

Storytelling through Gameplay

Dimensions of AI Design for Narrative Purposes

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Abstract

A vast number of game developers long for and seek to create games that impact and emotionally engage their players. However, it has proven to be a tough challenge to overcome, as a lot of narrative games today completely separate their emotional stories from their engaging gameplay[1, 2].

Extending this insight, this paper proposes the theoretical basis intended to contribute to the understanding of how to create expressive AI agents, by answering the following question: *How can developers tell stories through an AI agent's behaviour?*

A further key element in this paper is the creation of a conceptual framework, based on a literature study, exemplifying how AI agents can be designed to contribute and support the narrative in a game.

The framework suggests that creating these types of AI agents is an iterative process of defining the core themes within a game, deriving an agent's purpose from these and building its behaviours from that purpose. Also, defining how to communicate these behaviours to the player. The framework also emphasizes the importance of user testing during the design process, as a way of evaluating the balance of transparency and emergence within the AI system of the game. The framework is exemplified with a case study conducted on an AI agent, designed and developed for the game *Shelter 2: Paws* by game studio Might and Delight. The results of the study shows that AI agent has a close connection to the narrative through the main themes of friendship, cooperation and growing up in the game. Finally, the AI agent design is evaluated through user tests, which shows that players interact with the agent as expected and share the game experience that is intended by the developers.

Keywords: narrative, game narrative, AI design, narrative AI design, expressive AI

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Chapter 1

Introduction

You are standing alone in a vast and beautiful desert. The wind is caressing your face, forcing your red cloak and schal to dance like waves on the ocean. You slide down shimmering sand banks, leaving trails of dust behind you. In the emptiness, you start to wonder where you came from and what you are doing here. Then suddenly you notice, in the corner of your eye, something moving. You turn around and notice a hazy shape in the distance. As it approaches, you start to feel like you are looking into a mirror. In front of you is another red cloaked shape, undoubtedly a new friend. You keep on moving, but you are no longer alone, and as you travel together and interact with each other you start to learn things about this mysterious world and your own curious story.

These events are a description of what can happen in the anonymous online video game *Journey*. A game that has been described by critics as a breathtaking, magical, ethereal and innovative experience that emotionally connects with its players[5], and where the experience is re-shaped as players travel together and create authentic moments to remember and discuss[6].

These are the kinds of experiences a lot of game developers long for and seek to create: games that impact and emotionally engages their players. However, it has proven to be a tough challenge for developers, as a lot of narrative games today completely separate their emotional stories from their engaging gameplay[1, 2]. This type of game design lets the story flavour the game, motivate the player to perform certain actions and maintain a player's long-term interest in the game, but nothing beyond that. Even so, the game industry recently went through a reform where more focus, time and resources were put into narrative interpretation in games[7]. Proof of which lies in many new game experiences (such as *Journey*) and also in how players are being more accustomed to many different conventions of interaction and agency in games[4, 8].

Cognitive research in games has been around since the early 80's, but it has not quite caught up with this latest shift in the game industry. It has mainly been

focused on how people's brains are effected *by* games, as opposed to how games can be designed *for* them. The philosophy of adapting the game design to how people's brains actually work, i.e. integrating UX design in games, has hardly been seen in game research or even in the game industry so far. This is strange, as cognitive research shows that the most important processor for transforming data to an emotionally engaging experience is a person's brain[7].

The objective of this master thesis is therefore to contribute to the understanding of how games can be designed for their players by focusing on the depth of the game experience, rather than just the narrative or the gameplay in a game. The project consists of closer examining the interactions between user and system within games and working towards an understanding of how to design this interaction to create emotionally compelling games. This thesis will mainly focus on interactions between players (user) and AI agents (system) in games. The key purpose of the thesis is consequently to propose a design framework for creating narrative AI agents, as well as exemplify the framework through a case study, conducted on a user-system-interaction occurring in the game *Shelter 2: Paws*, currently in development by the game studio Might and Delight.

1.1 About Might and Delight

Might and Delight is a small independent game studio formed in Stockholm, Sweden. They have created titles like *Pid*, *Shelter* and *Shelter 2*, and they describe themselves as follows:

"Our goal is to create interesting experiences with a strong focus on well-crafted visual styles. We try to mold each project using a unique philosophy, choosing genres and settings that we are unfamiliar with. Our inspirations are often rooted in history, art or other cultural expressions besides games." [9]

The studio has a talent for making emotionally compelling games and integrates narrative gameplay design, i.e. gameplay that is designed in a way that supports the narrative of the game, in their work. Might and Delight are interested in knowing more about how to transfer their knowledge in narrative gameplay design to narrative AI agent design.

The author of this thesis is therefore engaged as a game developer on one of Might and Delight's game projects, *Shelter 2: Paws*. The author develops AI behaviours and examines how these can be designed from a narrative perspective, with the goal of creating an emotionally engaging game experience through the interaction between player and AI agent.

1.2 About *Shelter 2: Paws*

The game *Shelter 2: Paws* is an adventure spin-off game based on *Shelter 2*. It is the story of a lost Lynx cub on a journey looking for her family. The story is fairytale-like and has a dark and frightening atmosphere. The experience aims to evoke strong feelings of loneliness and longing.

The game follows a linear storytelling with a mixture of familiar gameplay (from the Shelter-series) and new elements, such as lighter puzzle solving and platforming. The levels are made up by smaller areas and sequences that each have a separate identity, with separate elements of fear.

A couple of levels into the game, the Lynx cub meets a friend in a Bear cub that she finds hurt and hungry in a glade. Together they have to find their way home and cooperate to overcome the obstacles set before them.



Figure 1.1: Concept art for *Shelter 2: Paws*, by Jakob Tuchten

1.3 Objectives

The goal of this master thesis is to investigate how AI agents can be designed to support the narrative of a game, where the problem statement is defined as follows: *How can developers tell stories through an AI agent's behaviour?* To answer this question the objectives of the thesis are stated as follows:

1. Specify core features for narrative design
2. Identify patterns of story centered AI agents

3. Create concepts for narrative AI design in games

1.4 Limitations

The general research methods used for this master thesis project are Case Study Research and Design Thinking. In combination they imply a research process where six stages are implemented. However, the scope of this project limits implementation of the last stage, refinement, to only include the prototype and not the design framework that is presented in this thesis.

The framework presented in the thesis is designed with regards to an AI Utility system. There is therefore no guarantee that the framework, as it is presented in this thesis, can be used for creating narrative AI agents for other types of AI systems. Also, the framework aims to closely integrate narrative and gameplay, and might therefore not be suitable for game projects that do not share this goal. Finally, the framework has been tested on a single AI agent in one game and should therefore not be considered complete at its current stage.

1.5 Terminology

Common terms and their explanations	
Game narrative	Also mentioned as narrative in games or storytelling in games. Refers to the story in a digital game.
Narrative design	Also mentioned as interactive narrative design. Refers to the design of the story in a digital game.
Narrative games	Refers to digital games that aim to tell some kind of story.
AI agent	Also mentioned as agent. Refers to a character in a digital game that is controlled by the game system (as opposed to being controlled by the player).
AI agent design	Refers to the design of an AI agent, i.e. what features and behaviours that agent has.
Narrative AI design	Refers to the design of an AI agent for narrative purposes in a digital game.
Prototype	Refers to a playable Unity scene or build, including the player and the AI agent, presented in the case study [chapter 8].

Table 1.1: Terminology regarding narrative and AI agent design in digital games

1.6 Thesis Outline

Chapter 2 - Methodology

Methods and work structure of this master thesis.

Chapter 3 - Narrative design in games

Theories on storytelling in games.

Chapter 4 - Design approaches in games

Theories on design approaches in games, either with a direct or close connection to narrative games.

Chapter 5 - AI design in games

Theories on AI design and system agency in games.

Chapter 6 - A study of games

A competitive evaluation of 9 games with examples of emotionally compelling narrative, narrative gameplay and AI system design.

Chapter 7 - Design Proposals

Design proposals on how to design narrative AI agents.

Chapter 8 - Case Study: *Companionship in Paws*

A case study of an AI agent in the game *Shelter 2: Paws*.

Chapter 9 - Discussion

Thoughts and discussion on the results, based on the initial goals of the thesis.

Chapter 2

Methodology

This chapter presents the methods and work structure of this master thesis.

The work structure for this project is based on Case Study Research[10], which is a methodology adapted for understanding complex social phenomena, and Design Thinking[11], a method for producing innovative products and services. Case Study Research consists of focusing on a case and retaining a holistic and real-world perspective. This is done through an iterative process with the phases; plan, design, prepare, collect, analyze and share. Design Thinking consists of creating concepts and prototypes, which is done through an iterative process with the phases; research, idea generation, refinement, prototyping and implementation. As this master thesis focuses on the narrative in the relationship between a player and an AI agent (which can be classed as a complex social phenomenon), in a computer game (which involves creating concepts and prototypes), these two methods have been merged and adapted for this specific project[10, 11]. The iterative process will therefore have the following set up:

1. Plan
2. Research (prepare)
3. Design (generate ideas)
4. Prototyping (implement)
5. Evaluation (collect and analyze)
6. Refinement

Plan consists of identifying the different components of the case that is studied. **Research** consists of a literature study, interviews with key persons and a competitive evaluation of other games.

Idea generation consists of generating ideas around the defined case.

Prototyping consists of prototyping (implementing) the ideas, this is done directly in Unity.

Evaluation consists of playing and testing the prototypes. Evaluation is firstly done by the developers in the project. The team progressively evaluates the ideas and refine, or discard, them. Once the project has advanced to the point of the first playable version of the game, it is tested by playtesters rather than the game developers.

Refinement consists of implementing changes and new ideas from the evaluation phase into the prototype.

2.1 Qualitative Research Design

In this project only qualitative research methods are used. In a lot of cases, a combination of both qualitative and quantitative research provides a more complete picture of the problem[12]. When it comes to testing narrative games, however, having players describe their emotions and the reasons for them in a constructive way (so developers can improve their games) has proved to be challenging[3, 13]. This is supported by the *Misattribution of Emotions*-theory[14], which states that people can experience emotional states without knowing why, even if they believe they can pinpoint the source. Based on this information, most of the early testing is done by the developers and only later on in the process other playtesters take part in the experience.

Having developers test their own game is however a challenging task. The Heisenberg principle¹ implies that one cannot observe the nature of an experience without disturbing the nature itself. Shell[3] proposes four different workarounds for this problem: analyse memories, two passes, sneak glances and observe silently, see Figure 2.1.

Analyse Memories is a method of playing and living the experience first and analysing the memory of it once the playthrough is completed. Memory is imperfect, so this should be used primarily on fresh memories and for testing powerful experiences. Also, playing with the intention of analysing the game later, rather than while playing, can actually help the developer to remember more details of the experience.

