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Sara Lindo

# Managing the story of non-linear interactive story game

Metropolia University of Applied Sciences

Bachelor of Engineering

Information and communication technology

Smart Systems

09 November 2020

Author Title	Sara Lindo Managing non-linear interactive story game
Number of Pages Date	35 pages 09 November 2020
Degree	Bachelor of Engineering
Degree Programme	Information and Communications Technology
Professional Major	Smart Systems
Instructors	Antti Laiho, Project Manager Kimmo Sauren, Principal Lecturer
<p>This thesis is about non-linear interactive story games. The idea of non-linear games originated from a book genre called choose your own adventure. These books let the reader choose the way the story would go with multiple options within the books.</p> <p>Non-linear games change every time they are played. Interactive games are a type of non-linear game that gives the player choices to move the story toward different directions. The player's actions determine the direction of the plot.</p> <p>In this final year project, an interactive story game called "Road trip" was created. It is a simple example to demonstrate how an interactive story game controller works. It also has certain traits of open world games, which allows the player to explore freely around the area.</p> <p>The game was created with Unity and the logic of the game used the tree-diagram as a base. Along with object-oriented programming, the controller of the game uses triggers as their base for the game logic. The triggers are invisible 3D-objects that detect the player and trigger the codes attached to it. These codes contained, for example, the choices that the player would come across while playing.</p> <p>As a result of this study, a controller that could easily manage the story of an interactive game was created. The controller could also be used to create a game that has both interactive story and open world aspects.</p>	
Keywords	Non-linear, interactive story, games, game controller, choices, psychology, managing story, multichoice

Tekijä Otsikko Sivumäärä Aika	Sara Lindo Tarinan hallinnointi epälineaarisisessa interaktiivisessa tarinapelissä 35 sivua 09.11.2020
Tutkinto	insinööri (AMK)
Tutkinto-ohjelma	Tieto- ja viestintätekniikka
Ammatillinen pääaine	Sulautetut järjestelmät
Ohjaajat	Lopputyön ohjaaja Antti Laiho Tutkintovastaava Kimmo Sauren
<p>Tämän insinööriyön aihe on epälineaariset interaktiiviset tarinapelit ja niiden tarinan sekä valintojen hallinta. Epälineaariset pelit saivat alkunsa ”valitse oma seikkailusi” -pelikirjoista, joiden tarinat muuttuivat riippuen lukijan omista valinnoista.</p> <p>Epälineaarisisilla peleillä tarkoitetaan pelejä, joissa peli on jokaisella pelikerralla erilainen. Epälineaarisisia pelejä monia erilaisia, mukaan lukien interaktiiviset tarinapelit. Interaktiivisissa tarinapeleissä pelaajan valinnat vaikuttavat pelin kulkuun. Pelaajan valinnat ja virheet muuttavat jokaista pelikertaa ja pelin tarina voi muuttua täysin riippuen pelaajan valinnoista. Pelaaja saattaa nähdä täysin uusia paikkoja tai tavata uusia hahmoja riippuen valinnoistaan. Usein interaktiivisessa tarinapelissä on useampi loppu, mutta joskus pelaajan valinnat vaikuttavat vain, mitä alun ja lopun välillä tapahtuu.</p> <p>Insinööriyön tuloksena syntyi ”Road trip”-peli. Pelin tarkoitus on antaa esimerkki epälineaarisisesta interaktiivisen tarinapelistä ja muutoksista, joita pelaajan valinnat tuovat peliin. Peli ottaa huomioon erityyppisiä valintoja, kuten pelaajan tekemän virheen luokitteluun valinnaksi. Pelissä on mukana myös aivoin pelimaailma, joka antaa pelaajalle mahdollisuuden liikkua vapaasti eri pelialueilla.</p> <p>”Road trip”-peli on toteutettu Unityn avulla ja sen logiikka käyttää hyväkseen puudiagrammi rakennetta. Peli käyttää hyväkseen 3D-laukaisimia, jotka pelihahmon tunnistaessaan aloittavat valintoja ohjaavan koodin. Näiden koodien avulla ohjataan, miten tarina jatkuu pelaajan valintojen jälkeen.</p> <p>Työn tuloksena syntyi ohjain, jonka avulla interaktiivisen pelin tarinan muutoksia pystytään seuraamaan. Ohjain myös mahdollistaa avoimen pelimaailman. Tätä ohjainta pystyy haluttaessa laajentamaan suuremmaksi peliksi ja sen avulla kaksi erilaista peliä pystytään yhdistämään toimivasti.</p>	
Avainsanat	Epälineaarinen, interaktiivinen tarina, pelit, pelin ohjain, valinnat, psykologia, monivalinnat, tarinan hallinta

## Contents

### List of Abbreviations

1	Introduction	1
2	History of non-linear games	2
2.1	Choose your own adventure	2
2.2	Early on non-linear games	4
2.3	Popularity of non-linear games	6
2.4	Interactive storytelling	13
3	Interactive story game requirements	16
3.1	Difference between interactive and non-interactive story game	16
3.2	Game technical requirements	17
3.3	Psychology behind choices	19
3.4	Influence of the choice	20
4	Road Trip game	24
4.1	Story of the game	25
4.2	Choices within the game	25
4.3	Environments and characters	28
4.4	Technical work and implementation	29
4.5	Walkthrough of the game	30
5	Results	33
5.1	Analysis	33
5.2	Future	33
6	Conclusion	34
	References	35

## List of Abbreviations

NPC	Non-playable character.
HP	Health points.
MP	Magic points or Mana.
RPG	Role-playing game, where the player has a character that they can level up to gain skills.

## 1 Introduction

This thesis focuses on non-linear story games and how they are technically built. This thesis' objective is to understand how player's choices change the interactive story and how those changes can be managed technically.

The following chapters contain information about the start and development of non-linear games, the psychological aspects of choice making and a demonstration of a non-linear game. History of the non-linear games shows where the idea for these types of games came from and later chapters provide further examples of the non-linear games.

The game made along this thesis provides an example of the controller in these games and shows the logic behind them. This game is just a small demonstration and the story in it is simply an example of the logic behind an interactive story. The game's objective is to give insight on how the stories and choices are managed in the games.

The topic was chosen to explore the complexity of trying to mimic real life choice-making in games. Creating a story-based game where players' choices matter is a demanding task, and to be able to create a successful non-linear game, one must understand how people make decisions. Therefore, this thesis does not only try to show what happens inside the game, but how players make their conscious and subconscious decisions.

## 2 History of non-linear games

Stories have always been interesting to mankind. Even before they were able to read and write, they had told stories to each other, often to teach others or warn them about a certain perceived threat. By the time digital era was reached, books had been around for thousands of years. It is no wonder that story-based video games started appearing late into the 20<sup>th</sup> century, with the exponential increase in processing power as well as the relative ease of use computers had, compared to decades prior.

### 2.1 Choose your own adventure

The first times one could experience non-linear story telling was with “choose your own adventure”- or “secret path”-books. It is a genre of books in which each reader can choose the path their story takes. The idea originally is from Packard, from when he told bedtime stories to his daughters and once had no more ideas on how to proceed. He next asked his daughters what should happen next and was intrigued by how different the answers were. This gave him the idea for a book called “The Adventure of You on a Sugar Cane Island” that he wrote in 1970. Unfortunately, it did not get support from publishers and the idea was abandoned. In 1975, however, he was able to get his book published and it sparked many other similar kinds of books. (Karf (1981)).

Choose-your-own-adventure books usually give the reader at least two options on how to proceed in the story and instructs on where to read next. This can be seen in practice in the image on the next page.

