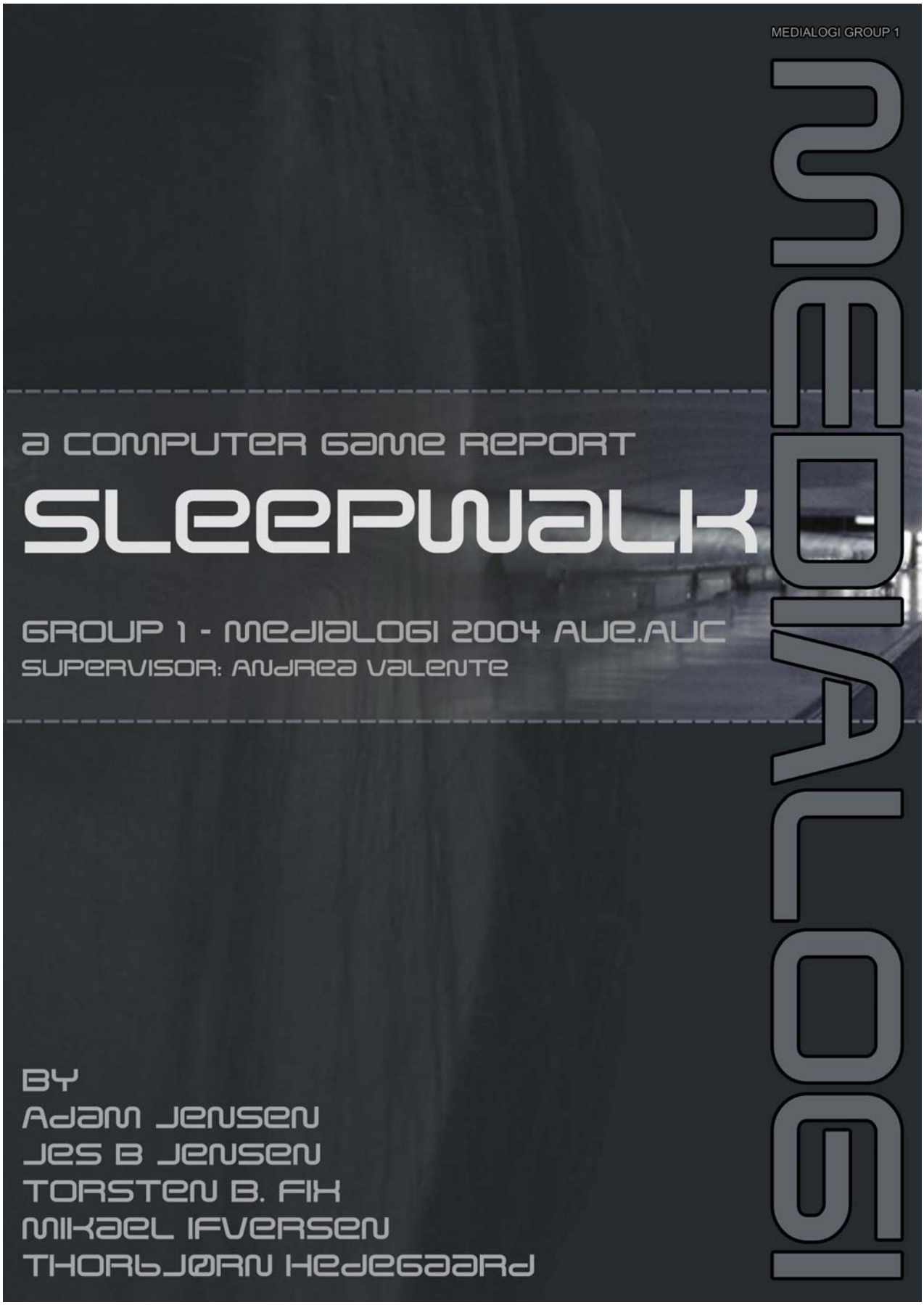
MEDIALOGI GROUP 1
A COMPUTER GAME REPORT
SLEEPWALK
GROUP 1 - MEDIALOGI 2004 AUE.AUC
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1. Introduction

The vast majority of games developed today are mostly devoted to an end-result – from the perspective of the player - and in many cases this result is obvious and therefore the game are without any challenge in terms of completion. The game play will in those cases most likely bore the player very quickly.

1.1 Problem area

With the project *SleepWalk* we will generate another kind of computer game. By combining the projects of the courses in computer games and hypermedia - at Aalborg University Esbjerg in the spring 2004 - into one bachelor project we will generate a concept where the player in the computer game have no boundaries and are without any clear sight of a beginning and ending. It is our intention to uncover the mysteries of games with another perspective than the traditional win-loose scenario.

1.2 Game in another perspective

By implementing hypermedia in the game we will move focus away from the traditional game structure as we explain later in chapter 2 *Theme Exploration and Concept* . The game will have no narrative start in the sense of a beginning and no end either; further more there is no winning in the traditional way. The theoretical background for this narrative structure is to be found in the ideas of Rhizomes. We will uncover the theories of Rhizomes later in this report; both briefly within the report and in an in-depth appendix-chapter about Rhizomes in a computer game perspective can be found in *Appendix v. In-depth: Rhizomes in computer games.*

Because of the nature of the game it is completely up to the player what to gain by playing and to find the meaning of the game, if such exist.

1.3 Our angle

The main question of the project has been:

Is it possible to make the player of the game go back to the game again and again to explore the dream universe we have created?

It has been our main drive in this project to try to produce a game that can intrigue players both after and during game play and subsequent leave the players to wonder and reflect about what just happened.

We have been inspired by the article of Shuen-Shing Lee "*I loose, Therefore I think - A Search for Contemplation amid Wars of Push-Button Glare"*[Lee, December 2003] to go another way than the traditional straight forward games; by creating a critical game, in the sense of a game that will more than "just" be a game that you play. In the words of Shuen-Shing Lee a critical game can be defined as games which *"...appropriate and twist the established gaming models and schemas of popular games."*[Lee, December2003] Further Lee states that this kind of games appeal to a kind of*"... new audiences, offering alternative goals such as meditative play or off-gaming engagement, very often by way of pain, rather than pleasure."* These views, from the above mentioned article, have inspired the project group to the idea of producing another kind of game: A game that could, or rather should, give the player something to think about; both during and after he plays the game.

1.4 Methods

Our main method has been one of *Trial & Error.*

When it comes to the area of computer games the experience in the group varies from very experienced players of computer games to rather limited experience towards the games that are on the marked today and from none at all to a growing knowledge when it comes to alternative games. That brings up the working methods we used in this project. A large part of the project has been

used on research in different areas such as related projects, game engines, critical games, hyper fiction games, incorporation of video in the game etc. This has produced several ideas and semi finished prototypes that will be covered in this report as you read.

1.5 Structure of this report

We have adapted most of the structure suggested by our project supervisors Andrea Valente and Conor J Curan; please refer to *appendix x. Structure of the Med 6 of the project report*.

Further the project group have decided that each member do the three individual ECTS points research; to be read in appendix iii through to appendix vii. Here is a short description of the topics that will be covered.

In appendix 1 AI, written by Thorbjørn Hedegaard the main focus will be on AI in computer games

Appendix 2. Games as political statements..., by Mikael Ifversen and details some news games and differences between main stream and critical games.

Appendix 3 *Rhizomes in computer games,* written by Adam Jensen will be an exploration of the theoretical and practical background for implementation of Rhizomes in computer games.

Appendix 4. Will be dealing with sound and music in games and will be written by Torsten B. Fix.

Finally Jes B. Jensen will be writing about narrative structures in games in appendix 5.

We will now continue with the chapter wherein we explore our theme and end up with a full-grown concept.

2 Thematic Exploration

To get an insight to what our game could contain we first have to do some research – mostly - in the field of Critical Art Games. This we will do from "the outside in" by which we mean that first we will look at projects which are similar – in one way or another – then continue to describe our angle of approach. From there, we will describe our motivation, describe the development of ideas and finally in this chapter end up with the concept which the computer game *SleepWalk* is based and developed. As we will describe later in the chapter concerning implementation; the concept will not be implemented in full as it is described in details, partly because of the choice of the Java 3D engine and partly because the matter of Artificial Intelligence – in the form of agents – of which we do not have the possibility to implement in full; more about this later.

2.1 Related projects

In this paragraph we will look at projects that are similar to our project. We want to pinpoint that the projects we will describe here will not bear full resemblance to ours; therefore only parts of the projects might have our interest. On top of this we also have included projects which have no apparently resemblance with computer games; these have been taken in to account because of the resemblance in the sense of thematic and theoretical presentation.