Two Passes builds on the Analyse Memories method, but instead of playing the experience once, it is run through twice. During the first playthrough the developer just plays the experience, without analysing anything, then the developer goes back and plays the experience again, this time analysing everything and maybe even pausing to take notes. This way the developer has the first untainted experience fresh in their minds, but also has the chance to stop and think at every single aspect of the game.

¹The principle, also called *paralysis by analysis*, is a reference to the Heisenberg Uncertainty Principle from quantum mechanics.

Sneak Glances is a method of sneaking quick glances at the experience while it is happening. These glances are so quick that they do not interrupt the nature of the experience. An example of such a glance is to ask quick questions such as *Exciting enough? Yes.*

Observe Silently builds on the sneak glances method, but continuously. The idea is to arrive at a state of mind where the developer is playing the experience and observing herself at the same time, hearing all of her thoughts and feeling all of her feelings. It is almost like having two minds, one that plays and another that observes.

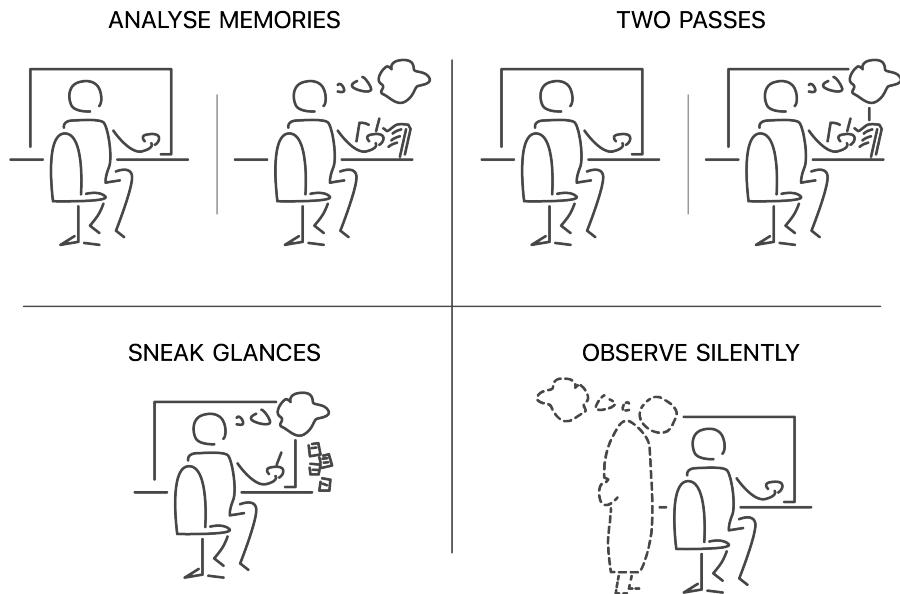


Figure 2.1: Analyse methods described by Shell[3]

In this thesis, the methods Analyse Memories and Two Passes are used. The two remaining, Sneak Glances and Observe Silently, take a lot of practice and experience to conduct properly and would for that reason be unreliable methods for this project.

The qualitative research in this project is done by testing concentrated events multiple times and the overall experience more seldom, but still frequently during the development process. While testing concentrated events, the method of Analyse Memories is used. The event is played through from point A to B and once it is finished problems and changes are written down from the fresh memories of that experience. While testing the overall experience, the method of Two Passes is used. The experience is played through once without being analysed and then a second time, where notes are taken during the process of playing the game.

2.2 Interviews

Interviews are a useful method for gathering deeper understanding of a process. There are three different types of interviews; structured, semi-structured and unstructured. Structured interviews use a predetermined set of questions, in contrast to unstructured interviews that can be adapted throughout the interview process and that heavily depend on the interviewees interests. Semi-structured interviews is a combination of structured and unstructured interviews and consists of both predetermined questions as well as the opportunity to ask further questions during the interview[15, 16]. In this project, interviews are of the type semi-structured to ensure qualitative results. The goal of the interviews is to gain further knowledge in the areas of narrative in games and AI-based design.

Interviews are mainly conducted via email and Skype, and take place over the course of 4 weeks. Each interviewee initially gets a fixed set of questions regarding their specialized field [Appendix A] and the author asks follow-up questions where more information is needed. Two of the interviews are done in written form, via email, with the benefit of eliminating the risk[16] of not taking notes correctly or missing out on parts of the interview. The third interview is done via Skype, with the benefit of having a conversation and getting answers of more depth from the interviewee[17]. Notes that are used, in the thesis, from this interview are approved by the interviewee to avoid previously mentioned risks.

The interviewees are chosen for their expertise in their respective fields: AI-based design, narrative in games and the design of game mechanics. Two of the interviewees are interviewed for gaining further information on their published works and the third for gaining further information on his game. The interviewees are:

1. Thomas Grip, Frictional Games.
2. Kian Bashiri, Dice.
3. Mirjam P. Eladhari, Otter Play.

2.3 Usability Tests

Usability tests are conducted on four playtesters, their personal information remains anonymous in this thesis, all of which have some experience and knowledge within the field of game design and development [Appendix B]. The tests are conducted over the time span of two weeks, with two tests per week. Each test takes about an hour and a half to complete.

The usability tests are divided into two parts; playtesting and interview. The playtest consists of the playtesters completing the entire game experience in

their own time, while being observed as they play. The interview takes place directly after the playthrough and consists of a set of predetermined questions [Appendix B].

2.4 Competitive Evaluations

Competitive Evaluations are used for discovering and comparing features, content and design elements. Its goal is to offer a better understanding of what competitors are doing and offering to users[18]. In this project the method is used for examining how other games have succeeded in conveying their game narrative through their gameplay.

For discussing the practice of narrative AI design in games from multiple angles, games from three different categories were chosen. The categories are as follows:

- Emotionally compelling narratives
- Narrative gameplay
- Narrative AI systems

The analysis is done on three games of each category mentioned above, making a total of 9 games. The first three are games that have been acclaimed emotionally compelling, the following three are known for their narrative gameplay and the last three have AI systems that are designed to tailor the experience of the player. The games are as follows:

1. Journey
2. Dear Esther
3. Shelter 2
4. Thomas was alone
5. Passage
6. Metro Rules of Conduct
7. Amnesia: The Dark Descent
8. Left 4 Dead
9. Façade

2.5 Prototypes

All prototypes are built in Unity, Version 4.6.2f1, written in C#. They are a part of the game *Shelter 2: Paws* by studio Might and Delight, release date in March 2016.

Chapter 3

Narrative design in games

This chapter presents different theories on narrative in games.

Games distinguish themselves from other media through their level of interactivity, which has imposed different views on their relationship to stories and storytelling. One the one hand there is the belief that stories are a fundamental part of game design[1], while on the other there is the concern that interactivity and narration cannot coexist[2]. The following chapter aims to give some insight to these different philosophies on storytelling in games.

3.1 Narratologists, Ludologists or Narrative Architects

Somewhere around the most recent millenium shift, a debate¹ arose within the game scholars community that opposed two groups: ludologists and narratologists[19]. Each group having a clear opinion on the narrative role of games and their creators. About ten years later, Jenkins[4] took it upon himself to respond to this debate and presented a third view on the problem, namely games as narrative architecture.

3.1.1 Narratology and Ludology

One can describe narratologists and ludologist as two sides of a coin. The former argue that games are closely connected to stories or that they should be

¹This debate is loosely named *the debate that never really took place*.

analyzed through narratology. The latter, on the other hand, focuses on game mechanics and argue that games cannot be analyzed as narrative[19]. Ludologists also state that the fundamental difference between games and narrative, is that games require immersed players that care about 'what is going to happen', whereas stories address external observers that want to know 'what has happened'. Narratologists on the other hand do not agree with this point of view and rather believe that "a reader or a film spectator who is engaged with and cares about the characters does not experience stories very differently from games"[20].

3.1.2 Narrative Architecture

Narrative Architecture derives from the division between narratologist and ludologist. In 2011, Jenkins[4] published his thoughts on the debate and stated that the discussion revolved around a too narrow model of narrative. This model being the rules and conventions of classical linear storytelling. Other kinds of storytelling, such as modernist and postmodernist experimentation and even more traditional forms, were neglected. An example of this is *commedia dell'arte*: a theatre form where the performance is based on improvisation and each actor has mastered the possible moves associated with her character. Similarly, game players master the combination of buttons for enabling game character actions. Also, in this theatre form no author or director has authority over what the actors do once they are on stage, but the shape of the story emerges from the possible choices of action (once again in similarity to games) that are presented by the (game) space. Jenkins therefore argues that instead of describing game designers as storytellers or not, there should rather be an understanding of them as narrative architects that have the power to effect different game narratives in different ways, see Table 3.1.

Spacial design effects	
Evoked narrative	The game space enhances our sense of immersion within a familiar world or communicates a fresh perspective on that story.
Enacted narrative	The game space retards or accelerates the plot trajectory (through the features of the environment) trajectory.
Embedded narrative	The game space becomes a memory palace whose contents must be deciphered to reconstruct the plot.
Emergent narrative	The game space has a rich narrative potential, which enables the players to construct stories themselves.

Table 3.1: Spacial design effects on game narratives[4]

3.2 The nature of game experiences

These different definitions and views on game creation and its purpose all seem to be nibbling at the same core, namely the game experience. An experience that differs from other media thanks to the interactivity it offers and an interactivity that let game developers tell stories that cannot be told any other way[3]. An example of this is the game *The Graveyard*, where the player controls an elderly woman, walking her through a graveyard. An experience that might sound like it just as well could be had in the form of a film or story, but where the interactivity gives the player a deeper, more intimate, connection to the woman and therefore is essential to the experience[21].

Games provide experiences and experiences can be expressed as stories. However, it is important to acknowledge that the game in itself is not the experience, but it *enables* the experience. Shell[3] describes this with the *tree falling in a forest*²-thought experiment, stating that if we define sound as the experience of hearing a sound then the answer is that if no one is there to hear the tree fall, it consequently does not make a sound when it falls. A game developer does not need to care about the tree or how it falls, but about the experience of hearing it fall. Hodent[7] explains this with cognitive research, where it has been found that people believe that their senses communicates the *reality* of things, when they in fact are a *construction* that their brains have built. The reason for this is that the human brain is extremely good at finding meaning in its environment based on very little information. Consequently, this implies that game developers must pay attention to and design for what seems to exist in a game, and not only for what actually exists in the game. This imaginary factor in games is also, in large, the very reason people play games in the first place[3, 7, 22].