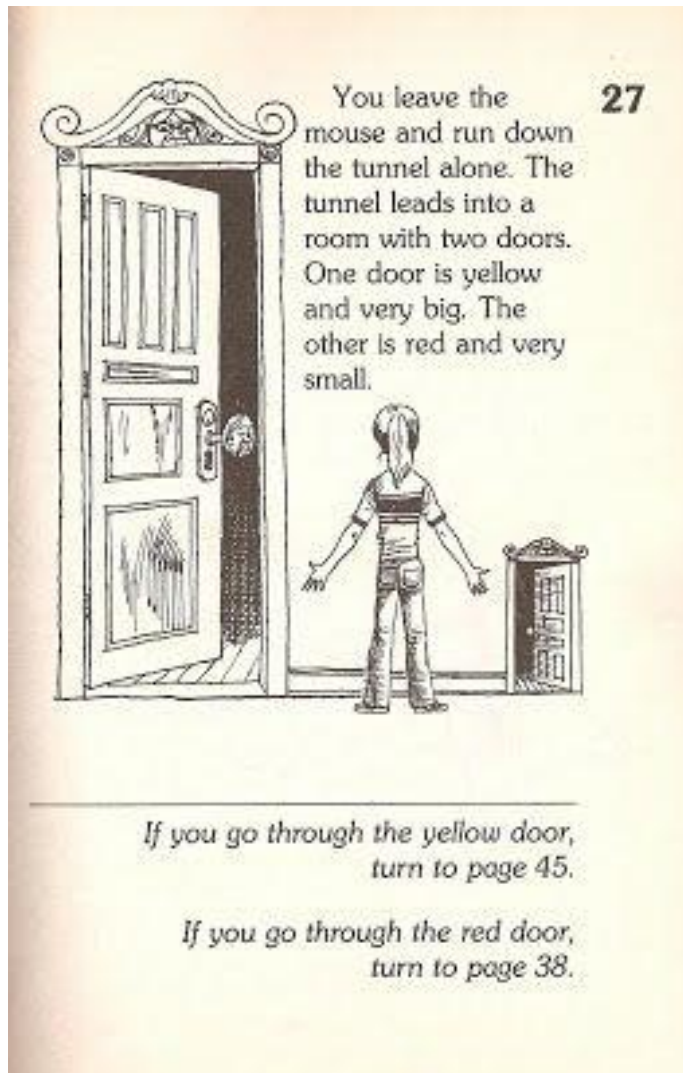


Image 1. Example page of a choose-own-adventure-book (Montgomery and Granger (1983), p.27).

As image 1 shows, the reader would read drastically different stories depending on which door they would choose. This type of storytelling also inspired the first non-linear video-games.

Another example of an choose-your-own-adventure book is Tick Tock, You're Dead. In the book, the reader is in a museum and "their" younger brother disappears. The reader finds a room with a time machine and see "their" brother run into it. Afterwards, the reader needs to choose if they will go to the past or future. The book does not only allow the reader to choose how to continue the story, but also relies on chance. If the reader meets the knight who is guarding the castle, they are required to flip a coin twice. Depending



on the result, the player will either continue their journey or die. The book has many bad endings and occasionally the story will end in cliffhangers, allowing the reader's imagination to fill the rest of the story. One example of such occurs when the reader has finally found the missing brother in the Jurassic era and is chased by a dinosaur. The reader has dropped the button that would allow them back to their own time, and the story ends with them touching something that could potentially be the button while the dinosaur is still approaching. These kinds of uncertain endings give the reader the freedom to have their own ideas and encourages them to create something by themselves. (Stine (1995)).

## 2.2 Early on non-linear games

Many story-based games have similarities to non-linear ones. Sometimes they might include side-quests or multiple options to solve problems in them, but they usually have specific starting and ending points. Even as early as text games, it was not unusual for the player to be able to roam around and possibly do things differently in each play-through, such that each one can be memorable in some way.

The text game Zork, also known as Colossal Cave Adventure, was one of the earliest text games, which gives the player different ways to solve problems presented in the game. During their adventure, the player would find various items, obstacles and enemies on their way. These could be resolved in contrasting manners depending on how the player chose to play the game. They might not pick the item they found, which would later be needed, or a thief, which would cause them to lose their items, might trick them. This might make the game more difficult, but usually would not prevent the player from proceeding in the game. Example of the game can be seen on the next page.

```

West of House                               Score: 0           Moves: 2
ZORK I: The Great Underground Empire
Copyright (c) 1981, 1982, 1983 Infocom, Inc. All rights reserved.
ZORK is a registered trademark of Infocom, Inc.
Revision 88 / Serial number 840726

West of House
You are standing in an open field west of a white house, with a boarded front
door.
There is a small mailbox here.

>open mailbox
Opening the small mailbox reveals a leaflet.

>read leaflet
(Taken)
"WELCOME TO ZORK!"

ZORK is a game of adventure, danger, and low cunning. In it you will explore
some of the most amazing territory ever seen by mortals. No computer should be
without one!"

>_

```

Image 2. Start of the text game Zork (Infocom (1979))

In the image 2 can be seen the start of the Zork. The player has done few moves in the game and found the greetings from the developers. (Infocom (1979)).

Another example of a text game in which the game appears to be non-linear is The Hitchhiker's Guide to the Galaxy. The game is as confusing as the radio comedy broadcast it is based on, following the same absurd logic. While the player is guided through the Milky Way, the game has random scenarios, which the player needs to complete. Unfortunately, the player is required to do all these scenarios in the game to proceed, so even if it gives them the illusion of differing tasks throughout playthroughs; those just come in a random order every time the game is played. It also gives the player the chance to make some minor choices, like whether or not to feed Arthur while he is a dog, though it truly only delays the task until later, where they need to buy the sandwich for him. (Infocom (1984)).

As can be seen of the previous examples, the idea of a game where the player can influence the game has always been in developers' minds. In the early stages, games tried to bring forth a feeling of change with randomness and obstacles. Sadly, they many

times punished certain behaviors from the player rather than creating variety. In Zork, you can avoid fights and enemies, by “choosing correctly” or having the “right equipment”. On the other hand, not eating peanuts in The Hitchhiker’s Guide to the Galaxy would result in death, and not feeding the dog would only delay the time when Arthur ate. In conclusion, these story heavy games were exploring the ways of choice and change but not giving the player real choices, only the illusion of such. (Infocom 1979; Infocom 1984.)

### 2.3 Popularity of non-linear games

The idea of non-linearity began to take different turns in the 21<sup>st</sup> century. It created multiple genres of games that grew in popularity because of their more interactive nature. Most of today’s games are non-linear in at least one way or another.

Crash Bandicoot 2 and 3 had a system where the player could choose in which order they would play the levels. This decreased their frustration, as they could attempt to clear another level if one of them proved to be too difficult at that moment. The only linearity that the games truly provided was that the player needed to finish all of the stages in one floor before they could clear the boss and proceed to the next floor. (Naughty Dog (1997), (1998))

#### Open world games

In open world games, the player is not restricted to an area or level that they need to be in, but rather they can move freely between places. Some games might restrict access to some of those at first. They might need a specific equipment or skill in order to access some of the aforementioned locations. Others let them roam freely, however the difficulty of enemies in different areas might instinctively guide the player to follow a specific order or avoid certain locations, even if it is not necessary to do so.

For example, in Skyrim the game allows the players to proceed at their own pace in nearly every single quest and side-quest available. Only at very few points does the game not allow the player to turn back after a step in a quest to do anything they would

like, wherever they might feel inclined to, and return at a later date to complete more steps, to eventually finish the given quest.

The only linear part of the game is the main storyline quest, which needs to be completed in a certain order; however, it is still possible to complete at whatever time the player wishes to do it, without much compromise. The game presents both an unusual, as well as a usual level up system, in which the unusual part consists of each individual ability being practiced leading to a small, incremental increase in overall experience toward the next level overall of the character, at which point the usual system is directly seen in all manner of RPGs, where the user can choose between a small increase in HP, magicka (Mana points, used for the casting of spells) or stamina.



Image 3. Fight with a Dragon (Bethesda Softworks (2011)).

Image 3 illustrates a fight with a dragon. The player is using fire magic to fight against it. The mana bar can be seen in the bottom left corner, in blue.