Following are the projects we will discuss:

2.1.1 Chinatown

The "game" *Chinatown* is made by the American artist Brody Condon [Condon, 2001-2004], who has been producing moderations (MODS) for first-person shooting games such as Counter Strike [http://www.tmpspace.com/vs.html] and Half-Life [http://www.tmpspace.com/ak_1.html] in other ways than what is 'normally' seen in the field of MODS. Brody takes the games to another 'level': He incorporates element of 'haplessness' and "*...removes the main impulse of gamers: to shoot, and*

attempts to use a game engine as a tool for expression through which the artist could comment upon and force a different reflection..." [Adriene Jenik,]. This is very much in line with the drive of the genre of *critical games* as described by Shuen-shing Lee [Lee, 2003] in his previous mentioned article, "*I loose, therefore I think",* in which he describes the elements of the games within the field of socially and politically criticism.

The 'game' *Chinatown* is kind of an 'anti-game' in the sense of the purpose of the game: The player does not have the possibility to play the game; it is not playable. Therefore it's only an exploration and presentation of the environment; which is Chinatown in Los Angeles. It remains as an artistic/cultural representation or model of the streets in Chinatown in Los Angeles. Further more the perspective is changing all the time according to the artificial intelligence (AI) where bots are moving around without any apparent aim; at times the bots are floating in the air.

We find that *Chinatown* offers the player a new angle towards the traditional first-person shooter games. There is a stark contrast between these traditional games where you walk around and kill monsters to a game where you as a player walk aimlessly in the streets and can do nothing. The contrast is especially apparent when the scene in Chinatown immolates the look and feel of a first person shooter game and then delivers a total different game experience.

2.1.2 Alice: Interactive Museum and L-Zone

At first glance the games *L-Zone* and *Alice: Interactive Museum* [Toshiba-EMI, 1993 & 1994] do not have much in common with our initial game idea. But by looking closer at screen shots and game description we find some similarities. Before describing the two games we would like to point out that, because of difficulties in locating the company – Synergy Interactive Corp. - which published both games, we will use the reviews seen on the web site MobyGames.com [MobyGames(TM), 1999-2004].

The *"L-Zone"* has similarities towards our game in the sense of lack of understanding at the starting point in the game. As it is described at MobyGames.com and which all in all fits very well to our

project: *"The goal is to try to understand the purpose and find the escape..."* [Toshiba-EMI Limited, 1993]. This is very much the same challenge or 'obstacle' the player meets in our – *SleepWalk* – game: It is not obvious or visible what kind of understanding is needed for the player to 'complete' the game.

In the matter of *Alice: Interactive...* we see a common ground towards our project in the way the artworks on the walls are "...very interactive resulting in clues or surprises." and "an artistic piece of software."[Toshiba-EMI, 1994]. This is very much in thread with our ideas in terms of creating a game with clues hidden in images, video / audio sequences, objects etc. that are located in the different environments that are presented to the player. Below you see a screen shot from the game *Alice: Interactive*... illustrating the nice looking 3D environment in the game.

Corp., 1994)

As we pointed out earlier in this section we will also take in to account other projects which at first sight do not have anything in common with our project. The next project fall in that category:

2.1.3 Den Ugudelige Farce (The Impious Farce), by Svend Åge Madsen

When reading the novel of the Danish writer Svend Åge Madsen *"Den Ugudelige Farce"* we get the impression that he was inspired by those ideas of Deleuze and Guatarri [Deleuze et al., 1987] concerning Rhizomes. These ideas will be described later in this chapter and in an in-depth appendix.

The similarities in this project are easy to find: First of all there is the matter of the structure which is poly-linear in both the novel and the game *SleepWalk.* In the novel the reader is presented with multiply choices in terms of different ways to go through the story. This is the same for our game.

Second is the matter of the puzzle pictures: In the novel the reader is presented with some – at times – distracting pictures which disturb the reader and his peace of mind. That is also the 'picture' we present for the player of our game: The player should be shaken in his foundation.

The next project in line is an 'oral' project which has been published on the Internet:

2.1.4 Painsong

The on-line artwork *Painsong* [Abrahams, 2004, /pain.htm], made by Annie Abrahams, is part of her great port folio of web-installation she has been doing since 1998. Her brief description of the artwork is: *"...words words, that hurts. 15 .mp3 mixed, to be mixed. Takes time to charge. Dependant on flux, computer, plugin, and you* "[Abrahams, 2004, /info/tous.htm].In this short description she indicates that the audience is about to experience something out of the ordinary: An experience that maybe will shake the foundation of the audience, maybe not. This is where we find

similarities with our computer game: We also hope to shake the foundation of the players of the game.

With these – short – descriptions of different kind of projects in which we find some common ground and relations to our game *SleepWalk*, we will now proceed to the section that describes the process that leads us to "The Concept" of our game.

2.2 Our angle

When we had our initial talks about this project we discussed in the group what direction we would like our project to take; as a result of those talks we decided that the end-product should be a computer game in which we would go a different way than the straight forward and more traditional games. We would like to do something else than 'just' the ordinary first-person shooter or an ordinary adventure game. For this purpose we began to dig into the field of non-linearity. It was then after we where introduced to the theories of Rhizomes by our supervisor – in Mobile gaming – Conor J. Curran[1] we did discover which way we could go in terms of non-linearity, or in this case as the supervisor in hypermedia course, Claus Atzenbeck[2] put it: *Poly-linearity* which in short, in the words of Claus, can be described as *"Exploration rather than linear reading"* and it is *"Dynamic: seldom whole text is being read"*, meaning that the 'reader' – or in our case the player – do not have to read/play the whole game to obtain some kind of comprehension within the text or game. Also Claus Atzenbeck states in a lecture that hypertext with a poly-linear structure has "*Alternative reading sequences*" which also applies a lot to the structure of the computer game *SleepWalk.*

[1]Please refer to his web site for the computer game course for details:
http://cs.aue.auc.dk/~conor/courses/computer_games/

[2]Please refer to Claus Atzeneck's web site for hypermedia course for details:
http://www.cs.aue.auc.dk/~claus/courses/2004/med-hypermedia/

2.3 Motivation

Our motivation has a great deal to do with the angle we chose for the computer game. We were very much motivated by the thoughts of creating a different kind of game; a different experience for the player and subsequently how do we create a game interface that ultimately convey those feelings and ideas.

As mentioned in the previous section we have been motivated by the theoretical input from both our hypermedia and computer games courses. In the hypermedia course we have been encouraged by the ideas about the poly-linearity you find in hyperfiction, and in the computer games course we have found interesting thoughts in the theories concerning Rhizomes.

2.4 Idea development

In this section we will describe the reference material that led to the story of the game.

As stated we set out to make an alternate kind of game and for this reason we chose to incorporate some theories that are normally not used in the context of the gaming industry.

The main thematic approach in *SleepWalk* is in a broad sense; that of dream symbols. We have used different, both theoretical and practical oriented books[3] in our 'quest' to unveil what kind of dreams or dream symbols we could use as elements and building blocks in our game.

2.4.1 Dream symbols and Themes

[3]Please refer to the list of recommended literature in the back in this report

First of all we will like to point out that our approach to the interpretation of dreams and the progression of finding dream symbols and themes has been with in the theoretical approach of Carl Gustav Jung, a former Professor of Psychology at the Federal Poly technical University of Zurich and one of the forefathers of modern psychology.

C.G. Jung was a co-worker of Sigmund Freud and they worked together from 1907 to 1912 on the quest of uncovering the anatomy of dreams; despite their different views upon the same topic. Sigmund Freud believed that all dreams are rooted in human sexuality, whereas Carl Jung looked at dreams as tools to help people develop in life [Barrows, year].

It is in this context we have looked at different kind of dream symbols which we will explain in the next section.

First we look at Jung's archetypes, which can be divided into the following five types:

1. Shadow
2. Anima/Animus
3. Syzygy
4. Child
5. Self [Davis, 2003]

Each of the five archetypes can be seen as patterns of human behaviour. These behaviours are related to Jung's theories about the Universal Unconscious, which are the patterns that Jung found in different cultures and time periods. The behavioural patterns rest more or less upon the same laws. This means that no matter which culture you examine for patterns, the result will be, more or less, the same archetypes. According to Jung there is not such a thing as a personal unconscious mind [Davis, 2003].

The behavioural pattern of the five archetypes has been our approach to implementing the dream symbols in the game SleepWalk.
Below you will see a table of the different archetypes with the coherent meanings and images according to Carl Jung [inspired by Davis, 2002]

Archetype	***Meanings***	***Images***
The Shadow	* The person you do not want to be. * Projection of your own dark sides in other people	* The dark side of man * The Wilderness
Anima/Animus	* The Soul * Inner Oppositions meets	* The exotic girl vs. The old man * Clark Kent vs. Superman
Syzygy *(divine couple)*	* Inner and Outer Oppositions joined * Shadow & Soul bonding	* Queen & King in their enchanted castle * Christ and the church
Child	* Hope and Promise for new beginnings * Promise of lost paradise to be regained	* The golden Ring * The golden Flower * Newborn Child
Self	* The collective Unconsciousness * The god Image	* Images of Spirits *

These archetypes and their coherent meanings/images is an important part of the game *SleepWalk* as they will stand in the midst of our concept that follows.