3.3 Summary

Games differ themselves from other media through their interactivity, as players are given a great deal of control over the events and their output. Designing games is therefore about designing experiences, which is a difficult task as the designer is removed from what she is actually trying to create:

"We create an artifact that a player interacts with, and cross our fingers that the experience that takes place during that interaction is something they will enjoy. We never truly see the the output of our work, as it is an experience had by someone else and, ultimately, unsharable." [3]

There are different views on whether or not games are narrative. However, it seems like recently the most common stand in the narratology-ludology debate

²If a tree falls in a forest and no one is around to hear it, does it make a sound?

is to conclude that there is an inverse relation between the two when it comes to digital games. Adams[23] describes this relation by stating that the more control the author exercises over a game, the less freedom is given to the player, and vice versa. Developers cannot maximize both, but can at best seek to create a satisfactory balance between them. As it is concluded that games are experiences and that stories are a form of experience, and in alignment with Adams' view on the matter, this thesis takes the stand that games are narrative (or at least can be) and that creating game experiences often include creating stories.

To create narrative games different methods can be used, however there does not seem to be any right way to go about it. What seems to be an important focus point though is the kind of experiences designers and developers want to share with their players and to build the narrative and the gameplay with regards to these. Ultimately also, to accept that games are a living media that holds unknown emotions and experiences for both the developers and the players, and use that to the benefit of the game in its design.

Chapter 4

Design approaches in games

This chapter presents two different design approaches for designing games. The approaches either have a direct or close connection to narrative games.

4.1 4-Layers Approach framework

The 4-Layers Approach to narrative design is a framework developed by Grip and Chmielarz[22]. The approach was created to ensure that the narrative of a game and its gameplay are closely connected, which is essential for creating better game narratives. As almost all game design primarily focuses on mechanics and tactics, the narrative of a game often comes out as a byproduct: a way to give a game some flavour, motivate the player to perform certain actions or maintain a player's interest in the game[1]. Grip therefore argues that as much attention should be payed to the narrative as to the mechanics and tactics:

”[...]having a symbiosis between all of layers is a core element of what makes video games special. If we want proper interactive story, we need to preserve this.”[22]

Before explaining the cornerstones of the 4-layer approach, it is important to know of Grip's core elements of storytelling: focus should be on storytelling, the bulk of the gameplay should be spent playing (as opposed to reading notes or watching cutscenes), game interactions should make narrative sense and there should not be any repetition or major progression blocks.

The 4-Layers Approach divides the design process into four big steps: gameplay, narrative goal, narrative background and mental modeling. The framework is

built on a scene structure, this means that the game must be divided into different scenes where each scene could be a puzzle, an enemy encounter or similar aspects of the game. Because of this structure, the gameplay must be designed specifically to fit each scene, rather than from the usual stance of how the game plays out as a whole, see Figure 4.1.

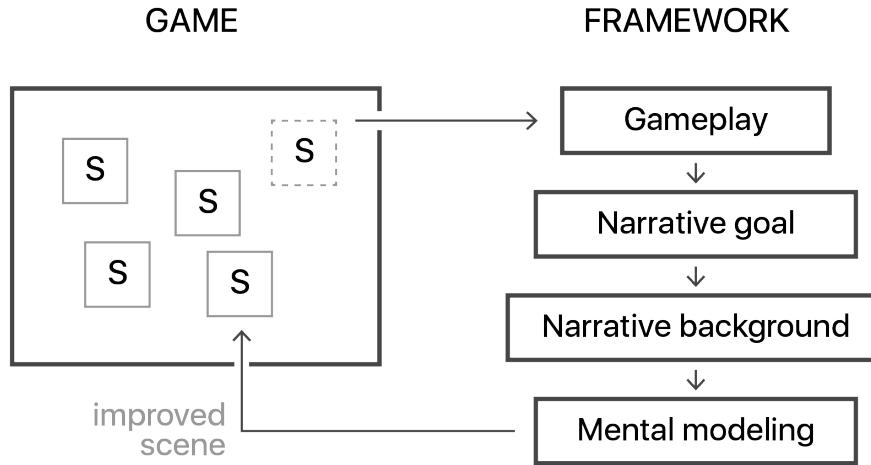


Figure 4.1: 4-Layers Approach Framework

4.1.1 Gameplay

The starting point of this framework is the basic gameplay and there are four basic rules to follow: coherency, streamlining, sense of accomplishment and action confirmation. Further explained, they state that:[22]

1. The gameplay must fit with the world, mood and characters of the game.
2. The steps required for any situation should not be too many or too complicated.
3. Achievements make the player feel agency, however common traps like 'press button to progress' should be avoided.
4. Players must understand what it is that they are doing and why they are doing it.

4.1.2 Narrative goal

Most games have an overarching narrative goal (a reason to get to the finish line), but fail to keep the player in a narrative mode during the whole experience. The

trick is to also give the player short-term narrative goals along the way, so that "they do not brush the story aside for some puzzling or shooting action"[22]. This way the actions are performed 'because of the story', instead of 'to get the story going'. Some examples of narrative goals are mystery, uncomfortable environment and character conflict.

4.1.3 Narrative background

With the two previous steps, the scene is already quite story-centered. However, the player actions are still very gameplay-focused. To avoid this the actions therefore have to be immersed into the story. In comparison with the previous step the actions are hereby performed 'to make the story appear'. Grip describes this as "By having the gameplay actions and the narrative beats coincide, we make it hard for the player to distinguish between the two. The goal is for this to lead to a sense of always being inside a story." [22] Some examples of narrative backgrounds are story fragments, complementary dialogs and emotionally significant assets.

4.1.4 Mental modeling

The final step is all about changing the way a player perceives a game. As described by Grip[22] "The important point here is that most of what exists in the player's mind has no systemic counterpart. The player might imagine a guard hiding behind a corner, thinking of how he might be looking around. But in reality there is no guard behind the corner. Thus, a great deal of the playing time is spent just imagining stuff." This is also supported by Shell[3], who argues that a game designer's job is to care about what seems to exist, as opposed to what really exists in a game. This implies that a lot of the gameplay does not translate into the classical input-output loop of the game system. Another insight proposed by the framework is that the player's mental model of the game is on the same level as the narrative. Therefore the purest form of playable story (i.e. a game where all the gameplay choices are made inside the narrative space) can be obtained simply by combining the two. The important thing here is to chose a mental model that fits with the narrative of the game. Some examples of mental models are danger, goal-confused mystery and social pressures.

4.2 MDA-framework

The MDA-framework is not solely designed for narrative games, but is a formal approach aimed at games in general. It was created by Hunnicke, LeBlanc and

Zubek[24] as an attempt to make it easier for the game development community to study and design games.

The framework builds upon the idea that, opposed to other media, the content of a game is its behaviour. Therefore games can be viewed as artifacts, rather than media, and they can be described as "systems that build behaviour via interaction"[24]. MDA stands for Mechanics, Dynamics and Aesthetics, three abstraction levels described as the design counterparts of the main components of a game: rules, system and fun.

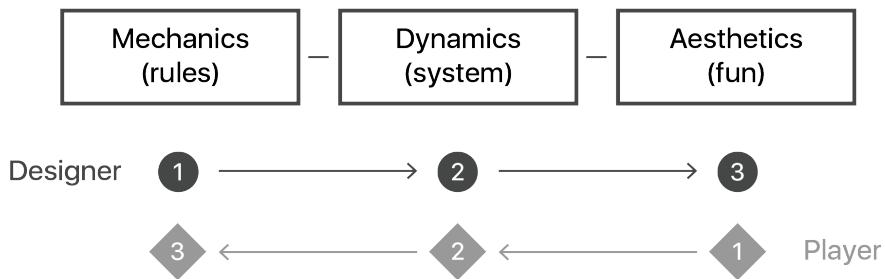


Figure 4.2: MDA-framework

Mechanics refer to the base components of a game: the rules, the basic actions a player can perform and the data representation and algorithms. Together with the game contents they support the overall gameplay mechanics in a game.

Dynamics refer to the run-time behavior of the mechanics as they are acting on player inputs and each others' outputs over time. These work to create aesthetic experiences in games.

Aesthetics refer to the emotional responses evoked in the player as she plays the game.

How these levels are perceived differs between the designer and the player, see Figure 4.2. The designer's perspective goes from the mechanics to the aesthetics: the mechanics bring forth a dynamic system behaviour, which finally lead to particular aesthetic experiences. In contrast, the player's perspective goes from the aesthetics to the mechanics: aesthetics set the tone of the game, which hint observable dynamics that finally reveal the operable mechanics.

Changes in any of these levels will have an effect on the two others. For example, changes in the aesthetics of a game will lead to mechanical changes for its AI. Depending on the scope of these changes, they will sometimes require the development of entirely new systems for navigation, reasoning and strategic problem solving.

"[...]we can reason explicitly about aesthetic goals, draw out dynamics that support those goals, and then scope the range of our mechanics accordingly." [24]

4.3 Summary

Both approaches support the theory that to create emotionally engaging narratives in games, the narrative of a game has to be closely connected to the mechanics and tactics of the game.

One way to achieve this is to divide the design process up in four different steps: gameplay, narrative goal, narrative background and mental modeling. By dividing the game experience into scenes and going through these layers for each scene, the mechanics of those scenes will be built in a way that supports the game narrative.

Another way to achieve this is to look at a game as an artifact, where the content of the game is defined by its behaviour, and where the behaviour derives from interaction.

In this thesis, both ways of looking at how to design the narrative, the mechanics and the AI system of the game is taken into consideration. This is done by further examining how mechanics and narrative are connected to each other and how designers can define AI behaviours that support the narrative.

Chapter 5

AI design in games

This chapter presents the design approach of AI-based game design, as well as a take on system agency and its role in games.

5.1 AI-based game design

AI-based game design is a design approach for creating rich AI systems that lead to emergent¹ gameplay. It can be used for innovating game AI and move games towards new playable experiences. AI systems influence all levels of a game, mainly the mechanics and aesthetics of a game, but also the dynamics indirectly. In other words, AI systems and games are intertwined and have to inform each other during the design process. This way intelligence and coherence is created within a game system[24, 25]. The idea of the approach is therefore to closely integrate the AI system into the games core mechanics and aesthetics, as well as into the setting and story. To achieve this, game developers have to design games and their AI systems in tandem, instead of separately, and create an iterative information loop between the two[25], see Figure 5.1.

As this is a loop, the design process can start with either the game system or the AI system. Regardless of the entry point, the iterative process has to start early in a project: the mechanics of the game depend on the rough design of the AI system and the components of the AI system depend on a rough design of the game system. When testing this approach on different game projects, development teams that were using an external knowledge domain as foundation and that built a new AI system with regards to this, as well as to the game narrative, had the best success in using the approach (M. Eladhari, Otter Play, Stockholm, Sweden, 14 December 2015). This does not mean, however, that

¹An emergent behavior or emergent property can appear when a number of agents form more complex behaviors as a collective.