Skyrim also has an extensive skill tree, which lets the player choose between numerous perks which could potentially change their playstyle, or unravel an array of new tools for them to use in engaging certain enemies, or entirely change the methods with which someone deals with the combat in-game overall. It could have been expanded upon or

even reworked once they knew its flaws, however for the time that was more than enough to satisfy players worldwide. All these different skills along with the open world let's each player find their own preferred way to play the game and gives them freedom to try different strategies to play the game. (Bethesda Softworks (2011)).

The Dark Souls franchise is very well-known for its ingenious non-linear gameplay and map design, in which the user can choose where they go and when, as well as when to face any particular boss, with only a few of them being completely blocked off from the player at the beginning. The creative way in which the map was designed makes this a possibility. In the first and third instalments of the series, the map is divided into four paths, and the player may go through them in any order to reach their ultimate objective.

Both games have locations with higher and lower difficulties, marked quite clearly by how easy it is for the player to kill enemies at first, however any of those areas can be explored and any path can be taken freely from the perspective of the player without a significant amount of struggle. A good example of this is the third instalment of the franchise, as in the early game, the player had the chance to kill an NPC, non-playable character, who identifies herself as the High Priestess.

That triggers what would normally be the fourth last boss fight in the game, and later on that path reveals the boss following that as well, further down the line the second last, in such a way as to allow the player the choice of challenging themselves and severely increasing the difficulty of an already significant challenge, should they want to. The games also have a wide variety of equipment, which can be played with, from armour to shields and weapons, which change playstyle and how the player will approach the given challenges significantly.

The weapons are mostly well-balanced, which means the player has many fighting techniques and stances available to them, increasing their agency over the fights yet more. Special abilities, blocking and dodging are just a few of the aspects, which drastically change according to player choices in the game.



Image 4. Boss fight in Dark Souls 3 (FromSoftware (2016)).

Image 4 is one of the boss fights in Dark Souls 3. The player's statistics such as health and stamina can be seen on the top left corner. The bottom left corner has the player's equipment and potions. (FromSoftware (2011), (2016)).

### Role-playing games

Role-playing game, or RPG shortened is a type of game where the player uses one character and/or a small party in a well-defined world. RPGs require the player to level up their character to obtain skills, and usually equipment as well. RPGs many times are, but do not have to be, non-linear due to having side-quests.

Disgaea 2 is a Japanese RPG where the player uses up to 10 characters to complete levels. The game is turn-based and requires the player to choose the actions of the characters before ending their turn and giving the enemies their own phase. The game seems quite linear at first, but after the player has completed the game, it gives the player the option for multiple endings, either by meeting different requirements at the end of the story or summoning different hidden/secret bosses.

Besides that, it has a secondary story, unlocked only after completion of the main one, which develops further on the story of one of the characters featured in the previous one. The game also gives the player the option to create different characters to suit their needs as the game progresses, with different abilities, proficiencies, stats, among other things, which leads to the possibility of said user highly diversifying and tailoring their team for their own needs.



Image 5. Arena in Disgaea 2 (Nippon Ichi Software (2006)).

Image 5 is from one of the levels in Disgaea 2. Characters with green health bar are used by player and the ones with red bar are the enemies in game. In the image can be seen that turn has changed and the enemies are about to attack.

The game gives the user incredible freedom as to what is possible inside the sandbox the developers have created and always has something for its player to seek after their current objective, long after the main story ends. Through creating time sinks, they have developed a game which can entertain the player for hundreds, or thousands of hours if they so wish, and stop playing it at any point. Bosses can be summoned out of order, and some are only found through niche and creative ways, creating an element much like Easter eggs for the endgame. (Nippon Ichi Software (2006)).

Dragon Age has complex system with multiple dialogue options between the player and NPCs, in which the player would have different options for dialogue and could pick between them. Choosing distinct dialogue choices would give them varied results, such as obtaining information from that character they otherwise would not have, or not obtaining certain items from speaking to a character. The mechanic essentially is a double-edged sword of sorts, as later it was refined so that specific characters whom “like” the user would cause other characters, generally an enemy faction of such aforementioned NPCs, to dislike the player.

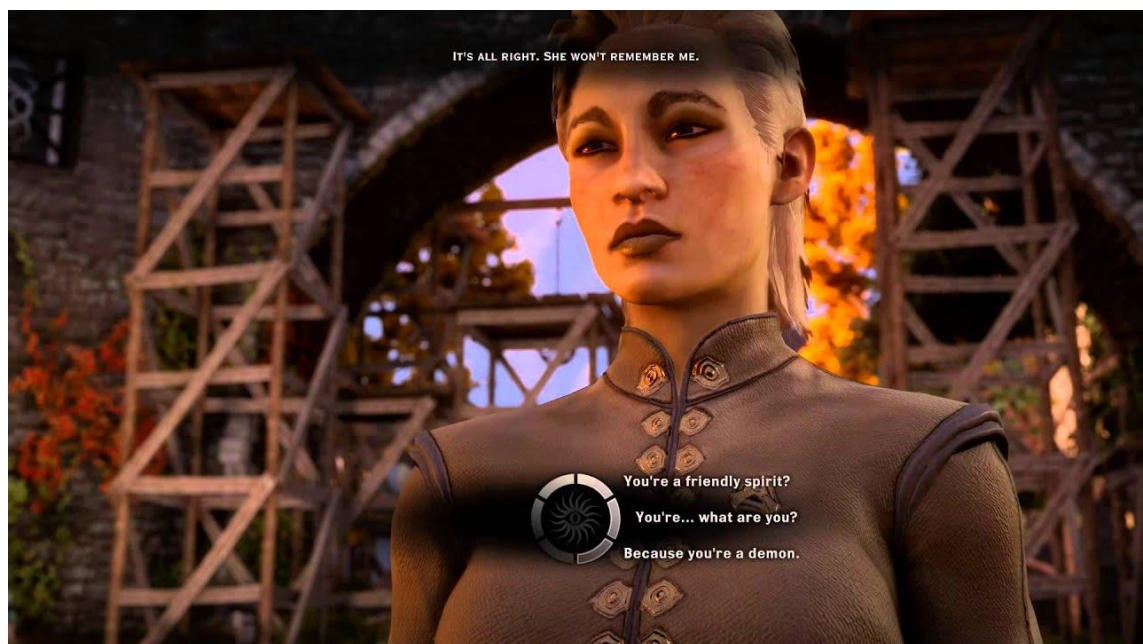


Image 6. Example of choices (BioWare (2014)).

In image 6 can be seen an example of the choices in the game. These choices change the relationship with the NPCs and how they react to the player. (BioWare (2014)).

### Visual Novels

Visual novel games are very popular, especially in Japan. These types of games are text based and have still pictures, usually in a specific style of art or even live action acting. Sometimes they contain video footage along with the other visual material. Visual novels are multiple-choice games where the decisions that the player makes change the game.



Danganronpa is a visual novel game about a group of teenagers that are trapped in a school campus. The rough idea of the plot is that the only way the students are allowed get out of said campus is to murder another student and not be caught by the other students. Every time a body is found, the player will investigate it and a trial will be held. If the killer is found, the other students will remain trapped in the school and the murderer will be executed gruesomely. Otherwise, if the wrong murderer is found guilty, the other students will all be killed, and the murderer can walk out of the location they were trapped in.



Image 7. Interaction with Makoto Naegi (Spike (2012)).

Image 7 depicts one of the interactions in the game. Makoto Naegi is one of the characters that helps the player the most, providing good observations and critical thinking in the game. (Spike (2012)).

## 2.4 Interactive storytelling

Interactive storytelling is probably what most people associate and most easily recognize as a non-linear game. These games have a story that divides itself depending on the choices that the player makes. The ways that these games present those choices differ drastically. Some have a moral system, where doing something considered good or bad will determine how the story proceeds. In others, there are systems as simple as heading to the left or right on a forest path. There may be tens of different endings, and in many of them, the player does not see entire scenes or parts of the game, depending on what choices they make.