Of course this short presentation of the theoretical background concerning Carl Jung's symbolic approach towards dreams is not complete. For further information on this matter, please refer to the web site dedicated to the theories of Carl Gustav Jung: http://www.cgjungpage.org/.

2.4.2 Navigational space

In *SleepWalk* the player is walking around in scenarios with a first person view; meaning that the player *is* 'present' in the game. This kind of view gives the player a feeling of being there him self and is quite pervasive in the sense of navigational 'freedom'. It has therefore been taking into consideration in the idea development that the player should not just have the visual sense of being present but also experience the game world in an auditory way.

The audio side of the game could be done in the incorporated sound class' in the Java 3D by SUN[4]. These will be described later on. Here we only deal with the matter of the ideas behind sounds in the game.

Sounds will be used in the game as bearings the player can navigate by: In *SleepWalk* we will associate sounds with e.g. objects, walls, lights, ceilings, floors etc. As an attribute the sounds will be equipped with a volume sphere which means that the volume level is depending on the distance to a sound source.

2.4.3 Narrative Structure

Our intention to make the game *SleepWalk* different rests quite a bit on the narrative structure.

We have been intrigued by the theories concerning Rhizomes. Briefly Rhizomes can be described as an alternative way of structuring information flow or text; here in the sense of the game's structure. The theoretical background for Rhizomes derives from Gilles Deleuze and Felix Guatarri [Deleuze et al., 1987] and deals with the nature of structures in art, philosophy, literature etc. Deleuze and Guatarri explains that Rhizomes *"...has no beginning or no end; it is always in the middle, between thing, interbeing,* intermezzo"[Deleuze et al., 1987, p. 25].

Related to the development of SleepWalk this translates to the game in a way that the player never experiences the sense of completion of a game in terms of traditional clear game endings and it will definitely influence the player's notion about a starting point in the game.

This we describe in details in the following section *The Concept.*

We will further cover the vast area of narratives in chapter 4.a *Hypermedia games.*

[4]Please refer to SUN's web site for information on Java 3D: http://java.sun.com/products/java-media/3D/

2.4.4 Look & Feel of SleepWalk

From the beginning and during the development of the ideas for our 'final' concept, we have tried to emphasize that the *look & feel* should give the player a feeling of being in 'another place' than the 'ordinary' (virtual) world.

The 'main' scene, as we are going to describe in detail in the section *The Concept,* will be the Portal; 'secondary'[5] the player has access to the emotion zones for involuntary explorative purposes.

While discussing what kind of look and feel this game could have we looked for inspiration in the surreal art of Salvador Dali[6] and the mathematical art works of M.C. Escher[7]. We also looked at the comic *"Valerian, agents in space and time"* [Christin et al.]; mainly because of the, at times, 'disturbing and dream like' images and a consistent story line.

2.5 The Concept

In this section we will give the reader an in-depth view of the concept we developed for *SleepWalk;* which we will try to implement in some form in the 3D game.

To give the reader an overview of how we will proceed with the description of the concept we will bring on the bullet list:

- ***The Game***
  - SleepWalk: what is it?

[5]As it is in Rhizomes nothing can be notated as primary or secondary as elements in Rhizomes are all in the same pool. The elements are all in the midst of the midst so to speak.

[6]Please refer to: http://www.dali-gallery.com/ for details on Salvador Dali and his paintings

[7]Please refer to: http://www.cs.unc.edu/~davemc/Pic/Escher for examples of M.C. Escher's works

  - Target group
  - The Message we want to deliver
  - Structure
  - Interface
  - Elements
- ***The Player***
  - Who is the player
  - Why are she/he playing the game
  - Where is the game been played
- ***The Environment***
  - Zones
  - Hot spots
  - Navigation
  - Sound effects
  - Music

As it is shown our concept will emphasize on three mayor area namely *The Game, The Player & The Environment.*

2.5.1 The Game

Following is an in dept chronological description of the concept used in the development of the game *SleepWalk.*

2.5.1.1 SleepWalk: What is it?

SleepWalk can be defined as a hyperfiction game with Rhizomic or poly-linear qualities. The main thread in our game is the poly-linear interaction in which the player will find, if the person is used to an ordinary game navigation, many strange ways to move around in both the 'main' area, which we have decided to call *The Portal* and the environments the player will be 'thrown' to and from.

The environments we have in mind are based upon the four basic human emotion (fear, grief, anger and joy) 'taken' from the web site: http://www..... These emotions will be presented in different ways as we describe later on in this section.

In order to conceptualize a game we need to define the target group.

2.5.1.2 The target group

When defining the target groups that we believe will have an interest in a game concept as the one we are describing here we categorize the target groups as a main group and a secondary group, in theory there are room for many more target groups pending of how broad you define such.

Our main audience will consist of people interested in the development of first persons adventure and shooter games and people who play these kinds of games on a regular basis.

The first target group will be found either in the main stream or in the 'alternative' game development industry. In the first category you will find games like Hitman, Unreal Tournament, Quake and more others; the second category is more difficult to pinpoint in terms of specific games, but could be games as to be found on i.e. the web sites http://www.watercoolergames.org and http://www.socialimpactgames.org.

The secondary target group is people who are playing (first person) games and are curious to get acquainted with other forms than that of first person games. There is a tendency in the computer game community to incorporate or add a broader sense of vision, in terms of political and cultural issues, to the games and viewed in this light our game can present the player with a different kind of game play than usually experienced.

2.5.1.3 The message we want to deliver

The message we want to deliver with this game, is basically to upset the narrative structure in the game play that players usually associate with computer games and leave the player with another experience than expected and there by give the player the notion that a game is not equal to have an end goal by means of solving puzzles and shooting monsters. The way we strip the player from the well known language of game play, will be intriguing for some players and leave them with a new sense of challenge that possible can mount to a critical state of mind when it comes to game experience as we know it.

2.5.1.4 The structure

The structure of the game will, as previously described, take its outset in a *poly-linear* or to be more precise from the view point of Rhizomes.

Rhizomes can bring a lot to a structure, such as an unpredictable story line, a never seen end; which is exactly what we applied to our game in sense of the no-beginning and no-ending properties. It is an all in-the-middle structure. The in-the-middle structure can be multiplied in such way that it can be seen anywhere, and nowhere, in the game. Questions like: *Where are you from?,* and *Where are you heading?* Are

> "*...totally useless questions. Making a clean slate, starting or beginning again from ground zero, seeking a beginning or a foundation – all imply a false conception of voyage and movement...*" [Deleuze et al., 1987, p.25]

This conceptual approach towards the structure can be seen from the player's point of view, as if Rhizomes has a random structure, which is not the case in *SleepWalk*; or for that matter elsewhere.

Rhizomes in the case of *SleepWalk* are observed as a way of moving the player, with or with out his consent to the different environments that make up the game. In figure 1 you can see an illustration of how movement between zones can happen.

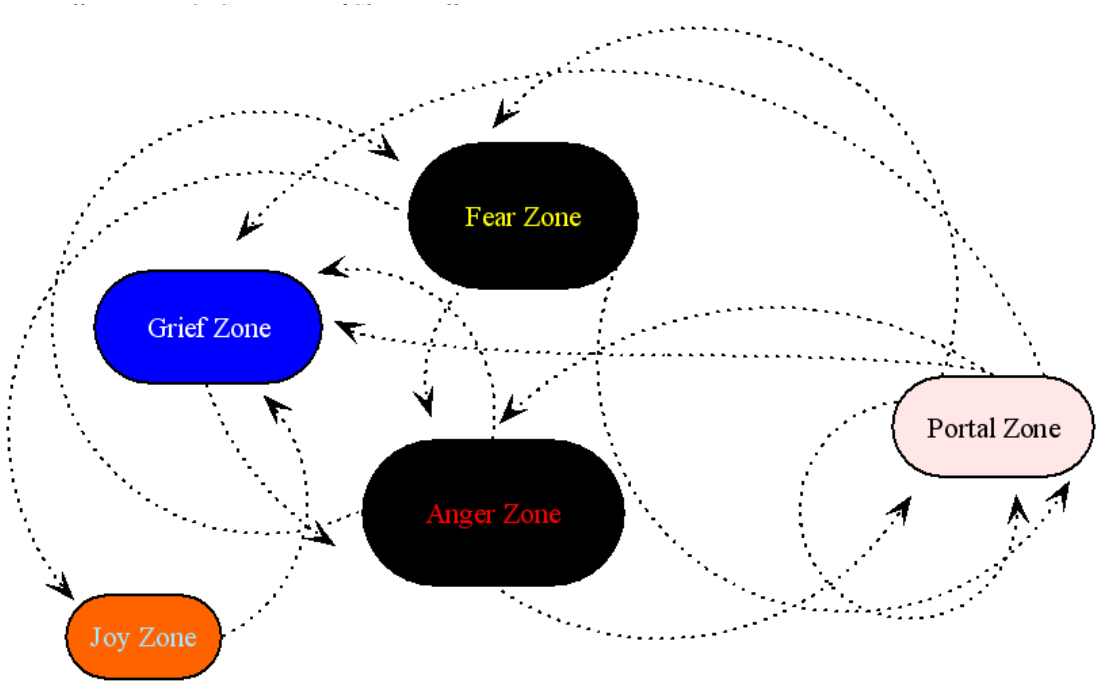


Illustration 1 The Structure of SleepWalk

As it can be seen in the illustration there is are spatial and size weighing matter in the game: the three emotion environments *Grief, Anger & Fear* are represented as clearly larger entities than *Joy*. It is incorporated in the concept of *SleepWalk* that the player will never be able to reach a state of *Joy;* it will only be visible in the distance: when the player is in a certain radius of the *Joy*-element she/he will be removed from it. Either this will be done in a way that the player will be thrown into another environment or the element will simply disappear. From here on the emotional environments of the game will be referred as *The Zones*.