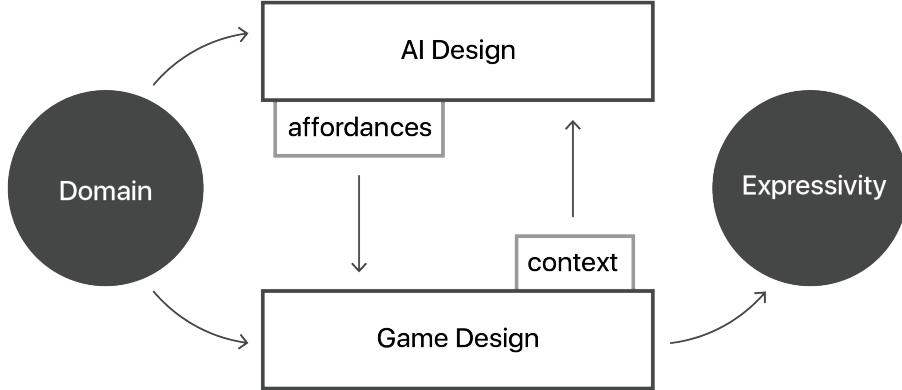


Figure 5.1: AI-based game design

AI systems are completely bound to one game. AI systems can be designed generally enough to afford different game mechanics, or to be used in similar contexts[25].

There are two major challenges to this approach: the Tail-Spin effect (also referred to as transparency) and emergent gameplay[25]. The Tail-Spin effect occurs when a player fails to comprehend the more complex processes at work within an AI system. However, games should not give out too much information about the AI system either as this can overwhelm the player, and consequently spoil the gameplay experience. The challenge here is to find the right amount of transparency, i.e. how much of the AI system is exposed to the player, as it binds the AI and game design with the player experience. Another challenge comes with emergent gameplay and emergence from the AI system. Emergence in a game can provide expressive power and unique experiences, however it also introduces loss of complete authorial control. As the player can interact with an emergent system in many different ways, which are also often unexpected, it is impossible for developers to script the entire game experience. To overcome these challenges, it is essential to conduct user tests during the development of these systems (M. Eladhari, Otter Play, Stockholm, Sweden, 14 December 2015). This, however, often becomes a cost in the design process as it introduces longer testing cycles. A way to avoid these high costs, is therefore to initially leave the system open for different levels of transparency and emergence, then conduct smaller and more concentrated user tests to detect the areas where this trade-off occurs.

5.2 Agency in narrative games

Agency in narrative games is often narrowly defined as the freedom given to a user to (at will) perform actions in the game world or alter the mechanics of the game narrative[8]. A model that once again brings up the dilemma of completely separating the gameplay and the narrative, as this type of free will of the user opposes the system's capacity to structure the user experience in a narrative way[1, 2]. Harrell and Zhu[8] do not agree with this view and believe that user agency should rather be used to *support* story content and narration. They therefore argue for a broader and more complicated notion of agency, proposing that it should refer to the following aspects:

1. The full range of player actions possible (in the story world and narration of the story).
2. The range of effects of these actions.
3. The system's capacity to constrain and modify the story world.

This would mean that player and system are interdependent and that both user and system agency have to be taken into account when developing narrative games.

”What is significant sometimes is not what the story is, but rather how the story is told. The use of agency is one of the channels for digital authors to express themselves.”[8]

5.2.1 System agency

Computational systems have the ability to establish meaningful context in narrative games, as well as modify the story world and provide affordances for user actions[8, 25]. Harrell and Zhu[8] identify two categories of system agency: as narrative generation and constraint or as character control. The former refers to systems as narrators or authors, who tell the story through their control of events and objects, and their presentation in the story world. The latter refers to systems as narrators or authors, who tell the story through their control of characters in the story.

To create stories that are meaningful and engaging, there has to be a relationship between the system and the player input. This relationship is called *agency play* and can be expressed in four levels: agency relationship, agency scope, agency dynamics and user input direction.

Agency relationship refers to the degree of dependency between user and system actions.

Agency scope refers to the local (short-term) or global (long-term) impact caused by either user or system actions.

Agency Dynamics refers to the dynamic variation during runtime in the relationship between user and system actions, and their scopes.

User Input Direction refers to the input, established by the user, that directs agency dynamics and agency scope.

One big risk to this approach, however, is that it can violate the user's expectation of transparent control over user characters.

5.3 Summary

For any game where AI agents are used, the AI system plays a large role in the narrative of the game. A system's agency gives it the opportunity of acting narrator and/or author of a game, which can be done through:

- Its control of events and objects in the game
- Its presentation in the game world
- Its control of non-playable game characters

In all these cases, the relationship between the system and the player input is of great importance for creating game narratives that are meaningful and engaging. This thesis will mainly focus on the latter example, where the system acts narrator through its control of non-playable characters, i.e. AI agents.

To create this strong relationship between the system and the player input, AI-based game design is a good and suitable tool. It proposes that there should be an iterative information loop between the AI system and the core mechanics and aesthetics, as well as the setting and story, of the game.

Another aspect to take in consideration when designing AI systems, is that finding the right level of transparency and emergence of the system tends to be a challenge. High transparency asks a lot of the player in terms of processing information and might overwhelm the player, low transparency on the other hand might create a wall where the player does not understand the system she is interacting with. Looking at emergence in games, it is clear that emergent systems provide expressive power and unique experiences to a game, but imposes the challenge of controlling the game experience as a game designer and developer.

Chapter 6

A study of games

This chapter discusses the practice of narrative AI design through analyzing games that have emotionally compelling narratives, narrative gameplay or narrative AI agent design.

6.1 Introduction to games

The analysis is done on three games of each category mentioned above, making a total of 9 games. The first three are games that have been acclaimed emotionally compelling, the following three are known for their narrative gameplay and the last three have AI systems that are designed to tailor the experience of the player. The following games were analyzed:

1. Journey
2. Dear Esther
3. Shelter 2
4. Thomas was alone
5. Passage
6. Metro Rules of Conduct
7. Amnesia: The Dark Descent
8. Left 4 Dead
9. Façade

Journey is an exploration and self-discovery game, developed by Thatgamecompany. In the game, the player wakes up alone in a vast and beautiful desert,

to discover that her goal is to get to a looming mountain top far away on the horizon, see Figure 6.1. To get there she has to traverse various landscapes and face rolling sand dunes, age-old ruins, caves and howling winds. During this journey she will discover secrets of a forgotten civilization and her own past. As the game is an anonymous online adventure, the player may also encounter a friend on her journey and experience a story of community and friendship. The game has been described as breathtaking, magical, and emotionally engaging[5].



Figure 6.1: Screenshot from Journey

Dear Esther is a first-person game about love, developed by The Chinese Room. The game is story driven and offers an immersive and emotional experience to its players. The game has very limited gameplay, in the sense that the player's only objective is to explore an island while listening to a male voice reading letters, that he wrote to his deceased wife. As the player moves forward through the island, more details about the wife's mysterious death are revealed. The letter fragments are played randomly and each game experience therefore forces the player to draw her own conclusion of the story. The game has been praised for pushing the boundaries of gameplay and storytelling in games, as well as questioned for its status as a video game[26].

Shelter 2 is a third-person adventure game, developed by Might and Delight. It is a game about life, nature and love. The player incarnates a Lynx mother, who at the beginning of the game is pregnant and looking for a safe place to give birth to her cubs. Once the cubs are born, she has to provide them with food and safety as she explores beautiful and awe inspiring landscapes. She can lose her children to famine or dangerous animals that appear at several occasions in the game. As time passes, her cubs grow up and finally leave her to start their own adult lives. This game has been acclaimed by its players for the emotional connection and responsibility they feel towards their lynx children[27].

Thomas was alone is a puzzle platformer game developed by Bithell. The game has the player control one or more simple geometric shapes, see Figure 6.2. These shapes each have a unique name and personality, which is conveyed to the player through a narrator. The premise of the game is that a mysterious event has taken place within a computer mainframe and caused several AI routines to run out of control and gain personalities. The goal for the player is to direct each shape to their corresponding exit point on each level.

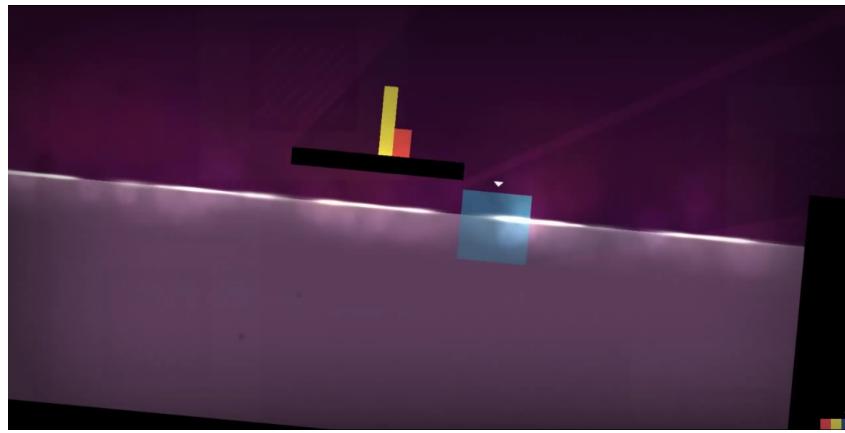


Figure 6.2: Screenshot from Thomas was alone

Passage is a five-minute autobiographical game about the journey of life, developed by Rohrer. It has been described as "a fantastically expressive" game and a "vehicle for exploring the human condition" [28]. The player starts out as a young man and the game takes the course over the remaining life span of this man. During the game the player's character grows older and older to eventually, and inevitably, perish. The game also introduces discrete choices such as:

1. Taking the "easy road" (linear road) through life VS exploring the world and discover new things (i.e. open treasures)
2. Going at it alone VS meeting a spouse to bring along on the journey

Metro Rules of Conduct is a game about peoples' behaviour in the underground of Stockholm, developed by Kian Bashiri. The goal of the game is to avoid eye contact with other people. In the game, the player is in an underground train together with a number of people facing her. The player can look at a person's face and belongings, however, that person will avoid eye contact with the player at every cost. If the player looks at one specific person long enough, that person will finally give in and look back at the player. When they make eye contact, the player is 'hurt', i.e. the screen turns red and a sound of pain is played.

Amnesia: The Dark Descent is a survival horror video game developed by Frictional Games. The game revolves around a character named Daniel, who has lost his memory and wakes up in a dark and fearful castle. The only information given about Daniel is that he has deliberately erased his memory and that he has to traverse the castle to kill a man, the Baron. His journey through the castle teaches him about his own past as he unravels the mysteries of the Brennenburg Castle, where he also finds himself hunted by fleshy, acidic growths and bizarre monsters, see Figure 6.3. In difference to other survival games, the player has no weapons to defend herself with, and her only choice of survival is to flee the monsters that attack her. Amnesia has been called one of the most difficult, draining, stressful and scariest game experiences[29].