The Sonic franchise's spin-off game *Shadow the Hedgehog* is one of the early interactive storytelling games. Its moral system allows the player to choose between villain, hero or neutral. Depending on the player's choice, they would advance to the next level with a different outcome for the story. If they would complete mission presented as good, they would proceed toward the good ending, and vice versa. The map of the game levels shows how the game proceeded depending on their choices.

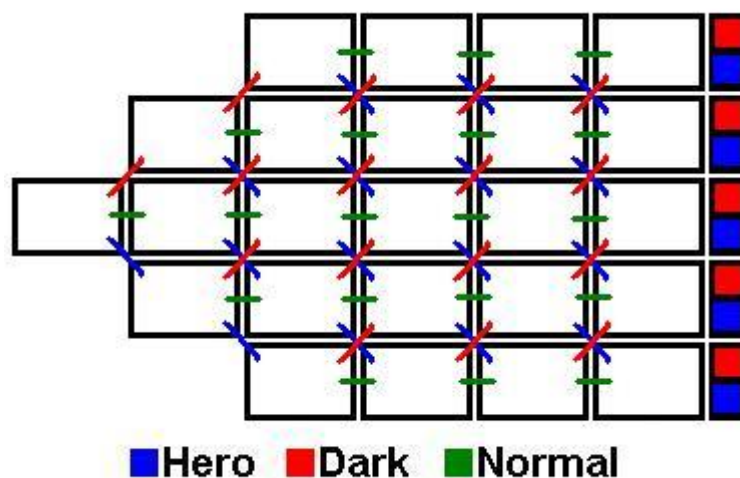


Figure 1. Level map of the game with corresponding choices (Genericide (2012).)

Figure 1 illustrates the level map. White boxes in the figure are the levels in the game. The different coloured lines show where the game will proceed depending which task is

completed at the end of the level. The red and blue boxes demonstrate the different endings that the game has.

One interesting fact about this game is that even the player's mistakes are taken in consideration. In some of the missions, if the task were not completed in the given timeframe, the player would lose the ability to proceed in that direction. In those cases, they would need to either restart the level or finish another mission instead. One of the main criticisms of the game is that in order to see all endings, and to unlock the final ending, the player needed to complete the first level at minimum 10 times. (Sega Studios USA (2005)).

Heavy Rain presents the usual interpretation of the interactive game genre, what players most commonly associate with such. In the story of said game, a young boy has gone missing and the player's job is to solve the mystery behind it. The game allows the user to see the story from many different angles by having the player control multiple characters. This is done in the likeness of scenes of a film, letting them play with one character for a period of time before having them control the next character. The goals of all controllable characters are the same, finding the missing boy, however the methods and resources used and available to them are different.



Image 8. Choice in Heavy Rain (Quantic Dream (2010))

In the image 8 is a simple choice from the start of the game. The father needs to decide if they want the kid to go to sleep now or later. These choices are neutral and will not change the outcome of the game. They are simply there to get the player used to the mechanics.

The boy's father starts to receive clues from the kidnapper throughout the duration of the game, however, he is told not to contact the police. The agent has plenty of resources but needs to work within the law. The private detective can work more freely than the agent and has connections around the city but does not have access to the clues that the agent does. The choices that the player makes not only influence the game, but also the way of playing it. If the player is more thorough and curiously looks around, they will find more clues and unlock more options. In this game, failures also influence the story.

Not finishing the given task from the kidnapper will end up in the dad not receiving any more clues. Even the death of a character can be punishment for not being able to fulfil the task given to the player. The interactions between characters also depend on the choices that the player makes. Some characters might be more willing to help if the player aids them or behaves politely toward them. All of this makes the game extremely complex, and in order to see all it has to offer, the game needs to be played multiple times. (Quantic Dream (2010)).

### 3 Interactive story game requirements

#### 3.1 Difference between interactive and non-interactive story game

Many games contain a story in some form or another, whether scattered across descriptions of items, in the scenario and stages around the layer, among other forms of indirect storytelling. It could be simple, without a concise, written plot, rather simply giving a brief objective or it could be a fully planned and well-written story. What truly differentiates interactive and non-interactive story games is how much agency, or choice, they give to the player. In an interactive story game, the player decides where the story goes, whereas a non-interactive one would make them follow the narrative linearly from start to end.

Detroit: Become Human is one of the most complex interactive games ever made. The player would have to play the game numerous times to see every scene, and choose its different dialogue options, since most of the choices will lead them in completely different directions. The player will see different cut scenes and results depending on the direction their choices lead the story. Entirely contrary to this concept is, for example, Alan Wake. The game is very story-heavy and one of its best assets is the interesting plot.

Unlike in Detroit: Become Human, Alan Wake forces the player to follow the story the same way every time. No matter how the player interacts with the game, they will end up following the same story, the same way. One thing apparent in interactive games like in Detroit: Become Human is that it has multiple characters the player can play as, whereas non-interactive games usually, although not always, have only one character the player is allowed to play as, like in Alan Wake. (Quantic Dream (2018) and Remedy Entertainment (2010)).

### 3.2 Game technical requirements

An interactive story game needs to give the player the choice to play the game differently in their playthroughs. This might mean that the player is only allowed to influence a few aspects of the story but is still required to play the game to completion at least two times in order to see all of the content that the game has to show. Ones that are more complex will take in account things like morals, interactions between characters and time.

The games have different sequences where they give the player the choice to make their decisions. After that, they can see the influence of the choice and their decisions cannot be changed any longer within the playthrough. The choices create a tree diagram that will lead the player to different directions.



Figure 2. Choice map of one of the sequences in Detroit: Become Human (Quantic Dreams (2018))

The choice map in Figure 2 is a good example of how interactive games are built. Even though most times the games have multiple endings, it is not always necessary. In Quantum Break the ending is always the same but the player is given choices throughout the course of the game that will change gameplay as well as the story. The game's idea was to show that even if the path might be different, the end result could still be the same.

The impact of the choice is not always the same and some of them are more extreme than others, since the player is choosing who lives and dies in the game. The influence of the choices in Quantum Break are seen more in the acted episodes that change accurately depending on the choices that the player has made. Unlike the tree map, like in most of interactive game controllers, Quantum Break's controller uses a controller like an if-else diagram shown below. (Quantic Dreams (2018) and Remedy Entertainment (2016)).

