gameplay and it is possible that a differently designed game, such as one featuring 3D graphics and more complex gameplay, would yield different or more statistically significant results. Similarly, we were only able to create and test a single story. A story featuring different content, as well as a more complex story, may also yield different results. A possible future extension of this research would be to repeat the study with a different story or a differently designed game, in order to observe how these factors will affect the ways in which players react to the rewind mechanic.

Another possible avenue for continuing this research would be to see if the narrative framework, specifically the in-story explanation for the rewind, has an effect. Is it possible that time travel is the most popular explanation because people react to it more positively? It would be worthwhile to conduct a study to examine how this affects the results.

We were not able to include the External Rewind as a part of our research study due to time limitations so we are unable to confirm to what degree the insights we obtained from the study are applicable to that rewind design. However this is also a type of rewind design and it would be worth conducting a future study to see how the results and insights found in this study apply to the External Rewind mechanic design.

Finally, this thesis focused only on the genre of interactive storytelling and specifically on games that prompt the player to make choices at key points that influence the narrative. However, as discussed in the introduction and background chapters, these are not the only types of games that are incorporating metagaming as a mechanic within the design of the game. As such, a future avenue for research on this topic would be to analyze the “Metagaming Mechanics” of other game genres and study how they affect the gameplay experience of their players.

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Appendix A

Go to these links to download and play “Rough Draft”:

Unrestricted Rewind:

<https://drive.google.com/open?id=0BwjwPF65kJdbTkhiVDFfWW5UVIU>

Restricted Rewind:

<https://drive.google.com/open?id=0BwjwPF65kJdbV0I5STBoUUUV0bkU>

Control:

<https://drive.google.com/open?id=0BwjwPF65kJdbQnZ2RnVSM2N0ZEE>

Open zip file and double click on the file titled “Rough Draft” to launch the game