Figure 6.3: Screenshot from Amnesia: The Dark Descent

Left 4 Dead is a cooperative first-person shooter horror game, developed by Turtle Rock Studios. The game takes place in an apocalyptic world, where a pandemic has infected people and turned them into zombie-like beings. The game has four game modes: single-player with AI controlled allies, four-player co-op campaign, four-player survival mode and eight-player online versus mode. In all these modes the AI Director, the AI system of the game, tailors the experience for every player by controlling item placements and level pacing[30].

Façade is an interactive storytelling game developed by Procedural Arts. The developers describe the game as an AI-based interactive story, where the player incarnates a close friend of the couple, Grace and Trip, who have invited the player over for cocktails. The couple have marital problems, which are exposed during the course of the evening and the player has to interact with them to either try to mend their relationship or drive them further apart, or as a third option get thrown out of their home. The player interacts with the characters by typing sentences to communicate with them.

6.2 Analysis

When it comes to the first three games: *Journey*, *Dear Esther* and *Shelter 2*, they have some similarities. First and foremost, they have quite a restricted and repetitive gameplay. In *Dear Esther*, the player can walk around and explore but not really engage with the environment as such. In *Journey*, the player can walk, jump, fly and communicate, and all of these actions are very straightforward and simplistic. The game *Shelter 2* is the one with most interaction of the three: walking, running, jumping, hunting, eating, drinking and sneaking, but other than that the interaction with the game world is limited. The limitation in gameplay also implies repetition, as there are just so much a player can do. This might sound as if it should be a negative aspect in a game, but it is actually one of the reasons why these games are so compelling. Cognitive science tells us that to be emotionally engaged in something, people need it to be simple and in lack of distractions[7, 31]. The simplistic gameplay of these games fulfills that condition and therefore it is easier for players to be immersed into these experiences. In addition to their simple gameplay, they all lack incongruous visual cues¹. *Journey* is an anonymous online experience, which means that when one player meets another player no information about the two players is exchanged. In other terms, there is no text showing the name or status of that other player, and therefore no information that is distracting from the game experience or reminding players that they are in a game. In *Shelter 2* there are a few interface symbols that appear to teach the player to do certain things. However, their design is consistent with the rest of the game world, they are few and also they manage to appear and disappear without distracting attention from the game experience. Finally, all three games are stunningly beautiful (though they have completely different art styles), which also plays into the hands of immersion. A player's primal senses of awe and wonder (amongst others) can easily be used as a primary hook for her deep involvement in the game. Also, the visual and auditory input and output in a game play a huge part in creating a coherent game world, which is another criteria to fulfill for creating engaging games[31, 32].

An interesting part with the anonymity in *Journey*, is how a player (that has no prior knowledge of this feature) easily can mistake another player for a character belonging to the game system, in other words an AI agent. This illustrates a theory previously discussed in this thesis, namely that the experience a game offers is not the game in itself but the sensations and imaginations of the player[3, 22]. A player experiencing *Journey* for the first time might mistake this online adventure game for a solo offline experience, as the fact that you are playing with other real players is not revealed until the very end of the game. This feature might also have given a bigger depth and awe to the game.

¹Information that is part of the interface such as heads up displays, tutorial messages, damage numbers appearing over enemies' heads, achievement notifications, friends list notifications etc.

Taking a look at the following three games: *Thomas was alone*, *Passage* and *Metro: Rules of Conduct*, it becomes evident that narrative gameplay can be done in various ways depending on what kind of story should be told, as well as what kind of experience should be had. A good place to start is the game *Passage*, as it contains a lot of good examples of how to use gameplay as a storytelling tool. At the opening screen of the game, the player can see the entire life of her character outlined in a hazy and compressed form, however she cannot see anything behind the character, see Figure 6.4.

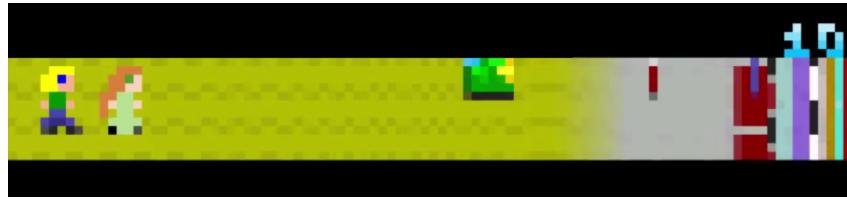


Figure 6.4: Screenshot from Passage

Rohrer himself described this design as a way to depict how "The early stages of life seem to be all about the future: what you're going to do when you grow up, who you're going to marry, and all the things you're going to do someday" [33]. As the player moves forward in the game, she also starts to see what has been left behind her. At a first glance, the game seems to be played from moving horizontally from left to right, see Figure 6.4, but the player can also move vertically, from top to bottom. These different directions of movement imposes the player with a choice. Choosing the "easy road" (i.e. only moving horizontally) will take the player through the entire game scenery before unavoidably dying, whereas choosing to move up and down on the screen lets the player explore a labyrinth-like landscape filled with treasures. However, the player can get stuck early on in the game and might never explore the entire scenery of the game. Another interesting game mechanic is how a player can move quite freely in the labyrinth while she is on her own, but cannot pass through certain openings after having met her spouse (as the two of them together are too wide to get through). Also, the player can accumulate points by opening treasure chest, but they do not really count for anything as death is inevitable after five minutes into the game. There are other gameplay notions also worth mentioning, such as how the pace in which you move slows down after your spouse dies, how the main character resembles the developer of the game but the simplistic pixel art at the same time suggest that it could be anyone and how there is no way to survive in the game. The narrative of the game is portrayed through these limited and pointless actions in the game. In *Metro Rules of Conduct*, the story being told is one of cultural differences and behaviour. This is portrayed by the actions a player can perform and how she is affected by them. The player can look at anything she wants and as long as she does not make eye contact with another person she is fine. However, once she has looked long enough at one person, that person will look back at her and as they

make eye contact the player 'is hit', i.e. the screen turns red and a sound of pain is played. The interactions in the game are very simple, but the consequences of them tell the whole story, namely that people in the underground of Stockholm avoid eye contact at any cost. In the game *Thomas was alone* a third way of creating narrative gameplay is illustrated, namely through separating characters through their abilities. The characters in the game are simple geometric forms, but as they all have their unique abilities and character traits, the player dress them with personalities. These personalities give life to the simple geometric forms in the game, this is also the main storyline in the game. A question might arise here, addressing if these characters are not in fact narrative AI agents. However, they are not really AI agents with behaviours, as the player is the one controlling them, so they still just fall under the category of narrative gameplay (and in a quite narrow sense even there).

The final three games: *Amnesia: The dark decent*, *Façade* and *Left 4 Dead*, are all equipped with an AI system that controls the behaviour of the AI agents in the game. In *Amnesia: The Dark Descent* the AI system is used for the monsters that haunt the player as she travels through the castle. The very frightening monsters in the game keep hidden and seldom show themselves to the player, Grip (T. Grip, Frictional Games, Stockholm, Sweden, 29 September 2015) explains that the goal of hiding the AI was to make it feel less mechanic and more alive through the imagination of the players. The challenge is to show enough to let the players know how the monsters work, but still let the AI system be subtle and random enough that the player does not fully understand them and let their imagination expand them. Another aspect of the AI system is that it was created with regards to the game narrative. Grip explains that they fully designed the experience of the game before building the AI for it and that they saw gameplay as a means of creating specific experiences. The AI system of the game *Left 4 Dead*, the AI Director, works as both enemy and ally and is therefore faced with many challenges. It is a dynamic system for game dramatics, pacing, and difficulty and it must be able to deliver robust behaviour performances (moving fluidly in the game world, climbing walls, decide on actions etc.), provide competent proxies², generate dramatic game pacing and promote replayability of the game. The AI agents' behaviours are designed and constrained after these criteria[30]. The AI system of *Façade* depicts a whole other set of challenges, as the game lets the player type anything she wants when communicating with the AI agents in the game. The AI characters will (in most cases) respond accordingly, behaving angry if the player is unpleasant and behaving happy if the player is nice, as well as avoiding responses like "I don't understand". The system does not have to care about a large number of different movements, in the extent that *Left 4 Dead* or *Amnesia* do, but as the main interaction of the game is to type conversation lines and because there are no clear objectives or tasks in the game, the player's choices are harder to predict. The system is built so that it will chose the next story 'beat' based on the player's moment-by-moment interaction, what stories have already occurred

²An agent or substitute authorized to act for another person.

and the pacing in the dramatic arc of the story.

6.3 Summary

The core aspects that are used to create emotional compelling narratives in these 9 different games can be summed down to:

- The movement assigned to a character (playable or not)
- The actions of a character, as well as the output or effect of this on the character and/or game world
- The aesthetics of the characters and the game world, as well as the interface and incongruous visual cues
- The personal abilities assigned to a character (these are not necessarily actions)
- The reward system in a game and its signification

When it comes to creating emotionally engaging narratives in games, as mentioned earlier, limitation in movement and action, as well as simplistic interfaces and awe inspiring artwork are all important aspects. Working with AI agent systems, on the other hand, has the designers focus more on the movement, actions and personal abilities of the agents. Designing narrative AI agents is all about designing compelling, believable and conveying behaviours. In a way, it can be compared to directing an actor in a scene, where the designer directs (i.e. designs and builds) the agent to portray and mediate a faithful character of that specific world. Finally, when it comes to narrative gameplay the focus seems to be more wide-spread. It becomes a question of finding the game elements that support and fit the *experience* the designer aims to offer in the game. These differences are illustrated more clearly in Table 6.1.

	Movement	Action and Output	Aesthetics	Personal abilities	Reward system
Journey	x	x	x		
Dear Esther	x	x	x		
Shelter 2	x	x	x		
Thomas was alone	x		x	x	
Passage	x	x	x	x	x
Metro Rules of Conduct	x	x	x		x
Amnesia: The dark descent	x	x		x	
Left 4 Dead	x	x		x	
Façade	x	x		x	

Table 6.1: A study of games: Different game aspects that are used for creating emotionally compelling narratives, narrative gameplay and narrative AI systems.

Chapter 7

Design Framework

This chapter presents design proposals on how to design AI agents that support the narrative in a game.

From the information retrieved in the literature study, as well as in the game analysis, a framework for designing narrative AI agents was developed. The set of guidelines in this framework is divided into two parts: an initial design phase, where the AI agent's basic behaviour is constructed, and an additional (but just as important) design phase, where game aspects connected to these behaviours are evaluated and designed. This framework also comments on the importance of user testing during the design process.