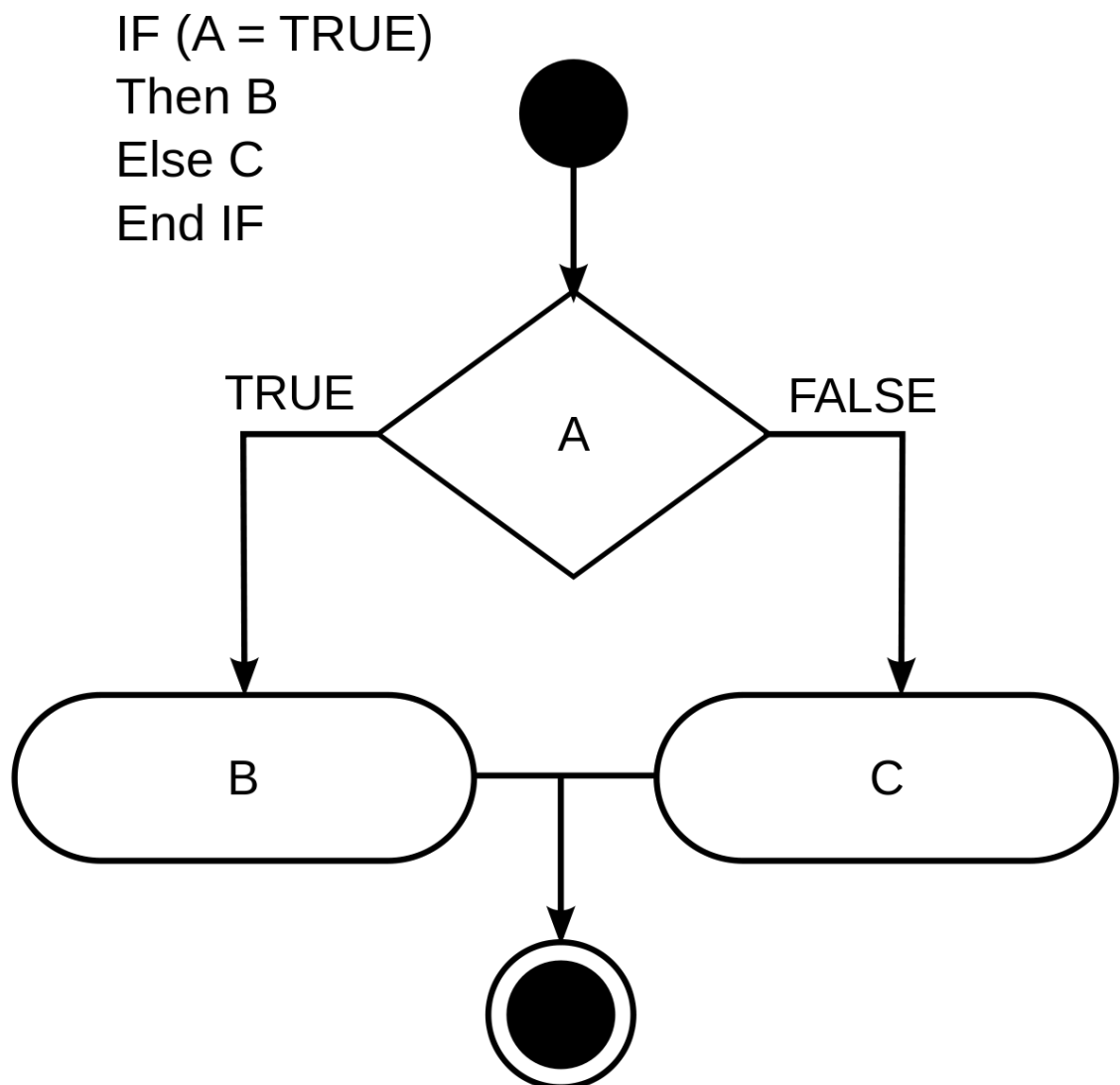


Figure 3. Example from Quantum break (Figure #1, Wikiversity)

In figure 3, A would be the choice given to the player, while B and C would be how the game would continue after the choice. The encircled dot would be the ending that the player would eventually arrive at. In conclusion, it can be deduced that in order to create an interactive story game, it needs branching of some kind, even if the game will always end the same way.

### 3.3 Psychology behind choices

In interactive story games, psychology is a large part of their success. Understanding human behaviour and decision-making shows how the games are built to purposefully lead the player. Some games are clearer about the influence of choices, whereas others are subtle.

Barry Schwartz talks about decision-making and choices in his TED talk “Paradox of decision making”. He presents the idea that there is such a thing as too many options. Western culture conditions the population at large to thinking that the more choices they have, the “freer” they are and therefore the happier they become. Unfortunately, there is a downside to having too many choices. This results in stress and exhaustion. This also leads to unhappiness with the choices that they have made, even if the choice is a good one in comparison to most others. In an interactive game, an excessive number of choices can be exhausting, and that is why some of them give hints to help the player. Detroit: Become Human allows the player to occasionally hear what the controlled character is thinking. Until Dawn, on the other hand has totems that the player can find during the game, to help the player make decisions. (Schwartz (2007), Quantic Dream (2018) and Supermassive games (2015)).

Daniel Kahneman talks about two manners of thinking in his book ‘Thinking fast and Slow’. These ways of thinking are called ‘System 1’ and ‘System 2’ in the book. System 1 is the intuitive or automatic way of thinking. This way of thinking is what brains use to make decisions and solve problems in everyday life. It is used for recognizing feelings, solving easy problems like 1+1. On the other hand, System 2 is used when one needs to focus on something intensely and make conscious effort for solving problems or making decisions. This means learning new skills, like playing any game for the first time or telling someone a phone number. Interactive games use these two systems in their



decision design. *Until Dawn*, for example, uses these types of choices at different times. If the main character is chased through the woods, the player needs to use their intuitive decision making to choose the path the character is taking within a few seconds. Other times, the game gives the player much more complex decisions, where they need to use their slower, more constructive decision-making. Using these decision-making methods not only makes the game flow differently; it also keeps the player interested. (Kahneman (2012) and Supermassive games (2015)).

### 3.4 Influence of the choice

Interactive games use in many ways. The influence and result of these choices can be very direct and clear, or unclear and revealed much later. There are games where failure is considered a factor and will influence the game just like choices would.

#### Morality Systems in games

Some of the games have a morality system. In these types of games, the player's actions are divided into good and bad. The *Infamous* series is very well-known for this system. In *Infamous 2*, this is called Karma. In the game there is a meter, showing whether the player's karma good or bad.



Image 9. Karma meter (Sucker Punch Productions (2011))

In the image 9 is the karma meter. This meter changes position depending of the way that the player chooses to play the game. Image 8 has the pointer in the middle, so the karma is neutral.

The game also delineates rules on how to play the game to keep that meter in the chosen direction. If the player wants to be deemed good, they should not hurt civilians and if they desire to be evil, they will help outlaws in some side-missions. The game also makes different skills available for unlocking, depending on how the player has chosen to play. In the end, depending on whether the player has chosen to be 'good' or 'bad' they see one of two endings. If they want to see the other ending, they need to play the game in the opposite style, in order to unlock said ending. (Sucker Punch Productions (2011)).

Another example of a morality system in games is in Dishonored. The game lets the player know at the start of the game that every action taken will affect its ending. The game doesn't give as clear of an indication as in Infamous 2 of how good or bad the player is, but it noticeably changes how the game ends. Some options and parts of the game can be lost depending on what decisions the player makes. Even if the game does warn the player that a more violent playing style will affect the game negatively, it never requires the player to play in a certain way, nor does it warn them about their actions. The weight of the player's actions during the game truly is revealed at the end of the game. The ending shows the results of the player's actions and how things would end, much like in real life. (Arkane Studios (2012)).

#### Changes in personality and relationships

The choices of the player can also change the personality and relationships of the character. Until Dawn shows this clearly by having direct statistics of the characters' traits and relationships.



Image 10. Character traits and relationship status screen (Supermassive Games (2015))

In image 10, one character's traits and relationships to other playable characters in the game can be seen. The white line shows where the traits and relationships were at the start of the game. That also helps seeing how the player's choices have affected the game. These choices change how the characters interact with each other, as well as how willing they are to help or trust each other. (Supermassive Games (2015)).

Detroit: Become Human also used the relationships system as one of the ways to show how the player's choices changed gameplay. The changes in relationship status are shown in the moment they happen. The game shows the player whether the relationship would increase or decrease. These statuses could be seen in the character's page, similarly to Until Dawn. The influence of characters' relationships is a major point in this game. For example, if Connor, the android agent helping the human police officer Hank, wasn't in good terms with him at the end of the game, he could not convince Hank to trust him when faced with a hostile model of Connor's, physically identical to him. (Quantic Dreams (2018)).

## Action and inaction

The most common type of choice that interactive story games have is a multiple choice. These choices can vary drastically, depending on the situation given to the player. It could be something as simple as looking to the left or right while looking for something, or it could be as complex as a cop asking a question to their suspect, or even how they should ask it. Usually, these types of choices have immediate results in the game, letting the player know what changed because of their choice.