2.5.1.5 The Interface

The interface of the game is rather simple but entails all the necessary elements to manoeuvre in the game world: the users can use the arrow keys (for moving back and forth and sideward) and the mouse is active for both changes of direction when you move as well as to view in the directions you desire. Additionally the player can – if it applies to the zone he is occupying – sometimes fly, hop in the air, crawl and zoom in or out. At this moment we haven't really decided where to apply the latter part of the player's ability to move.

2.5.1.6 Elements

The elements we are going to use in the game can be categorized in terms of rooms, lights, textures and objects. Video and audio are definitely important elements which we discuss later in this chapter.

Each game zone will have its own distinct design and might not resemble each other at all therefore some elements might not be present in some zones and on the other hand be overly used in other zones.

The rooms can either illustrate a specific room or be used to define an area in which we place objects or lights etc. in order to create a sort of road sign for the player.

All the elements in the game will contribute to how the player will experience the Zones that he will encounter. The elements are influencing the entire exploration of the game since no one is chasing the player it has to be the interconnection and the placement of the elements that capture the attention of the player and guides him through the Rhizomic jungle of *SleepWalk*.

2.5.2 The Player

2.5.2.1 Who is the player?

The player is most likely to be in the age group of the 18 to 35 as it is in this group that you find a large group of computer game players. As stated earlier in this chapter a portion of our target group has to be found in category of first person shooter players and we therefore find the following numbers very interesting. According to figures from Entertainment Software Association (ESA) the number of shooter game units sold are 13,6 % of the computer game marked in USA [ESA, 2004, p. 3]. On top of this we might also find some players from of our secondary target group amongst the Role-Playing genre which amount to 8,7 % of the total sold units of the most sold computer games[ESA, 2004, p.3]. Further we have decided that the game *SleepWalk* is an adult-only and

children-don't-go-there game because of the explicit pictures of death and sexual content.

2.5.2.2 Why will the player play the game?

Our player will play *SleepWalk* from the standpoint of pure curiosity; since it is a different kind of game than we are used to it can attract the attention of the gamer that is ready to try something totally different to what he is normally playing.

2.5.2.3 Where is the game been played?

We see the game being played – as a one-on-one session with the computer[8] - home alone in front of the computer; as there can appear pictures, sounds, video sequences of such explicit nature that it might scare your neighbour or frighten children and therefore we give the game a X-rating.

2.5.3 The Environment

In this section we describe how we envision the dynamics of the environments that the player encounters on his way and how they are connected with the action and decisions that the player makes.

2.5.3.1 The game Zones

As previously mentioned we have decided that the game will consist of four *Emotion Zones* which all will be 'accessible' from the main navigational point of the game namely *The Portal.* Following will be a brief overview of the zones and the navigational mechanism of the zones.

[8]This is applicable for the first (beta) version of *SleepWalk* as it is our intention that a further development (version four or five) should give the player to play the game on-line with other players. Please refer to chapter six *Further development* for details about this subject.

The *Emotion Zones* are associated with themes that can be found in the emotions anger, fear grief and joy. The zones will be explored in a dynamic sense where the intensity will be controlled by the way the player interacts with the scenarios that he is presented with in *The Portal.* The interactions are controlled by agents scattered all over the scenarios and these agents will reward the player with points pending on what actions the player took in a given area or under a given set of circumstances; i.e. the player will unknowingly collect some points by repeatedly entering a non specific area or look at certain images for a certain amount of time etc. This dynamic approach is creating a result as e.g. an anger scene where the amount of anger exposed in the scene is directly related to the amount of anger points accumulated by the player in the portal. So as to both trick the player and give the player a sense of familiarity with known computer games the idea of actually have some kind of 'score board' presented for the player in the bottom of the screen in the form of a red meter came up.

This meter will get its input from the just mentioned agents and the numbers collected from the interactions are summed up and illustrated by the meter. This will give the player an impression of that of his actions is resulting in an end of game result, this is as previous stated not the case though the hole idea of a point meter is to create that specific illusion for the player. Another perceptive problem with the point meter will be the fact that the player will have a really hard time figuring out how the points are affiliated in terms of anger or grief etc. Since one of the core elements in this game is supposed to be deception there will not be a direct link between what the player might interpret as anger and what actually does represent anger in terms of accumulating the points that will bring the player to the anger zone; this is another beauty in the concept of Rhizomes.

We will now go on to describe the different zones as we see them being presented for the player.

The Portal: The portal is the entrance point of the game; it will not necessarily be the same exact starting point every time the game are being played, but you always do start in the portal. The portal is made up of elements which visual placement changes according to your movements in the portal.

This dynamic implementation is not to be confused with the way the player access the different dynamic zones as mentioned earlier in this section. The idea behind having a game world that changes according to where you move as a player is related to the whole aspect rooted in the dream world, in a sense that you ask the question can you trust what you see, is it real.

By showing different objects at different times in the same scene we create a rather active game world that has a wealth of navigational clues embedded in the scene. You can say that we create different islands out of the same space dictated by the way the player interprets the visual and the auditory clues.

In terms of how the portal actually will change we can implement the changing of objects or textures mapped to objects, the colour of the lighting in a room, the sound in a room etc.

We envision the portal as a group of islands in a common space that you as a player feel the need to explore and thereby create the story in which you rearrange the narrative structure.

In chapter 3.3.5.1 we will describe the different approaches in developing the portal we present screenshots and layouts of the different ideas.

The anger room: The anger room is seen as properly the most vivid or strongest room. It has always been seen as the room that will make the player feel sick by what takes place here. We thought of a place where the player is confined to a small room with no possible movement and in front of you is placed a video screen. The video will contain hardcore violence, disturbing sexual content and other obscure elements that we can find in fiction as well as in documentary video clips. The idea is to show the rather dark side of the human mind and culture and do it in a way that the player really don't want to come to the anger room. To accompany the video clips we want to incorporate a loud and disturbing soundtrack and possible play with the light colour and intensity in order to escalate the disturbance.

One of the consequences of being in the anger room is that once you are in you can't get out of the room, you are trapped in a certain amount of time depending of the volume of anger points your

agents have accumulated, and you either turn your head or turn your computer off if you don't have the stomach to be in the room.

This experience will most definitely leave the player with a feeling that this is a different game and hopefully find it a bit intrusive.

The fear zone: The fear zone is based on a more traditional setting in terms of computer games. It is a maze that illustrates an insane asylum with lots of rooms and where strange things will happen. In this part we want to implement the familiar feeling found in dreams where your ability to move fast or especially run seems to vanish, this we can do by slowing down the speed of the player in desired places.

The player is placed in a labyrinth where the first level of the environment is a normal but a filthy hospital. When the player walks around the area he can hear screams and moans from behind the heavy doors in each cell. If the player looks through the door windows he will see movie clips from horror movie etc.

At the end of the corridor there is a stairway that leads down to the basement.

In the basement the walls are made of heavy stones. Lighting is very sparse and leaves parts of the tunnels in completely darkness. Some of the lights flicker as if the light bulbs are broken. All through this level the player can hear his beating heart. When something happens the heartbeat either stops or bangs like crazy. Throughout this level the player can also hear distant screams and sounds of the committed being tortured. When he enters a room where something is going to happen, the volume is turned way up.

Sometimes the player should feel like he is been followed by darkness. This could be done when the player is walking along a corridor and the lights shuts off one by one in front of him as if something is coming towards him.

The joy zone: We ended up with all but eliminate the joy zone completely and instead have

different representation of the joy zone in the portal as well as the possibility to add the same representation in to the other zones.