7.1 Behaviour design

The initial design phase consists of answering the following three questions:

1. Which are the main themes of the game?
2. What is the purpose of this character in the story?
3. What kind of behaviours and characteristics underline this purpose?

An important note here is the informative loop that is discussed in AI-based game design [chapter 5]. As the AI agent's behaviours are discovered, new ideas for mechanics and aesthetics, as well as the narrative, in the game will arise. It is important to let the two continuously inform each other to create engaging, believable and compelling game narratives. This phase is therefore a non-linear process, see Figure 7.1, where each step has to be reviewed on an ongoing basis throughout the design process of the game.

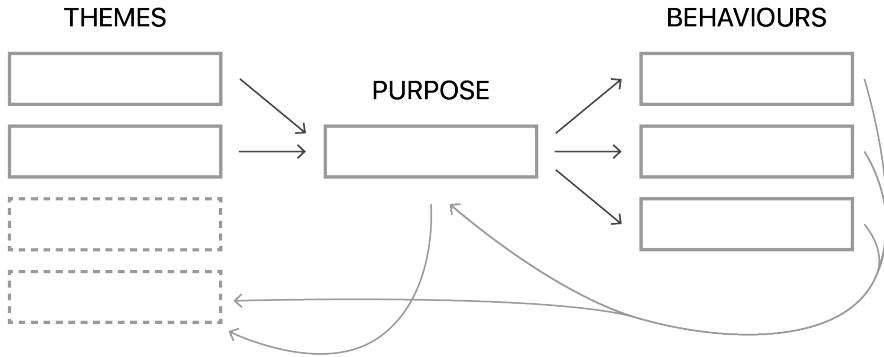


Figure 7.1: Behaviour design process

7.1.1 The main themes of the game

Trying to define the narrative or main storyline in a game can sometimes prove to be challenging, as stories can be complicated, long, abstract or just difficult to explain. Therefore, this framework proposes that the designer/developer begins by defining the main themes of the game. A main theme is a single (or couple of) word describing an experience that the designer is aiming to portray in her game. It can be anything from a genre (horror, drama, comedy, adventure) to a feeling (happiness, solitude, fear) or an event (growing up, exploring, learning). Defining the main themes of the game, rather than the story, will help the designer to efficiently create a clear image of the game context and experience.

7.1.2 The purpose of the AI agent

Once the main themes are defined, focus can be shifted towards the AI agent and its purpose in the game narrative. A helpful tool for doing this is to choose a number of themes from the newly defined main themes and connect the character to these. As an example, imagine a game where the main themes are exploring, challenge, cooperation and friendship. By creating a character and connecting it to one or more of these themes, a feeling for what purpose the character might have will more easily appear. For example an agent could be connected to the theme *challenge* and would then most likely be some sort of enemy or character posing an obstacle to the player. Another agent could be connected to the themes *friendship* and *exploring* and might be designed as a type of guide or guardian for the player. Different combinations of themes will result

in different purposes for a character¹, but as long as they are connected to the main themes of the game their purpose will contribute to the game experience in some sense.

7.1.3 The behaviours of the AI agent

Once the purpose of the agent is defined, its behaviours and characteristics can be designed. These, in their turn, derive directly from the purpose of the agent. Continuing the example from before, imagine an agent that has the purpose of guiding the player through the game. This agent would then for example need behaviours that would let it detect points of interest in the game, make sure the player is following behind, signal or communicate things to the player and so on. Its characteristics would probably be friendly, helpful and patient, but this heavily depends on the type of experience that is sought out. The design process for this example is illustrated in Figure 7.2.

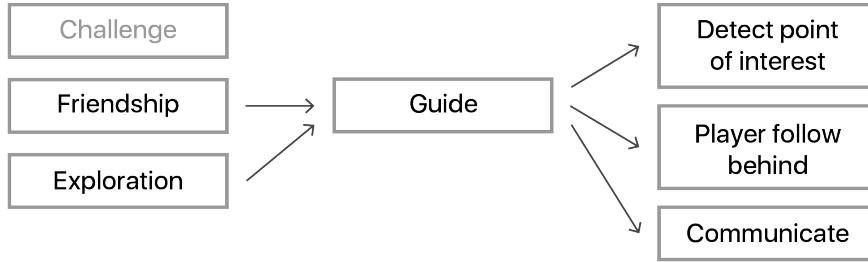


Figure 7.2: Behaviour design for described example

Slightly modifying one step in the process, see Figure 7.3, can change the entire purpose or behaviour of the AI agent. This is why it is of importance to let the process be an iterative one, and let decisions on all levels inform the others. As an example, by removing the behaviour of communication from previously described example, the theme of challenge might also be connected to its purpose and the purpose might be modified from *guide* to *mysterious guide*. This opens up a whole new set of opportunities for the AI agent and the narrative of the game.

”Tweaking a small aspect of the game’s narrative can change the entire experience.”[21]

¹Different agents can be connected to the same theme and different themes can be connected to the same agent, here it is a question of designing as many or as few agents as the designer sees fit to communicate the main themes of the game.

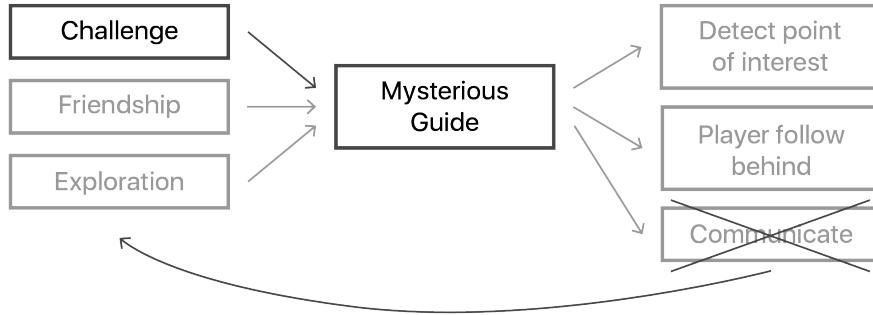


Figure 7.3: Modifying a step in the Behaviour design for described example

7.2 Communicative design

The additional design phase consists of answering one single question:

1. How are the behaviours and characteristics of the AI agent communicated in the game?

In the Competitive Analysis [chapter 6] different game aspects that are used for creating emotionally compelling narratives, narrative gameplay and narrative AI systems were defined. These aspects are:

- The movement assigned to a character (playable or not)
- The actions of a character, as well as the output or effect of this on the character and/or game world
- The aesthetics of the characters and the game world, as well as the interface and incongruous visual cues
- The personal abilities assigned to a character (these are not necessarily actions)
- The reward system in a game and its significance

These game aspects can also be used for defining in which way the behaviours and characteristics of the AI agent should be communicated. From here a number of choices can be made for the AI agent, depending on the game experience as well as the game narrative (notice that the narrative is of importance here, as opposed to the main themes)². The game narrative will have a great impact on choosing how to communicate the agent's behaviour, because the story defines what is possible and not within the game world. It will decide whether

²This framework is not suggesting that the game narrative should be decided at this point in the design process, only that the first design phase can be done without taking the actual story into account, while the second part of the design process **must** take the story into account.

or not the characters can speak to each other, how they can move in the game world, what the world will look like, which actions and abilities are assigned to a character and so on. Before reaching this phase, the process is all about *what* should be designed, whereas in this phase it is all about *how* it should be designed, which means that every choice has to be consistent with the corresponding game world.

Going back to the previous example presented in this framework, the AI agent is defined as a character who has the purpose of guiding the player through the game by leading the player to interest points and communicating important information to the player. Imagine that the story of the game is a young person who is leaving home for the first time to travel abroad and discover different cultures. This imposes a range of different possibilities and limitations to how a designer would communicate the purpose and behaviour of this agent. Perhaps the agent speaks in a foreign language, which limits the communication between the two characters. A clearer example of how to conduct this phase is presented in the case study [chapter 8].

An important aspect to take in consideration here are the challenges of transparency and emergence that often emerge within AI design. How the agent communicates its behaviours and characteristics is directly connected to these problems. High transparency asks a lot of the player in terms of processing information and might overwhelm the player, as well as break the illusion of the organic, living character (as opposed to the robotic and calculable character). Low transparency, on the other hand, might create a communicative wall where the player does not understand the agents intentions and behaviour. One way to go around this problem, is to consider what information can be filled in by players themselves and let those parts of the characters behaviours be hidden, while the character clearly communicates the narrative threads that are of great importance and need of explanation[3, 7, 22]. When it comes to the emergence of the agent, high emergence may provide it with strong expressive power, impressive complexity and unique behaviours, but it also imposes the challenge of controlling the game experience as a game designer and developer. Whereas low emergence will give the agent a robotic and calculable appearance in the game.

7.3 User testing

Testing the agent's behaviours, and how players react and behave in relation to them, is a very important part of the design process. This is a great aid for identifying the level of transparency and emergence (M. Eladhari, Otter Play, Stockholm, Sweden, 14 December 2015), as well as identifying if the agent's behaviours are communicated in a clear way. From the user tests, where the designers and/or developers observe the player as she plays the game, different ways to improve the agent's behaviour will be detected.

Chapter 8

Case Study: *Companionship in Paws*

This chapter presents the case study conducted during the development process of the game *Shelter 2: Paws*, where several AI agents are developed by the author of this thesis. The case study focuses on one of those agents, which plays a big role in the game and its narrative. The case study is used as an example of how to implement the Design Framework presented in the previous chapter.

8.1 Presentation

A main storyline in the game *Shelter 2: Paws* is the relationship between the player and an AI agent in the game. This agent takes the form of a bear cub, see Figure 8.1, that the player meets a couple of levels into the game experience. At this point the player (a Lynx cub) has already been separated from its Lynx family and has travelled alone for a while through a frightening landscape, trying to reunite with her kin. The player finds the AI agent (a bear cub), from here on referred to as agent, who is very ill and starving. She decides to help the agent and fetches food for her to eat. As soon as the agent regains her strength, the two cubs form a bond of friendship. For the remaining levels, until the player reunites with its family, the two animal friends follow each other and tackle obstacles together.

The AI system used for this game, and consequently the AI agent, is a Utility System. This type of AI system can be described as a system that takes an arbitrary action and rates it using arbitrary values. Further explained, the AI agent has a number of different behaviours, which each have a number of different actions with different priorities. Depending on what the player does,



Figure 8.1: Case Study AI agent from the game *Shelter 2: Paws*

or other conditions that occur through the game, different agent behaviours will trigger and different actions will be performed depending on their priority. An example of this is the behaviour of following the player, which chooses an action for the agent depending on what the player does. If the player is running, the agent follows closely behind the player. If the player is walking, the agent might follow the player, but might also wander off exploring the surroundings on its own. If the player has left the agent behind and is too far away, the agent will teleport close to the player. And so on. Each behaviour has different actions with different priorities.