At the other side of the spectrum, there is inaction. Some of the games give the player the choice to not do anything. *Until Dawn* uses this in multiple cases. Early in the game, the player gets the choice to throw a snowball at a bird. If they do, it has a negative consequence later in the game, resulting in some of the characters getting hurt. Also, a good example is a trap in an abandoned asylum. The player has the choice to go to it and check it or ignore it. Another example of inactivity is in *Detroit: Become Human*. The first time the player meets the android Markus, they are faced with the choice for him to defend himself. If the player chooses to defend Markus, an old man dies when he tries to get between Markus and his son. If the player chooses not to, the old man he belongs to will live. (Supermassive Games (2015) and Quantic Dream (2018)).

## Failure as a choice

Sometimes, failure is still considered as a choice by the game. *Heavy Rain* uses this multiple times. The kidnapped child's father needs to drive against traffic at a highway in order to fulfill the task given by his son's kidnapper. Another character needs to escape from a house on fire. Both of those can result in the death of that character if the task is failed. In *Detroit: Become human*, failure is seen as an option too. A few characters are trying to avoid the police and get into a bus that will take them to safety. In order to do so, they need to go through alleys full of policemen. If they are caught, they fail their mission and are sent to camps instead. (Quantic Dream (2010), (2018)).

## Time as a factor in games

One of the reasons why the player is bound by the choice that they make is time. After choosing between one option and the other, time has passed, and the player cannot change their choice. This is not always the case, as *Until Dawn* uses time as a factor differently depending on the situation. Sometimes, it does not matter if the player chooses to go right or left, because they can go back and investigate the other direction as well. Other times, the choice that the player made has affected the character because time has already passed. The character might have fallen or encountered something that makes it impossible to go back the same route they came from.

One other way to use time in choice making in games is to have timed choices. This forces the player to choose with their instincts and not stop to think rationally about their choices. *Until Dawn* uses this a few times in the game. Some of the actions might be difficult to react to in time, like the high five between Josh and Sam in the boiler room, since the player is not given much time to react to this and does not expect it. Other times when the choices are timed are, for example, when running away from the masked man, the player needs to choose directions, dodge quickly and decide between running and hiding. (Supermassive Games (2015)).

As a conclusion, it can be observed that there are different ways to create a non-linear game. Even simple interactive story games have multiple different methods. All the different factors and types of choices give the opportunity to create varied games. Interactive games are not set in a strict mold, which allows the developers to design their own type of interactive game.

## 4 Road Trip game

The Road Trip game was made to demonstrate the controller in an interactive story game. It is a short game which would act as one scene in a bigger game.

#### 4.1 Story of the game

Inspiration for the story came from two dreams that were merged to create an interesting plot. The idea is that the main character of the game would be an agent investigating a terrorist threat. The director of the department had gotten a hint that there might be a “mole”, someone working on the inside loyal to another organization in their unit, and the main character was supposed to find out who it was. She had just gotten enough information and was headed to the director when the unit was attacked, and she needed to escape.

While attempting to get away from said mole, driving at high speeds in a narrow forest road, she would encounter a deer and crash while swerving her car to dodge it. This would lead to the player’s first choice, where they would either find their way to train tracks that would lead them to the city or find a pathway through the forest to a small village. The story would continue differently depending on where the player would go from there. If they went to the city, the story would proceed to trying to stop the bombing, whereas in the village it would be about trying to survive attempts on her life from the aforementioned mole while solving cases of missing people in the village.

For the thesis, this idea needed to be shortened to fit within the timeline. That is why the Road Trip game is a demo of the game, working as its own separate example. The Road Trip game focuses on the moment when the first actual choice of the player happens. In this small demo, the player is driving a car until they meet the deer and have to choose to which side, they would swerve to dodge the deer. This will determine the crash site and the player will have to wander the area to find their way through the forest.

#### 4.2 Choices within the game

The choices in this game were made to be much like the tree diagram showed earlier in figure 2. Time was also considered as a factor. Some of the choices require quick decision-making from the player. The very first choice in the game is timed, and if the player does not make said decision quickly, they will be randomly assigned a crash site and considered injured, which does affect the playthrough. For example, an injured player

cannot face the bear or try to walk upstream at the river since the flow is too strong, which would result in the character drowning.

Other choices do not take time as a factor. The road trip game was an attempt at making the player have the sensation of an open world, since the player can roam the different areas as they please. They can also go to the same area multiple times and exit from different points. They can go to the same place where they found the bear if they had decided previously not to go to it. This was done so that the player does not feel constricted by time, but rather given the freedom to explore and look wherever they please. The choice map can be seen in the next figure.

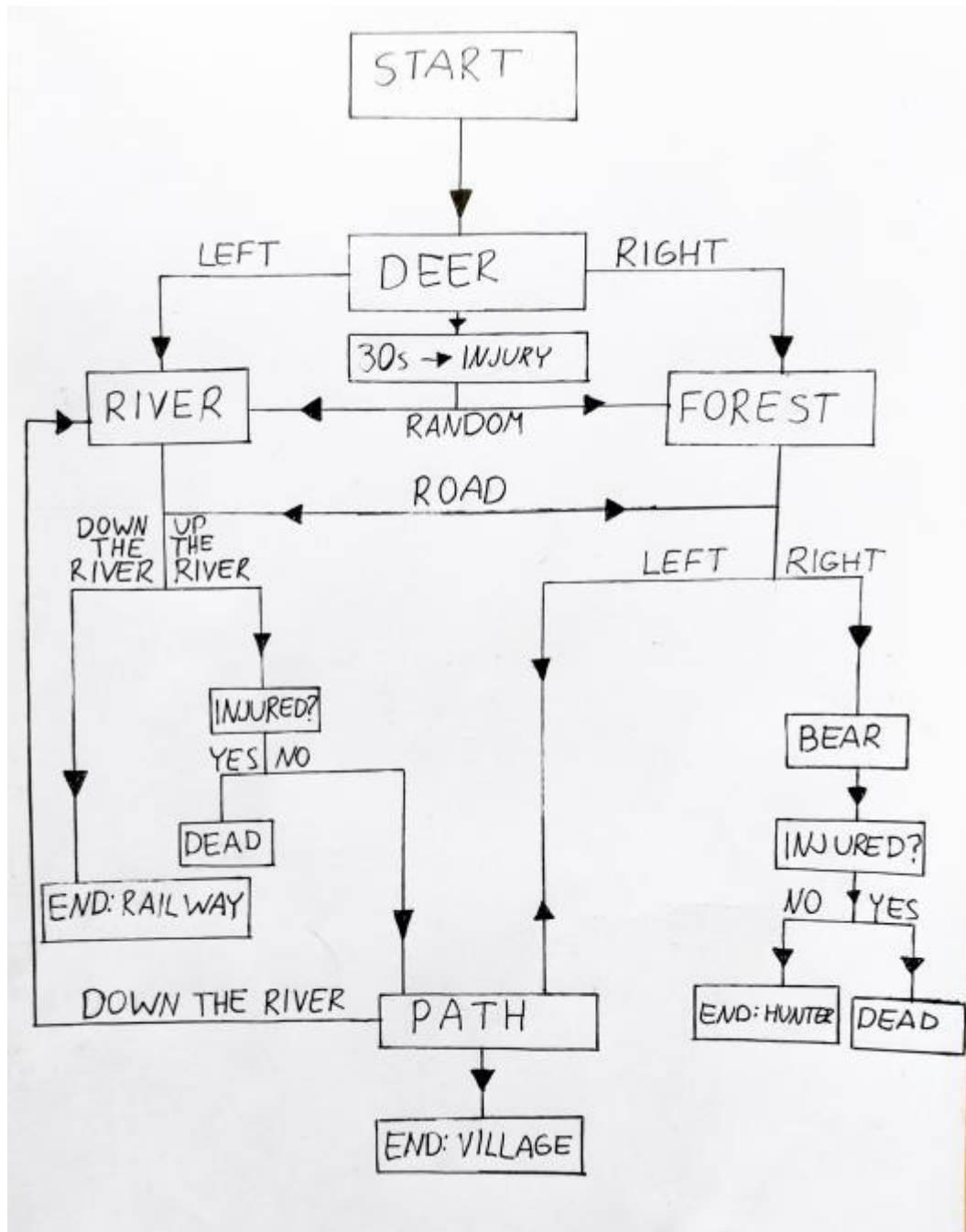


Figure 4. Road Trip game choice map (Sara Lindo 2020)

As can be seen in Figure 4, the open world aspect creates loops along with the tree diagram method. The arrows are there to demonstrate which directions the player is able to go. Sometimes they can choose to go back and forth the same way, which is also shown with the opposite directing arrows. A good example of this is the path and the



forest, where the player can get to the path by going left, or coming back from where they came, now at the left passage in the forest.