In the fear zone the joy feeling will be represented with a white rabbit that walks around the corridors of the insane asylum. The joy zone representatives in the portal are foremost thought of as sounds, video clips and images that would kind of appear like the teasers you know from the film industry, they will give you a taste but save the pie for later. For this to have an effect we will have to use some intriguing audio and video, sex is an excellent choice for stirring the human imagination associated with joy.

The basic idea is that you as a player never end up in a joy zone or seem to be in a state of joy during game play on the contrary it is an illusion that we uphold for the player by presenting the idea of joy as an equal partner to the other three emotion zones.

At some point during the discussions of the joy zone we came up with the idea to create a whole game world that illustrates joy which then the player will enter arbitrary in a setting of flashbacks known from film, it is suppose to happen very fast as if it is an edited film sequence. This again will illustrate the lack of control you experience when you dream and even though you want something good to happen it is out of your control and at the same time it is going to take a while for the player before he realises that he never gets the pleasure of really exploring the joy zone.

The grief zone: The grief zone has not been conceptualized.

2.5.3.2 Hot spots

The purposes of hotspots are to create invisible areas where the agents will reward you with points according to a predefined set of instructions related to each individual hotspot. As an example we can think of the gathering of points that will bring the player to the different emotion zones as discussed earlier where the player by entering different hotspots eventually will be thrown in to

another zone. A hotspot can also be seen as triggers as well, when we think about the dynamic scene mentioned in the section describing the portal, you will have to enter a hotspot in order to trigger that a new object, colour or texture becomes visible.

In order to eliminate the predictability of the game we decided that the location of the individual hotspots should arbitrary change so that the player can't duplicate the movement that led to the last game experience.

2.5.3.3 Navigation

In our quest to get the player to move around in the game and collect the points that are going to expose the emotion zones to the player we will use several kinds of navigational bait.

It is all about catching the attention of the player and leave some road signs to navigate by and with that in mind we are among other things going to use light settings to create interesting areas. With the help of light and colour it is possible over quite a distance to create some kind of discrete attention towards an area and when first the player has entered the area there are plenty of opportunities to implement navigational objects and images that will lure the player thru the area and in to the hotspots.

In our portal where there are vast areas of empty space, sound will be a navigational bearing that will help you when you get lost in that space. As soon as you loose the visible bearings in the portal it is actually pretty easy to also loose your orientation and therefore sound will be a helpful parameter to guide you between the different islands in the portal.

2.5.3.4 Sound effects and Music

As described in the different zones, sound has to be integrated in the game in order to produce the

desired results. Think of the importance of the soundtrack in a movie and then transcend this thought to our game. We want to create moods that engulf the player and sound is a strong media to use for creating emotional changes and states. We already established the need to use sound for navigational purpose and the need to use sound in the fear zone in order to create the uneasy feeling of fear and we mentioned that sound in the anger room will be a driving force.

It is the idea that the portal will contain a spatial soundtrack that is intended to underline the mysterious new approach we have taken with this game. The soundtrack will consist of a theme which we will loop and edit in different variations in order to use the soundtrack in different zones when needed.

This concludes the description of the ideas, goals and concept. In the next chapter we will describe how we implemented the ideas into the game.

3. Implementation of the theme

We had some wild ideas about how out game should sound and be played. We came to the conclusion that the lack of programming skills on our group, meant that we would have to use some 3rd party game engine that would we able to fulfil some of the ideas we original had. We found the book, Developing Games in Java, with this there was an almost complete game engine in Java. Some of the strong points of the engine were the flexible way of creating environments, texture, lights etc. and of course it was a working 3d-engine in java.

3.1 The problem domain

3.1.1 Classes

Bsp2D

RoomDef	The RoomDef class represents a convex room with walls, a floor, and a ceiling. The floor may be above the ceiling, in which case the RoomDef is a "pillar" or "block" structure, rather than a "room". RoomDefs are used as a shortcut to create the actual BSPPolygons used in the 2D BSP tree.
MapLoader	The MapLoader class loads maps from a text file based on the Alias|Wavefront OBJ file specification.
BSPTreeeTraverser	A BSPTreeTraverer traverses a 2D BSP tree either with an in-order or draw-order (front-to-back) order. Visited polygons are signalled using a BSPTreeTraverseListener.
BSPTreeTraverseListener	A BSPTreeTraverseListener is an interface for a BSPTreeTraverser to signal visited polygons.
BSPTreeBuilder	The BSPTreeBuilder class builds a BSP tree from a list of polygons. The polygons must be BSPPolygons.
BSPTree	The BSPTree class represents a 2D Binary Space Partitioned tree of

	polygons. The BSPTree is built using a BSPTreeBuilder class, and can be traversed using BSPTreeTraverser class.
BSPRenderer	The BSPRenderer class is a renderer capable of drawing polygons in a BSP tree and any polygon objects in the scene. When drawing BSP polygons, the BSPRenderer writes the BSP Polygon depth to a z-buffer. Polygon objects use the z-buffer to determine their visibility within the scene on a per-pixel basis.
BSPPolygon	A BSPPolygon is a TexturedPolygon3D with a type (TYPE_FLOOR, TYPE_WALL, or TYPE_PASSABLE_WALL) an ambient light intensity value, and a BSPLine representation if the type is a TYPE_WALL or TYPE_PASSABLE_WALL.
BSPLine	BSPLine is a subclass of line2D.Float, which includes floating point fields x1, y1, x2 and y2 that define a line segment, the BSPLine also includes the value for the lines normal.

Game

Physics	The Physics class is a singleton that represents various attributes (like gravity) and the functions to manipulate objects based on those physical attributes. Currently, only gravity and scoot-up acceleration when traveling up stairs) are supported.
GridGameObjectManager	The GridGameObjectManager is a GameObjectManager that integrally arranges GameObjects on a 2D grid for visibility determination and to limit the number of tests for collision detection.
GameObjectRenderer	The GameObjectRenderer interface provides a method for drawing a GameObject.
GameObjectManager	The GameObjectManager interface provides methods to keep track of and draw GameObjects.
GameObject	A GameObject class is a base class for any type of object in a game that is represented by a PolygonGroup. For example, a GameObject can be a static object (like a crate), a moving

	object (like a projectile or a bad guy), or any other type of object (like a power-ups). GameObjects have three basic states: STATE_IDLE, STATE_ACTIVE, or STATE_DESTROYED.
CollisionDetectionWithSliding	The CollisionDetectionWithSliding class handles collision detection between the GameObjects, and between GameObjects and a BSP tree. When a collision occurs, the GameObject slides to the side rather than stops.
CollisionDetection	The CollisionDetection class handles collision detection between the GameObjects, and between GameObjects and a BSP tree. When a collision occurs, the GameObject stops.

Graphics

ScreenManager	The ScreenManager class manages initializing and displaying full screen graphics modes.

Graphics3D

FastTexturedPolygonRenderer	The FastTexturedPolygonRenderer is a PolygonRenderer that efficiently renders Textures.
PolygonRenderer	The PolygonRenderer class is an abstract class that transforms and draws polygons onto the screen.
ScanConverter	The ScanConverter class converts a projected polygon into a series of horizontal scans for drawing.
ShadedSurfacePolygonRederer	The ShadedSurfacePolygonRenderer is a PolygonRenderer that renders polygons with ShadedSurfaces. It keeps track of built surfaces, and clears any surfaces that weren't used in the last rendered frame to save memory.
ShadedTexturedPolygonRenderer	The ShadedTexturedPolygonRenderer class is a PolygonRenderer that renders ShadedTextured dynamically with one light source. By default, the ambient light intensity is 0.5 and there is no point light.

SolidPolygonRenderer	The SolidPolygonRenderer class transforms and draws solid-colored polygons onto the screen.
SortedScanConverter	A ScanConverter used to draw sorted polygons from front-to-back with no overdraw. Polygons are added and clipped to a list of what's in the view window. Call clear() before drawing every frame.
ZBuffer	The ZBuffer class implements a z-buffer, or depth-buffer, that records the depth of every pixel in a 3D view window. The value recorded for each pixel is the inverse of the depth (1/z), so there is higher precision for close objects and a lower precision for far-away objects (where high depth precision is not as visually important).
ZBufferRenderer	The ZBufferedRenderer is a PolygonRenderer that renders polygons with a Z-Buffer to ensure correct rendering (closer objects appear in front of farther away objects).

Texture

PowerOf2Texture	The PowerOf2Texture class is a Texture with a width and height that are a power of 2 (32, 128, etc.).
ShadedSurface	A ShadedSurface is a pre-shaded Texture that maps onto a polygon.
ShadedTexture	The ShadedTexture class is a Texture that has multiple shades. The texture source image is stored as a 8-bit image with a palette for every shade.
Texture	The Texture class is an abstract class that represents a 16-bit colour texture.