8.2 Using The Framework

The process and implementation of the Design Framework [chapter 7] are illustrated by taking this AI agent as an example. The design of the agent is presented by showing the framework design process step-by-step.

8.2.1 The main themes of the game

The first step of the suggested Design Framework is to identify the main themes of the game. As stated earlier these are defined by looking at the overall story of the game and all the aspects that the developers want to convey to the player through the game.

The game *Shelter 2: Paws* lets the player take control of one of the Lynx cubs, rather than the mother as in the previous games of the Shelter-series. The game takes the player through the journey of losing her family, finding herself on her own for the first time, meeting a new friend, tackling obstacles and avoiding

scary dangers. The main themes of the game *Shelter 2: Paws* can therefore be identified as follows:

- Horror
- Solitude
- Adventure
- Friendship / Companionship
- Cooperation
- Growing up

8.2.2 The purpose of the AI agent

Once the main themes of the game are identified, the AI agent can be placed in connection to one or many of these. In this particular case, the AI agent's purpose is to convey the themes of friendship/companionship, cooperation and growing up. In other words, its purpose is to act a companion to the player, see Figure 8.2.

Connecting the AI agent to the main themes is however only half of the work at this point. Here, it is important to identify exactly *how* these themes should be conveyed through the agent.

When the player meets the agent, she has been confronted by a lot of events and elements that convey the themes of horror, solitude and adventure. In other words, when the two companions meet, the player is probably in the mindset of solitude and fear. One way of conveying friendship and companionship to the player is therefore to contradict this mindset, by having the agent be a sort of safe haven that gives security, courage and bravery to the player. Also, by letting the two characters interact with each other to move on in the game, by introducing actions of collaboration, the theme of cooperation is conveyed. Finally, as the player slowly becomes more secure, courageous and brave, the theme of growing up is presented.

In the next paragraph, a further design choice for underlining this last theme is explained, however the author would like to warn the reader at this point, asking that anyone who does not want to know how the game ends avoids from reading this next paragraph.

Spoiler:

To really convey that the player goes through a journey of being a small cub (dependent on its mother) to being a brave, strong and independent cub (after tackling all obstacles), the end of the game holds a surprise. It suggests, in a very open and abstract way, that the AI agent (bear cub) is in fact an imaginary friend conjured by the player's character at this moment of stress and helplessness. The difference made by this subtle hint is that the player might realise

that she in fact grew up on her own, through her own power and will, without the help of anyone else.

8.2.3 The behaviour of the AI agent

Once the purpose of the AI agent is clear the behaviours, traits and characteristics of the agent can be designed. It was decided that the agent should provide the player with security, courage and bravery and that this should be conveyed through the theme of cooperation, friendship and growing up. The agent is therefore given behaviours and traits that lets it do things that the player cannot do herself. The following behaviours were given to the agent:

- Lead the player to different places.
- Signal points of interest.
- Follow the player around, always keeping close.
- Carry the player over/up to obstacles, like water or high walls.
- Defend player from dangerous animals.
- Sense danger and be scared itself. This creates situations where the player has to be brave and help the agent.
- Communicate through animal calls, i.e. sound effects, with different emotions (sad, hurt, happy, scared etc.).
- Other random behaviours to make the agent more life like¹.

The way in which these behaviours are connected to the game narrative is depicted in Figure 8.2.

8.2.4 Communicating the behaviours

The game world of *Shelter 2: Paws* is the world of animals in mostly a realistic sense, but also with some fable-like events. This implies, amongst other things, that the characters in the game cannot communicate with words, pick up other objects than things to eat and that no man made objects occur in the game. The communication of the AI agent's behaviours therefore heavily lies on its body language and personality. With the help of the game aspects presented in the Design Framework this can be translated into communication through movement, aesthetics and actions, as well as personal abilities to some extent. In this case, personal abilities refer to abilities that the agent has but the player

¹The world is often perceived as random, therefore creating randomness in AI systems is an effective way of making them seem more realistic (M. Eladhar, Otter Play, Stockholm, Sweden, 14 December 2015).

does not have. The behaviours are communicated through both single or multiple game aspects, as is depicted in Table 8.1. The game does not contain a reward system and therefore no behaviour uses this game aspect.

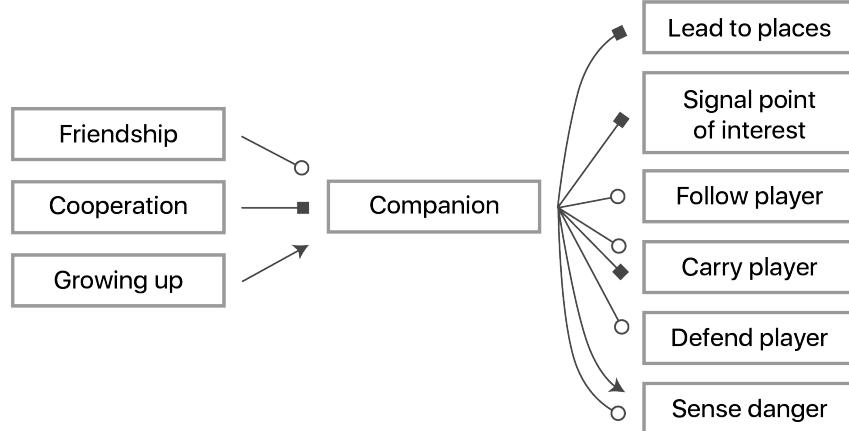


Figure 8.2: Behaviour design for case study AI agent

	Movement	Action and Output	Aesthetics	Personal abilities	Reward system
Leading the player	x	x	x		
Signal POI	x		x		
Follow player		x			
Carry player			x	x	
Threaten other animals	x	x	x	x	
Be scared	x		x		
Calling out to player			x		
Random behaviours	x	x	x	x	

Table 8.1: Case study: Corresponding game aspects for communicating the behaviours of the agent.

To describe one of the behaviours more in detail, leading the player from one point to the other is done by the following steps:

- Signaling that the player should jump up on the agent's back. This is done by movement (stopping and waiting for player) and aesthetics (a specific animation for signaling this specific behaviour).
- Once the player is on the agent's back, walk to the interest point. This is done by movement and action (the agent decides where to go).

Each behaviour is connected in this way to different game aspects, all of which *communicates* the agent's behaviour to the player. To distinguish different behaviours the movement, actions and aesthetics differ from behaviour to behaviour.

Another important note, is that aesthetics are constantly used in the game, not only on the agent, to convey the AI agent's behaviours. An example of this are small openings where only the player can pass and where the agent cannot follow the player, even if it previously did so. Another example of such are higher platforms where the player needs to jump up on the agent's back to be able to reach it, then help the agent to follow by pushing down a log that the agent can climb up on.

8.2.5 User testing

The agent's behaviour was also tested on four playtesters (from here on referred to as players), at two different stages of development, all of which had some experience and knowledge within the field of game design and development. The players were observed to see how they interacted with the agent, during their playthrough of the entire experience, as well as asked a set of predetermined questions after the experience was completed [Appendix B].

The tests showed that most agent behaviours were easy to understand and interact with. All players understood the purpose of the agent and its actions, and mostly how to interact with it. Interactions that were understood by all players were:

- Being carried by the agent.
- Helping the agent by creating paths for it and having it follow.
- Following the agent to points of interest.
- Answering the agent as it calls out (however, problems occurred with this interaction as well, as is described in the following paragraph).

Interactions that were understood by only some players:

- First encounter with the agent and feeding it to restore its health.

This occurred in one playtest, where the player was afraid of the agent at first and did not know how to interact with it. A few moments later, the player made the connection that the agent was not a threat, as the common denominators between the player character and the agent were noticed. After this insight, the player instantly understood that the agent had to be fed and restored to good health.

Finally, there were also a couple of situations where most players had a hard time understanding the interactions, namely:

- Leading the agent when it is scared
- Communicating with the agent through calls

In the first case, all players either had a hard time understanding how to interact with the agent or either interpreted this behaviour as a default behaviour from that point on, meaning the player would constantly try to call the agent close even though the agent was not in this particular behaviour at that moment. The problem of the second case was expected by the developers, as the different calls had not been distinguished at that point in the production, but the user test still made it clear that distinguishing them was a necessity.

More importantly, the user tests showed that players interacted with the agent in accordance with its purpose, as well as formed an attachment to it. The players payed attention to the behaviours of the agent and they spent time communicating (through calls) with the agent even though this feature was not completed at the time. One player explicitly expressed gratitude towards the agent when being helped by it. Also, players had a hard time parting with the agent once they had returned to their Lynx family, indicating that they had formed some sort of amicable bond with it.

Chapter 9

Discussion

The purpose of this master thesis was to investigate how AI agents can be designed to support the narrative of a game, where the problem statement was defined as follows: *How can developers tell stories through an AI agent's behaviour?*

To answer this question the following objectives were stated:

1. Specify core features for narrative design
2. Identify patterns of story centered AI agents
3. Create concepts for narrative AI design in games

To specify core features for narrative design, a literature study on storytelling in games, design approaches for (narrative) games and AI agent design was conducted. This study showed that narrative design in games is a somewhat conflicted subject, where a lot of focus lies on the uniqueness in games as a media and what this implies. Furthermore, the study implied that as games are different from other media, through their interactivity, narrative design in games is a delicate balancing act between the author's control of the story (and how it is being told) and the player's ability to influence the game. Finally, it is safe to argue that this objective was not met as it proved quite impossible to pin-point any specific core features for the area. The conclusion that was reached from this study, however, was rather that there is such a vast number of ways to go about this that the importance lies in focusing on the kind of experience that should be shared with the players, and build the narrative and the gameplay with regard this. Ultimately also, to accept that games are a living media that holds unknown emotions and experiences for both developers and players, as well as use that to the benefit of the game and its design. Even though the objective was not met, the results served the purpose of building a foundation for the remaining research work of this project.