### 4.3 Environments and characters

The game has four different areas. The road where the player sees the deer, the forest where the bear is found, the river which hides the railway and the pathway which is the way to the village. The road is the only location different from others, since it cannot be accessed after the car accident. The three others are connected and can be explored freely.

The game has the main character (agent), deer, bear and hunter. Before the crash, the player drives a car, but after the crash, they are introduced to the main character. In the picture below can be found an image of the main character.

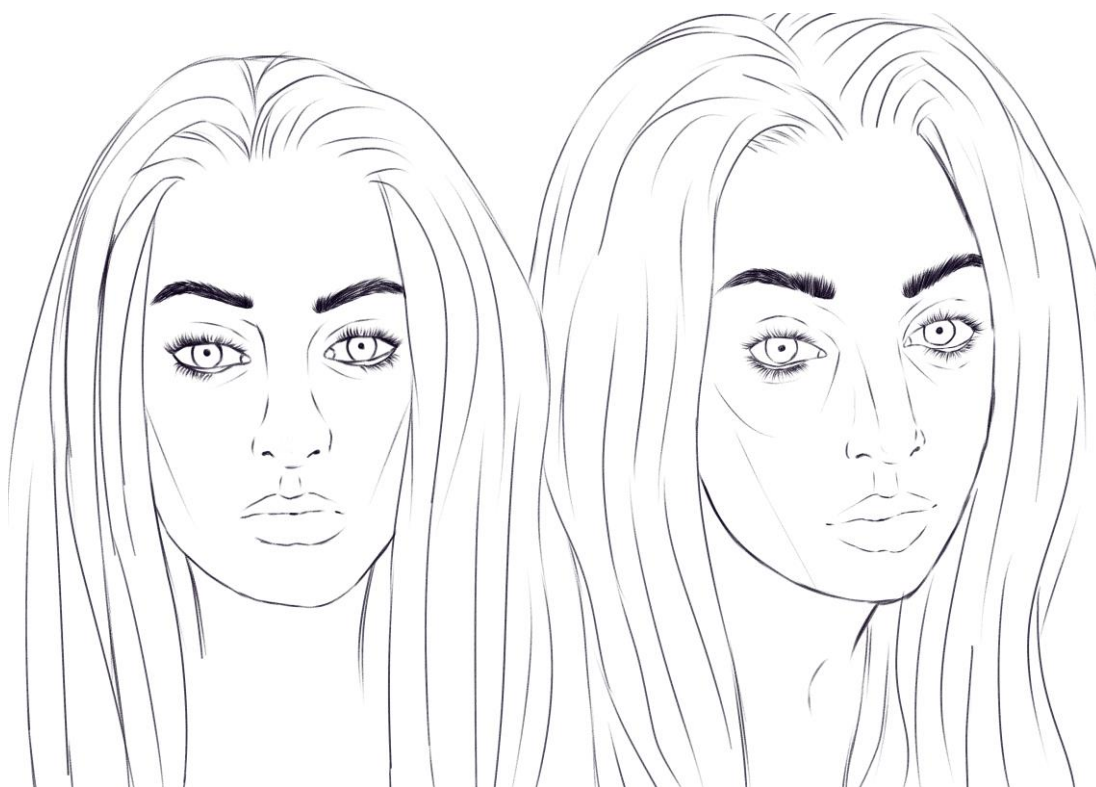


Image 11. Sketch of the main character (Sara Lindo)

In the image 11 is the sketch of the main character. This picture was used for creating the 3D-model, which turned out to be more time taking than first believed. For this reason, the character was not animated when the demo was finished. The 3D model for the hunter was created but was not put in the game, due to the lack of animations. The deer's and bear's 3D models were not only coloured for the game. Since animation was not possible in the given time frame, many scenes were replaced with still pictures. These illustrations were made to give some visual interest to the game.

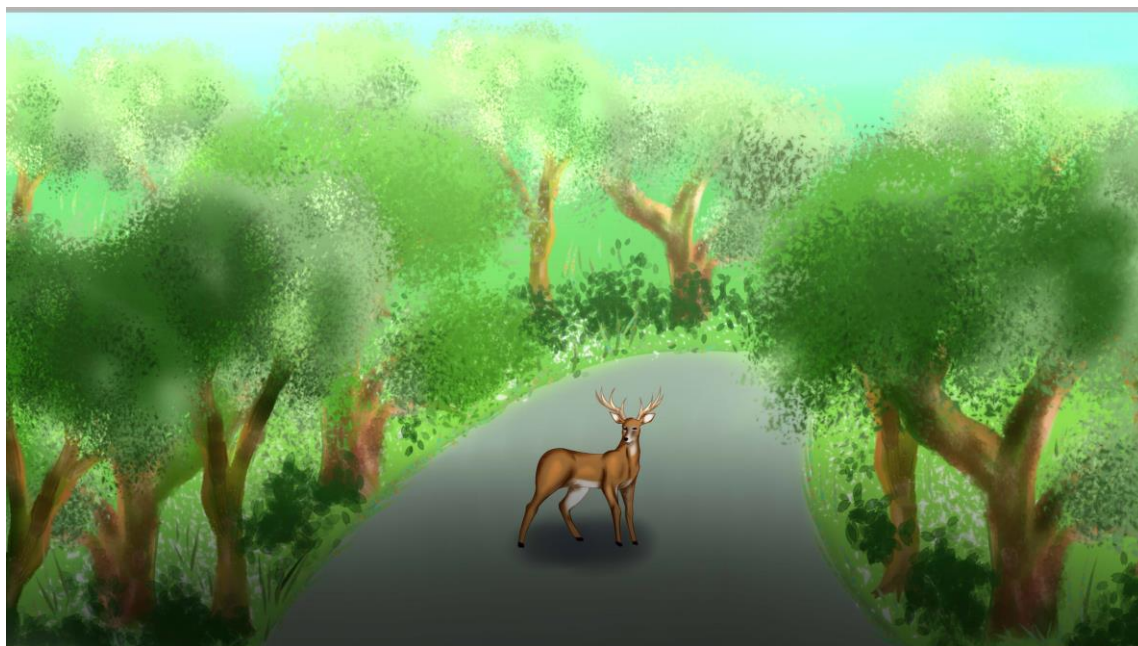


Image 12. Encounter with the deer (Sara Lindo)

Image 12 is an example of the illustrations found in the game. This picture is from the choice screen with the deer.

#### 4.4 Technical work and implementation

The game was created as a Unity project. Creating the controller for a 3D game turned out to be challenging. The original idea was to create a Main class that would have managed the choices by calling other classes and their functions. Unfortunately, due to the open world nature of the game, this was not possible.

Instead of using the Main as the core of the controller, 3D triggers in the game were used to control the choices and events. These triggers were invisible 3D-blocks without mesh collider, meaning that the player could not see them, and the 3D-character could walk through them. These triggers were added around the map in order to set events in the game, and each trigger can contain more than one code attached to it.

The triggers recognized the player by checking the tag given to the object. If the detected object on the trigger was the player, the event would be activated. Each trigger was given their own set of codes. Some of them simply changed an area to another if they detected the player, others would trigger the choice menu or an ending. Some of them also checked if the player was injured. A good example of this is the trigger found in the river. If the player attempted to go to the path from the river while injured, they would die.

The triggers also controlled the music and sound effects in the game. For example, every time the player entered a choice menu, the music would change, and the effects would stop playing. Similarly, they would trigger the effects needed like the break sound when meeting the deer.