Input

GameAction	The GameAction class is an abstract to a user-initiated action, like jumping or moving. Game Actions can be mapped to keys or the mouse with the Input Manager.
InputManager	The InputManager manages input of key and mouse events. Events are mapped to GameActions.

Math3D

MovingTransform3D	A MovingTransform3D is a Transform3D that has a location velocity and an angular rotation velocity for rotation around the x, y, and z axes.
ObjectLoader	The ObjectLoader class loads a subset of the Alias|Wavefront OBJ file specification.
PointLight3D	A PointLight3D is a point light that has intensity (between 0 and 1) and optionally a distance falloff value, which causes the light to diminish with distance.
Polygon3D	The Polygon3D class represents a polygon as a series of vertices.
PolygonGroup	The PolygonGroup is a group of polygons with a MovingTransform3D. PolygonGroups can also contain other PolygonGroups.
PolygonGroupBounds	The PolygonGroupBounds represents a cylinder bounds around a PolygonGroup that can be used for collision detection.
Rectangle3D	A Rectangle3D is a rectangle in 3D space, defined as an origin and vectors pointing in the directions of the base (width) and side (height).
SolidPolygon3D	The SolidPolygon3D class is a Polygon with a colour.
TexturedPolygon3D	The TexturedPolygon3D class is a Polygon with a texture.
Transform3D	The Transform3D class represents a rotation and translation.
Transformable	Interface used in Vector3D
Vector3D	The Vector3D class implements a 3D vector with the floating-point values x, y, and z. Vectors can be thought of either as a (x,y,z) point or as a vector from (0,0,0) to (x,y,z).
ViewWindow	The ViewWindow class represents the geometry of a view window for 3D viewing.

Shooter3D

Bot	The Bot game object is a small static bot with a turret that turns to face the player.
JumpingGameObject	A GameObject that can jump
Player	A Player object.
ShooterCore	abstract class ShooterCore extends GameCore3D

Test

GameCore	Simple abstract class used for testing. Subclasses should implement the draw() method.
GameCore3D	abstract class GameCore3D

Util

LoopingByteInputStream	The LoopingByteInputStream is a ByteArrayInputStream that loops indefinitly. The looping stops when the close() method is called.
MoreMath	The MoreMath class provides functions not contained in the java.lang.Math or java.lang.StrictMath classes.
TimeSmoothie	Smoothes out the jumps in time do to poor timer accuracy. This is a simple algorithm that is slightly inaccurate (the smoothed time may be slightly ahead of real time) but gives better-looking results.

The descriptions above are mostly taken from the class description in the java files.

3.1.2 User interface

The user interface uses a common 3d-shooter configuration. The game is in 1st-person view, which means that the user can see anything but the avatar.

The player uses the mouse for looking around the environment like most 1st-person shooters.

Check the cd-rom for file: interface-video.avi

Keyboard controls:

Action	Primary	Secondary
Move forward	Up-Arrow	W
Move backwards	Down-Arrow	S
Move left	Left-Arrow	A
Move right	Right-Arrow	D
Jump	Space	
Increase screen size	+	
Decrease screen size	-	
Exit Game	Esc	

3.2 From map to screen

In the following we will describe how the engine set up a scene using data from the map file and the texture.mtl file, since this is where we so far have been making our game.

The map file is first loaded into the MapLoader class where it is processed using the MapLineParser which goes through the file and creates the different object, materials and lights and assign location on the map using a vertex for the rooms and a Vector3D for Pointligth and objects.
A room is defined by vertices, a room vertex contain following (x, z, top, bottom, texture, texture bounds), x and z are the coordinates that you define in the map file, while top is the ceiling and bottom is the floor, texture is defined by name and texture bounds are the dimensions of the room. All this is processed in the RoomDef class which creates and returns a list of BSPPolygons that represent the vertical walls and horizontal ceiling and floor of each room using the functions createHorizontalPolygons and createVerticalPolygons. These are then set into a BSPTree using the BSPTreeBuilder that goes through the list of polygons with BSPLine and creates nodes and leafs. Following is an illustration of the relations between the classes that are connected to the BSP 2D in the Brackeen's 3D engine.

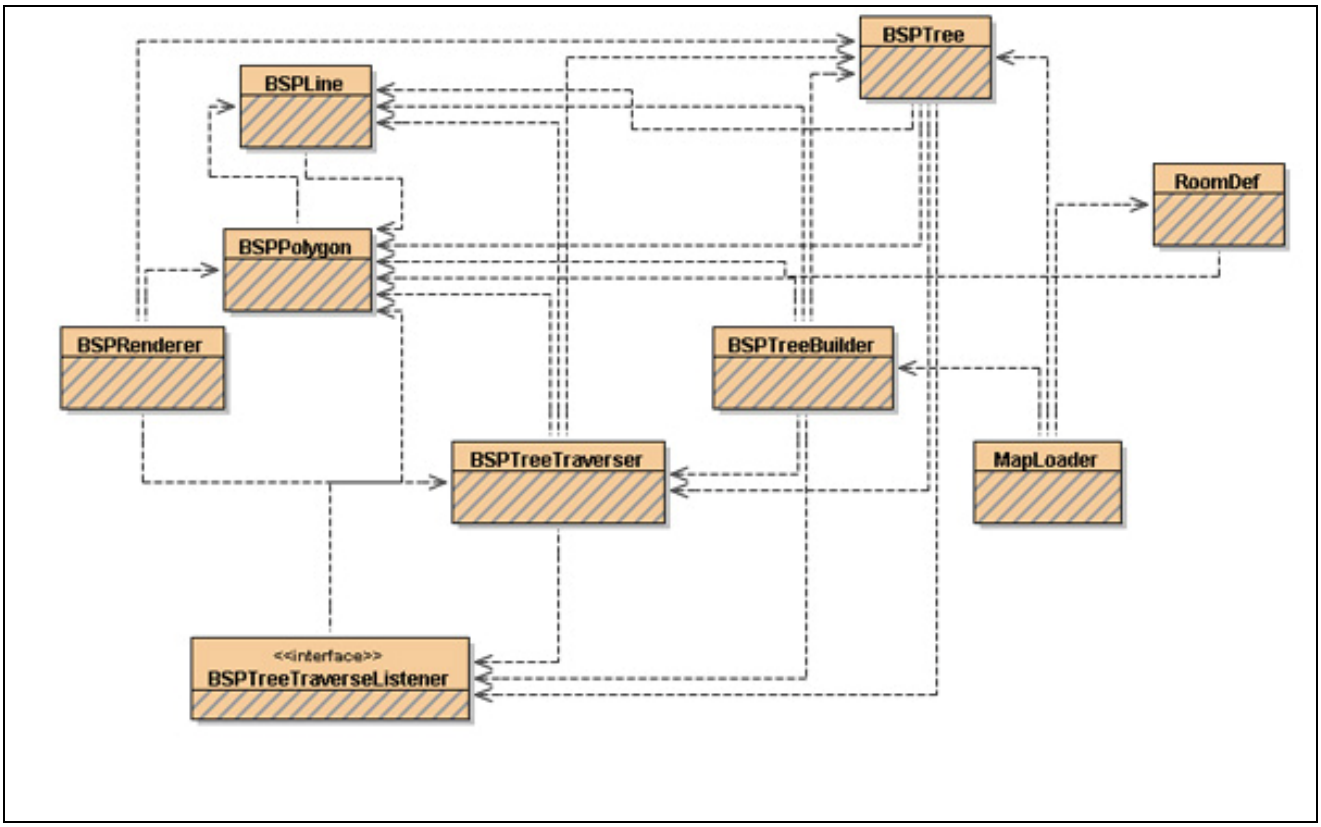


Illustration of the dataflow in com.brackeen.javagamebook.bsp2D

The BSPTree is then the traversed in the BSPRenderer and draw the polygons in the BSP tree and any polygon objects in the scene, the BSPRenderer writes the BSP polygon depth to a z-buffer, which determines their visibility within the scene.

This is how the scene is converted from map file to the screen.

3.3 Graphic implementation

So far you have heard how the engine works in theory. I this three part section we will first describe how the map is created second how objects are imported into the game and third how textures have been used in the game. Afterwards we describe how we created the maps in our game.

In order to create the graphics in our game we have in this 3d engine the capability to use three sets of file formats, namely the map, mtl and obj formats. All three formats are simple script languages that are very similar and based on the obj format by Wavefront.

3.3.1 The map file format

The map file format is created by David Brackeen in an attempt to address a way to create rooms with floor, ceiling and walls as well as a way to control the setting of objects and light. The trick here is that we now have the ability to create game worlds in a text based environment that turns groups of polygons into rooms [Brackeen 2004].