To identify patterns of story centered AI agents, a competitive evaluation of 9 different games was conducted. The games were chosen for either their emotionally compelling narratives, narrative gameplay or narrative AI agent design. The evaluation resulted in identifying core aspects for creating emotional compelling narratives. These core aspects are:

- The movement assigned to a character (playable or not)
- The actions of a character, as well as the output or effect of this on the character and/or game world
- The aesthetics of the characters and the game world, as well as the interface and incongruous visual cues
- The personal abilities assigned to a character (these are not necessarily actions)
- The reward system in a game and its signification

It should be noted that the last aspect mentioned above, namely reward systems, is in a category of its own. Most games, even the ones with restricted gameplay, integrate the first four aspects in some form. However, reward systems in the form of extrinsic rewards (such as points, virtual money, badges etc.) is not something that is necessarily implemented in games. Therefore, it might seem strange that this aspect is presented and included in coherence with the rest. Nevertheless, it is still an aspect that was detected during the study and should therefore be included accordingly. As depicted in Table 6.1, 2 out of 9 games in the study use this aspect, in contrast to the other aspects where a majority of games use them. It should be noted that this difference does not necessarily mean that reward systems are a less adequate means for conveying a narrative, but only that the majority of the games in the study did not even have a reward system to begin with. To conclude whether or not reward systems are less effective (for communicating the game narrative) than the other aspects, this matter has to be studied further.

The games that were studied represent a vast range of game genres and game studio sizes. However, these were not factors that was taken into consideration in the comparison. It could be interesting to examine whether some game genres or game studios have a tendency to use certain game aspects for narrative purposes. This demands a study on a much larger scale though, as no serious conclusions can be drawn from such a small number of games. A bigger study would also be of interest to examine whether there are more game aspects to be added to the list above, which is highly likely. This would also result in the development and refinement of the framework discussed below.

To create concepts for narrative AI design in games, a framework was built from the information retrieved from the previously mentioned studies. This framework suggests an iterative process, depicted by Figure 7.1, shortly described by identifying the main themes of the game narrative, deriving a purpose from these and designing the behaviours from that purpose. Finally, also identifying

which game aspects should communicate these behaviours. The framework was exemplified in a case study conducted on an AI agent of the game *Shelter 2: Paws*. The AI agent was developed by the author of this paper, during the course of this master thesis, and finally tested in four playtests. The user tests showed that users understood the purpose of the AI agent and treated the agent accordingly. Also, that the players formed an attachment to the agent.

The narrative of the game is, shortly described, a young Lynx cub who loses her family and has to travel through vast and frightful landscapes to find her way home. On the way she meets a companion, in the form of a bear cub, and they help each other to overcome their fears and sense of helplessness. As the players treated the agent as a friend, created a strong bond with it and helped it through tricky passages and moments of fear, as well as was helped by it: it is safe to argue that the players experienced the narrative of friendship, cooperation and growing up through their interaction with the agent. Consequently, it can therefore also be argued that the framework has succeeded in presenting a design process that leads to the creation of narrative AI agents. However, the framework has yet to be tested on other game projects and on other types of AI systems, than the one presented in this thesis, to see if it works on a larger scale. It is likely that individual parts of the framework, or the overall flow, can be of use to a larger group of developers. However, any AI system that is not focused on behaviours or actions will have to modify the last stage of the framework to fit their system. Finally, even if the framework should be further developed and refined, it clearly states that the AI system of a game has to be designed in regard to the game narrative. It might sound obvious, but is still rare in games today, and it is an important philosophy for developers to adopt if they seek to create better integrated and emotionally compelling gameplay.

Chapter 10

Future Work

The goal of this thesis was to provide further understanding of how to design AI agents for narrative purposes in digital games. For further work, it would be of great interest to continue developing, testing and refining the framework, so that it can be applicable on a larger scale. To achieve this, the following work is of interest:

- Use the framework on other types of AI systems than Utility Systems and analyse the differences that occur between them. Also, evaluate and refine the framework from the results. This would broaden the user area of the framework and improve its process.
- Use the framework on different genres of games and games of different scale and analyse the differences that occur between them. Also, evaluate and refine the framework from the results. This would also broaden the user area and improve its process, as well as make it more attractive for more developers.
- Conduct research on how the design of AI agent randomness can be integrated into the framework, as this is also an important part of creating realistic AI systems. This is a huge project in itself, but it would be very interesting to see if AI agent randomness could be a part of the design process and not just something that should be done 'anyways'. This would bring the framework closer to completion.
- Conduct more user tests and explore how the AI agents' behaviours and actions effect the players while they are playing. In other words, further test the framework and its efficiency.
- Further examine how the trade-off between transparency and emergence of AI systems can be handled in an efficient and cost effective way. This is also an enormous project, but one that will contribute to creating better and more impressive AI systems for games.

Chapter 11

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Bibliography

- [1] A. Rollings and E. Adams. *Andrew Rollings and Ernest Adams on Game Design*. New Riders Publishing, 2003.
- [2] Jesper Juul. Games telling stories?: A brief note on games and narratives. *Game Studies*, 1(1), 2001.
- [3] Jesse Shell. *The Art of Game Design: A Book of Lenses*. Morgan Kaufmann Publishers, 2010.
- [4] Henry Jenkins. Game design as narrative architecture. <http://interactive.usc.edu>, 2011. [Online; accessed September 2015].
- [5] Metacritic. Journey for playstation 3. <http://www.metacritic.com>, 2012. [Online; accessed November 2015].
- [6] IGN. Journey - playstation 3. <http://www.ign.com>, 2012. [Online; accessed November 2015].
- [7] Carl-Johan Johansson. The human factor (original title: Den mänskliga faktorn). *Level*, 13, 2015.
- [8] D. Fox Harrell and Jichen Zhu. Agency play: Dimensions of agency for interactive narrative design. *Association for the Advancement of Artificial Intelligence*, 2009.
- [9] Might and Delight. Might and delight: Studio. <http://mightanddelight.com>, 2014. [Online; accessed September 2015].
- [10] Robert K. Yin. *Case study research: design and method*. SAGE Publications, Inc., 2014.
- [11] G. Ambrose and P. Harris. *Basics Design 08: Design Thinking*. Basics design. AVA Publishing, 2009.
- [12] J.W. Creswell. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, 2013.

- [13] Kris Graft. Four ways to design for horror, from amnesia dev frictional games. <http://www.gamasutra.com/view/news>, 2014. [Online; accessed September 2015].
- [14] David McRaney. Misattribution of arousal. <http://youarenotsosmart.com>, 2011. [Online; accessed September 2015].
- [15] D. Wilkinson and P. Birmingham. *Using Research Instruments: A Guide for Researchers*. Routledge Study Guides. RoutledgeFalmer, 2003.
- [16] Jennifer Rowley. Conducting research interviews. *Management Research Review*, 35(3/4):260–271, 2012.
- [17] Katie Couric. Katie couric on how to conduct a good interview. <https://www.youtube.com>, 2009. [Online; accessed January 2016].
- [18] Amy Schade. Competitive usability evaluations: Learning from your competition. *Nielsen Norman Group*, 2013.
- [19] Gonzalo Frasca. Ludologists love stories, too: notes from a debate that never took place. <http://www.ludology.org/articles>, 2003. [Online; accessed September 2015].
- [20] Jan Simons. Narrative, games, and theory. *Game Studies*, 7(1), 2007.
- [21] Kevin Nguyen. Getting over “game over”: How indie developers are making games into art. *The Bygone Bureau*, 2009.
- [22] Thomas Grip. 4-layers: A narrative design approach. <http://gamasutra.com/blogs/ThomasGrip>, 2014. [Online; accessed September 2015].
- [23] 2005 Game Developers’ Conference. *Interactive Narratives Revisited: Ten Years of Research*, San Jose, 2005.
- [24] Game Developers’ Conference. *MDA: A Formal Approach to Game Design and Game Research*, San Jose, 2001-2004.
- [25] Mirjam P. Eladhari, Anne Sullivan, Gillian Smith, and Josh McCoy. Ai-based game design: Enabling new playable experiences. *Academia*, 2011.
- [26] Tadhg Kelly. What dear esther is not... <http://www.whatgamesare.com>, 2012. [Online; accessed January 2016].
- [27] Steam Community. In what ways have your cubs died? tell me your story! <https://steamcommunity.com/>, 2016. [Online; accessed January 2016].
- [28] Clive Thompson. Poetic passage provokes heavy thoughts on life, death. <http://archive.wired.com/gaming/gamingreviews>, 2008. [Online; accessed October 2015].
- [29] Metacritic. Amnesia: The dark decent. <http://www.metacritic.com>, 2011. [Online; accessed November 2015].

- [30] Michael Booth. The ai systems of left 4 dead. <http://www.valvesoftware.com/publications>, 2009. [Online; accessed November 2015].
- [31] Jamie Madigan. The psychology of immersion in video games. <http://www.psychologyofgames.com>, 2010. [Online; accessed November 2015].
- [32] Babak Kaveh. A fresh look at the concept of immersion. <http://www.gamedesignideas.com>, 2010. [Online; accessed November 2015].
- [33] Jason Rohrer. What i was trying to do with passage. <http://hcsoftware.sourceforge.net/passage/statement>, 2014. [Online; accessed November 2015].

Interviews

- Thomas Grip, Frictional Games, Stockholm, Sweden, 29 September 2015.
- Kian Bashiri, Dice, Stockholm, Sweden, 13 October 2015.
- Mirjam P. Eladhari, Otter Play, Stockholm, Sweden, 14 December 2015.

Appendix A

Key Person Interview Questions

Thomas Grip, Frictional Games:

- Do you actively think about how the AI in your games support or effect the story?
- If so: How does this influence the way you build the AI for the games?
- If so: Which are the challenges you have encountered in developing a narrative AI?
- Have you gained any further insights to the *4-Layers Approach* after working on SOMA?

Kian Bashiri, Dice:

- I am personally under the impression that the role of AI agents in games today is very narrow (they are either treated as obstacles or information billboards). What is your point of view on this matter?
- Have you, for any game project, designed narrative AI agents?
- If so: Which were the challenges you encountered during that process?
- If so: Did you gain any insights during that process?
- Thinking of the subject for this master thesis, do you have any examples of games I should be looking at where gameplay is used for narrative purposes?

Mirjam P. Eladhari, Otter Play:

- You mention that AI can break new territory in the space of stories, which positive or negative aspects have you encountered when exploring this?

- Which have been the biggest challenges for integrating AI in the setting and story of games?
- How have you tackled the problem regarding transparency and emergence in games? Do you have any tips or tricks for finding the right level of transparency and/or emergence for an AI system?

Appendix B

Usability Test Interviews

Playtesters:

- Man, Adult, Level Designer.
- Woman, Adult, QA-tester.
- Man, Adult, Game Design Student.
- Woman, Adult, Game Design Student.

Interview questions:

- What are your thoughts on the pacing in the game? Was any part too lengthy or too short?
- What are your thoughts on the dramatic curve in the game?
- What are your thoughts on the difficulty in the game?
- What are your thoughts on the learning curve in the game? Did you ever feel like you did not know what you were supposed to do?
- Is there anything that "brakes the illusion" in the game?
- Is there anything that the game lacks? What do you find is the weakest aspect of the experience?