In order for the open world concept to work, the player needed to spawn in a specific place on the scene depending on which scene they were coming from. Game manager was created to take care of the coordinates. The triggers contain the coordinates and the direction that the character will be facing in the new scene. The trigger would transmit this information to the game manager, which would take care of the proper placing of the character in the new scene.

In the end, the main became just the starting code of the game. The 3D-triggers were, by the end of the project, the solution in the 3D environment. This might be because of the logic that Unity uses, by attaching the codes to 3D-objects rather than having complex object-oriented systems with databases like many text games used to have.

#### 4.5 Walkthrough of the game

The game starts with the player driving a car on a forest road. If they would turn around in the road, they would eventually come across fallen trees that would not allow them

passage. When going to the direction that they were originally facing, they will eventually come across the deer. This is the first time that the game gives the player a choice that will make the game branch in a different direction. After the player has chosen if they are going to dodge the deer to the left or right, they will crash. The crash sites can be seen in the map, presented in the next image.

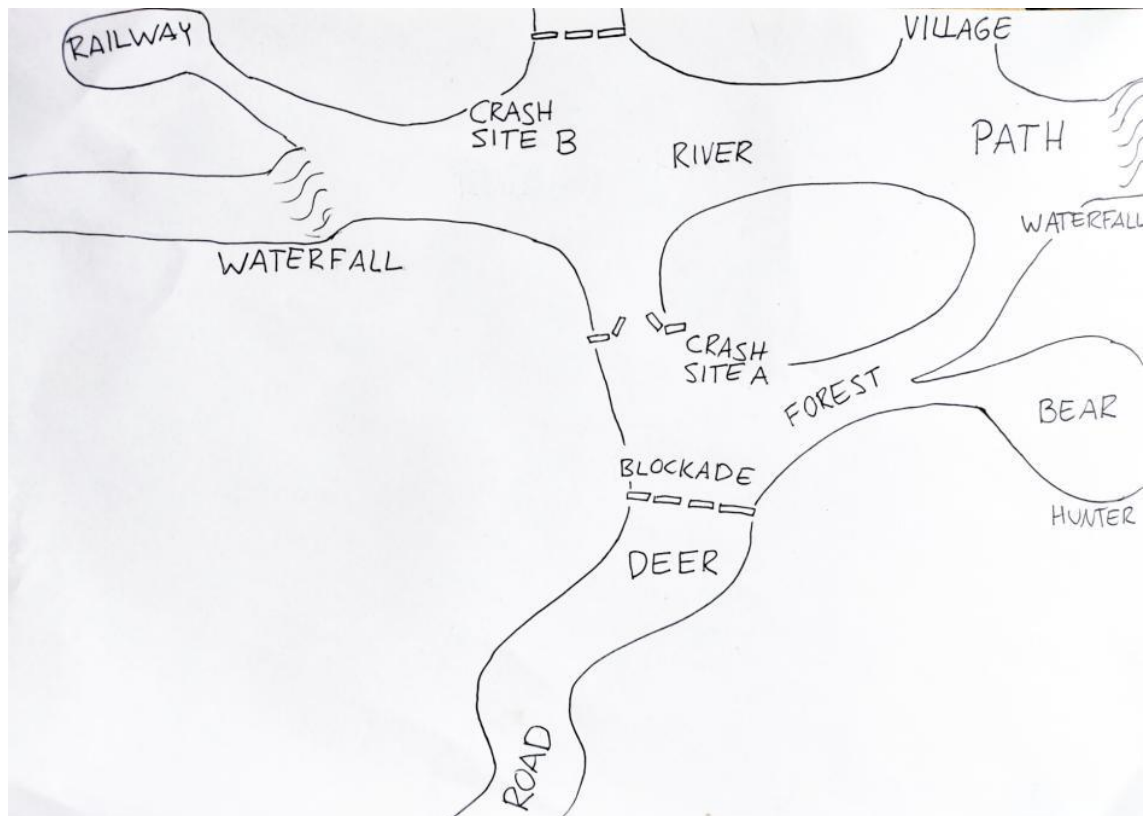


Image 13. Map of the Road Trip game (Sara Lindo)

Image 13 contains the map of the game. It is used to help demonstrating where things are in the game.

Scenario 1: The player decides to dodge toward the right. They crash into crash site A seen in the image 13 but were not badly injured. Their game will continue from the forest.

Scenario 2: The player decides to dodge toward the left. They crash into crash site B seen in the image 13 but were not badly injured. Their game will continue from the river.

Scenario 3: The player does not decide which direction to dodge to fast enough. The game will randomly choose either crash site A or B. The player is considered injured by the game, which will change some outcomes.

Forest: Part of the road goes next to the forest. The player can get to the river by walking past the open blockade shown in image 13. A sand path leads deeper into the forest, which will lead them to a crossroads. Left leads to a new area called path. Right will take them where the bear is.

Bear: The player can decide if they want to come closer to the bear or leave. If the player decides to leave, the game will put the player back at the passage, facing toward the crossroads. The player can turn around and walk to the bear if they wish to change their choice. If the player decides to encounter the bear, there are two outcomes. If the player is injured from the crash, the bear will kill the player and the game ends. If the player is not injured, a gunshot will be heard. The hunter is fast enough to help, and the player has reached one of the good endings of the game.

River: The road continues to both sides of the river. One side is blocked; the other will let the player wander to the forest. If the player continues to go too far downstream, they will fall from the waterfall and die. If instead they find the passage next to the waterfall, they will walk downhill and find the Railway, one of the good endings. If the player decides to go back upstream and they're injured, they will drown and the game ends. Otherwise they will be in a new area called path.

Path: The player can go in three directions. Left from the waterfall is a way to the forest. Downstream will get them to the river area. Lastly, going to the right from the waterfall will get the player to the village, which is the last good ending in the game.

## 5 Results

### 5.1 Analysis

The interactive story game controllers are complex and branch many times. Even for a small game that can be considered a simple demo of a game, there is a complex tree diagram. In order to keep the controller clear and easy to understand and possibly change if needed, the tree diagrams must be planned clearly.

The easiest technical implementation is to have a main class for each scene or area. The main class would control all the other classes and functions needed in the scene. Choices would have their own class or function that controls them. The main class in the scene could hold the tree diagram controller that would move the story forward after every choice and decision. The database would have the necessary information about needed variables and possible changes in them. It could contain things such as character traits, relationships, morality, injuries etc.

In the given example, the controller used triggers instead of classes. This was because the player could move to different areas and scenes freely. These triggers could easily be replaced with classes in a game that does not have an open world concept in it. Likewise, if the game requires more free movement between areas, triggers are a valid method to do so.

### 5.2 Future

Because of the complexity of non-linear interactive story games, a whole team would be needed to make a full game within a reasonable timeframe. The road trip game will stay as an idea for now, however it might be written to a script in some point. It might be done in a different medium than a game. A choose your own adventure book is one valid option or polishing the idea enough that it could be made to a game later.

## 6 Conclusion

The idea of non-linear games came from choose your own adventure books. Some of the early on games had some traits of non-linear games, but the choices in those games were limited.

There are multiple types of non-linear games. Interactive games are a type of non-linear games that give the player choices to steer the story toward different directions. Interactive story games have different types of choices that they take in consideration in order to change their narrative. Some of those choices are, for example, the relationships of the characters, morality and action. Choices and mistakes that the player makes change the game, making it different with each playthrough.

Road trip game is a small game created to demonstrate how to manage the story of an interactive game. It also has few traits from open world games, letting the player roam around freely. The game can be expanded to a full-sized interactive game, but it also works on its own.

The game is a working example of the controller in interactive games. Its use of both a tree diagram and loop diagram as the logic of the game makes it different from most interactive games. Additionally, it can be used to create a game that is both interactive and open world. The use of 3D-triggers instead of simply object-oriented coding was the key to making this logic work.

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