Below we have a description of the map file format:

mtllib <filename>	Loads the materials from an external file
usemtl <name>	Uses the named material loaded from above mtl file.
v <x> <y> <z>	A vertex with floating point coordinates is defined
ambientLightIntensity	Controls the intensity of the ambient light
pointligth [v] [angle] [intensity] [fallout]	A pointligth is created at the given vertex, angle default to -1, intensity and fallout are optional
room [name]	Defines a new room which consist of horizontal floor and ceiling with vertical walls
floor [height] / ceil [height]	Both floor and ceiling are defined by height
wall [x] [z] [bottom] [top]	A walls starting point is a vertex located on the x and z axis
obj [v] [name] [filename] [angle]	Object can be null or have a unique name are called by the filename and placed at v location
player [v] [angle]	Location of the player start position

As we are going to illustrate later, the map file actually gives us a few different ways to manipulate the graphical contents of the game. E.g. both the floor and ceiling parameters can have usemtl null which means the no polygons are created. This can be applied to the wall parameter as well in order to e.g. create a square room with only three visible walls. Everything you see in the game world belongs in a room; if you place an object such as an obj file outside a room it simply will not be visible. There is also a difference in the way you create the walls; when you define the vertices that make up the walls you get different results pending the direction you build the walls. If you build

your walls clockwise your walls are only visible from outside the room and when you build counter clockwise walls the opposite takes place and the walls will only be visible from the inside of the room.

As promised earlier we will show you an example of a room (Illustration 3) followed by a selection of the corresponding map file.

Illustration 3 EastPortalGarden

room EastPortalGarden	The name of the room is EastPortalGarden and is part of a three room portal.
ambientLightIntensity .1	The ambientLightIntensity is set to its lowest setting before being off.
usemtl FloorPavement floor 168	The material for the floor is FloorPavement and the floor is raised to 168

```
usemtl black
ceil 850
wall 2500 -415
wall 2500 0 168 168
wall 6500 0 168 168
wall 6500 -1000 168 168
wall 2500 -1000
usemtl null
wall 2500 -585
usemtl black
wall 2500 -585 318 850

# Portal 1
room LeftPortalPillar1
ambientLightIntensity .1
usemtl texture_G
floor 168
ceil 518
wall 3040 -650
wall 3030 -650
wall 3020 -660
wall 3020 -670
wall 3030 -680
wall 3040 -680
wall 3050 -670
wall 3050 -660
room RightPortalPillar1
ambientLightIntensity .1
floor 168
ceil 518
wall 3040 -330
wall 3030 -330
```

The ceiling and the walls that are build are black.

In order to see the rooms with the blue water stream to the sides of the EastPortalGarden room; the adjacent walls are not above the floor and can therefore not obstruct the view. The reason we have a part of the wall with usemtl set to null is that there is an opening in the wall behind the viewpoint of the image that connects a tunnel to the room. The last wall vertex has a bottom and top parameter at 318 and 850 in order to close the wall above the tunnel.

In order to be able to walk thru the pillars the pillars could not be created as objects. This is due to the collision detection feature that prevents the player from walking thru objects and walls.

As you can see each pillar is made up by its own room and paired with another pillar room and subsequently connected with an object named Bridge5.obj.

Each set of pillars are equipped with a point light in the bridge area.

This entire procedure is repeated for each set of pillars located in the EastPortalGarden room.

```
wall 3020 -340
wall 3020 -350
wall 3030 -360
wall 3040 -360
wall 3050 -350
wall 3050 -340
# Portal 1 Bridge
v 3033 523 -505
obj null Bridge5.obj -1
# Light
v 3033 500 -505
pontlight -1 5 750
# End of Portal 1
v 3210 335 -665
obj null LeftPortalImagePlane1.obj -1
```

The images you see between the pillars in Illustration 3 are image planes.

The image planes are objects that are made in Maya and exported as obj files. Each object is mapped with textures of a famous painting and is only visible from the front of the image due to the fact that an image plane is a flat surface with only one face.

In order to avoid repetition the rooms containing the water streams does not have the code listed but in these rooms there are, as pictured in Illustration 3, several strong point lights that creates the illusion of reflection in the water and some shadows in the rear of the image. The point lights are set with a fairly high intensity and a longer falloff distance than the height of the light; the combination of those parameters gives you the control you need in order to use the light to create some depth and atmosphere. The shadows are in fact just dark spots since the game engine we use is not able to produce shadows.

After this technical discussion of the tools available for the graphical implementation we move on to a discussion of the graphical elements actually used in the game.

3.3.2 The obj file format

The obj file format is here used to convert the geometry in 3d objects created in programs such as Waterfronts Maya or 3d Studio Max to a file format ready to incorporate in java.

"The Wavefront .obj file format is a standard 3D object file format created for use with Wavefront's Advanced Visualizer™. Models are available for purchase from Viewpoint DataLabs, as well as other 3D model companies. Object Files are text based files supporting both polygonal and free-form geometry (curves and surfaces). The Java 3D .obj file loader supports a subset of the file format, but it is enough to load most of the commonly available Object Files. Free-form geometry is not supported in Java3D nor in JavaView" [Polthier, 2003].

The obj line parser class created by Brackeen and used in our game engine support five keywords, namely: [Brackeen, 2004]

mtllib <filename>	Loads the material from an external mtl file.
v <x> <y> <z>	Define a vertex with floating point coordinates.
f <v1> <v2> <v3> …	Define a new face. A face is a convex polygon with vertices listed in counter clockwise order. The face can have any number of polygons.
g <name>	Defines a new group by name. The subsequent faces are added to this group.
usemtl <name>	Uses the named material loaded from the earlier mentioned mtl library for subsequent faces.

Following are the obj file elements that are not supported by our game engine: [sun java3d documentation, 1998]

`vn <x> <y> <z>` A vector normal [Weisstein].

`vt <u> <v>` A texture coordinate.

`s int` or `s off` If the vn token is not used in the file to specify vertex normals for the model, this token may be used to put faces into groups for normal calculation ("smoothing groups") in the same manner as the 'g' token is used to group faces geometrically. Faces in the same smoothing group will have their normals calculated as if they are part of the same smooth surface.

As an example of a simple obj file from our game we have below the code from a single image plane from the octagonal image billboard object you see in the portal room.

mtllib textures.mtl	Loads the textures found in textures.mtl
v 57.389914 -55.250999 135.411484 v 136.788853 -53.865086 55.480659 v 134.832297 58.617899 55.480659 v 55.426518 57.231866 135.411484	The four vectors that represent the four corners of the image plane are listed in order of there creation and here numbered 1 to 4.
vt 0.000000 0.000000 vt 1.000000 0.000000 vt 1.000000 1.000000 vt 0.000000 1.000000	Text marked red is ignored by the parser and have in this case no effect on the object. So to improve performance we delete these lines.
vn 0.706999 0.012341 0.707107 vn 0.706999 0.012341 0.707107 vn 0.706999 0.012341 0.707107 vn 0.706999 0.012341 0.707107	
s off	
g pPlane8	The name of the new group.
usemtl birth	birth is the name of the material loaded from the textures.mtl library in this case it is an photographic image rather than a textural image.
f 1/1/1 2/2/2 3/3/3 4/4/4	Defines the face which in this case is a rectangle created by the vectors numbered 1 to 4 as listed in the top of this script.

The code above is one out of eight image planes that combined as one object makes up the image billboard shown in Illustration 4. It is the image plane in the centre.

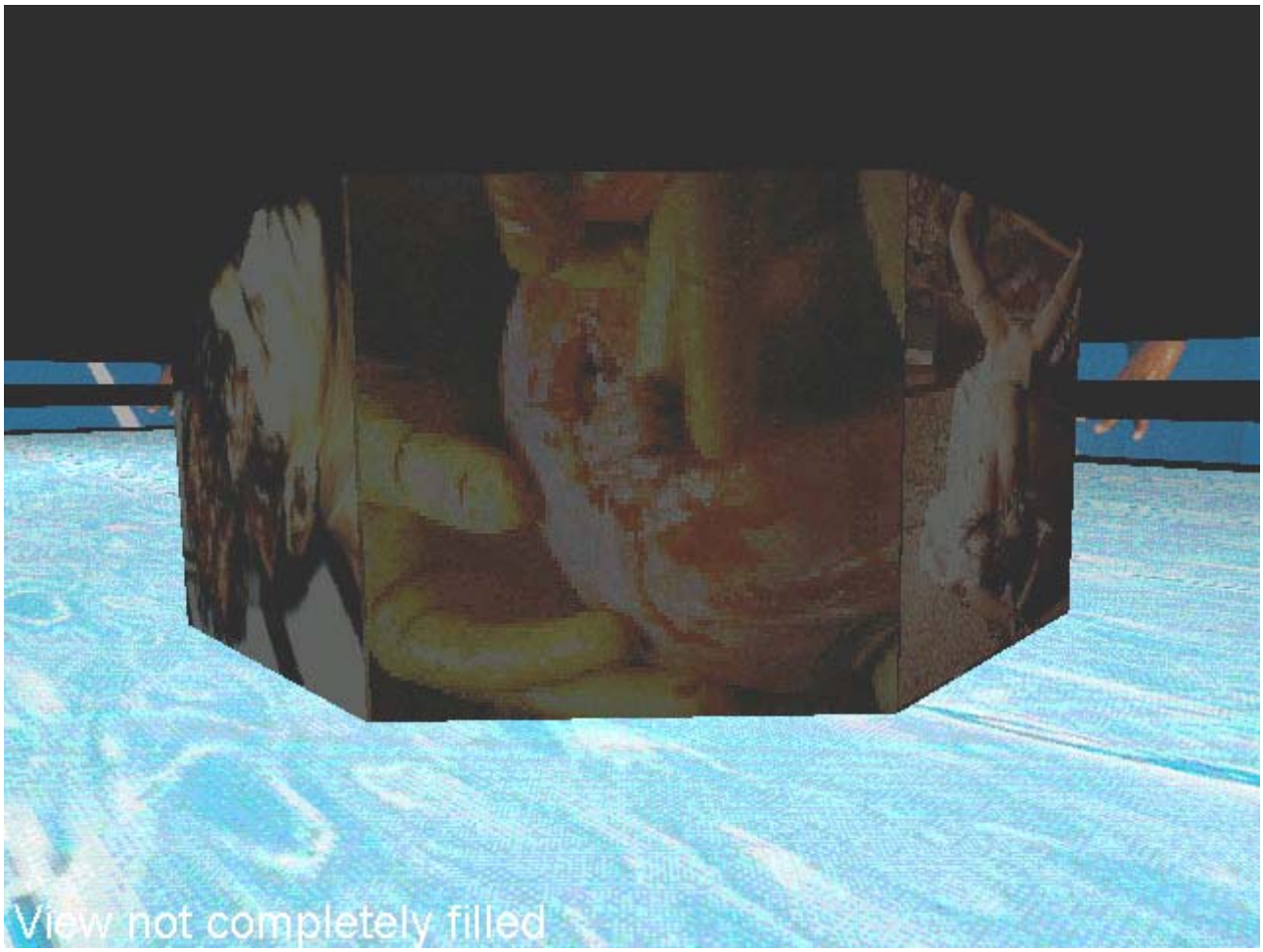


Illustration 5 – the result of the obj file just mentioned times eight

The mtl file format

When you convert an object created in Maya to an obj file you subsequently get an mtl file that contains all the data concerning illumination and texturing. The mtl file format is designed to define a broad array of materials e.g. reflective surfaces, bump maps, solid colours, textures etc and the file format therefore can handle a lot of information concerning the materials [Brackeen, 2004]. As an example we show how an arbitrary mtl file can look like.

newmtl flatwhite	newmtl states that new material is defined here and the name is flatwhite.
Ka 0.5000 0.5000 0.5000	Ka is the ambient portion of a material colour and contains RGB values.
Kd 1.0000 1.0000 1.0000	Kd is the diffuse portion of the material colour and is the most dominant colour.
illum 1	Illum is the parameter that contains the model of illumination, here it is a flat material with no highlight indicated by the number 1

The mtl file parser in our game engine is designed with the purpose of supporting texture mapping and therefore only recognizes the following two parameters namely newmtl and map_Kd. The file - textures.mtl is where all our texture is mapped and the file contains several pieces of scripts like this:

newmtl birth	Name of material
map_Kd Birth.png	The above name is mapped to the png image named Birth

In our example it is connected with the obj file in the first line of code by loading the mtl library textures.mtl and then the usemtl keyword points towards a texture named birth. The result of both obj and mtl files can be seen in Illustration 6.

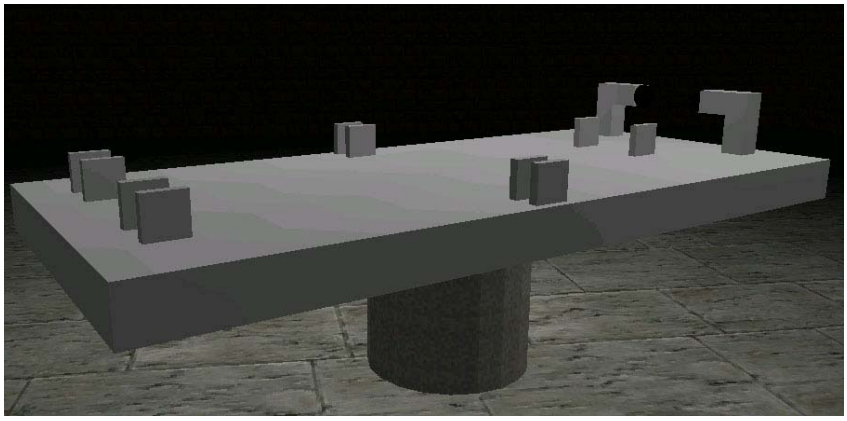
3.3.3 Models

Electric torture table:

The idea with this model is of cause to scare the payer. It idea behind the model is that a subject is supposed to be strapped onto the table with his wrists, ankles and neck locked to the table. The two

pieces of metal on the side of where the subjects head is are sort of teslacoils[9] which sends beams of high voltage from pole to pole. This would obviously be very painful.

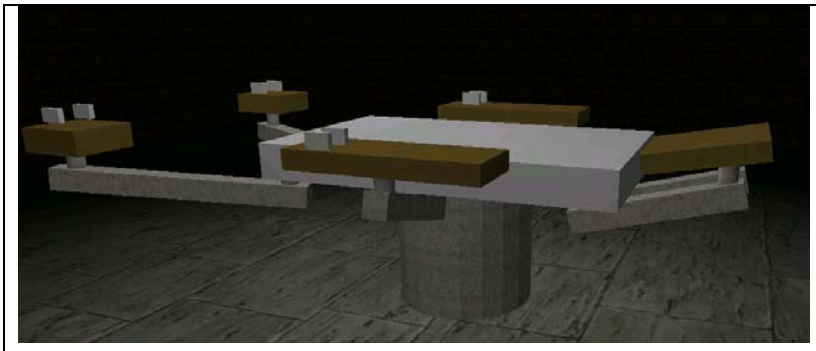
Together with the electric torture table is a switch which switches on and off.

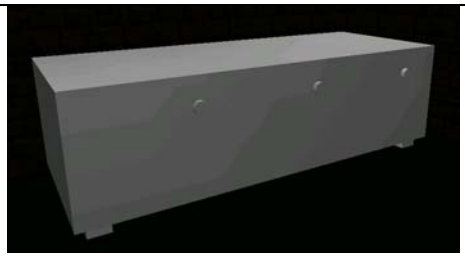


The surgery table:

The idea behind this model is that the subjects are fastened by the ankles and wrists. The main difference between the surgery table and the Electric torture table are that the subjects' legs are on separate platforms which can be moved around. This table is based on a delivery chair.
The surgery table is used to fasten subjects when doctors perform surgery, or when subjects refuse to take their medicine.

In the same room as the surgery tables there are storage units where doctors and nurses can store medicine etc.

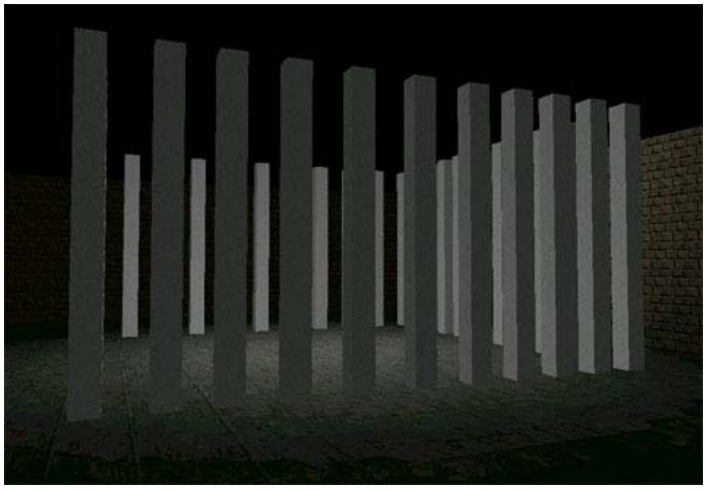




[9] Information about teslacoils can be found here: http://www.lod.org/teslacoils.html

The Jail

This is a model of a jail. This is where most of the committed are housed. The really crazy are in the rubber cells.



General furniture

We made the following models our selves because of the simple reason that most models on 3dcafe.com and sites like it, are too complex to use in our game.

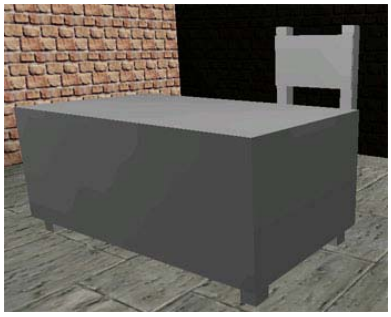


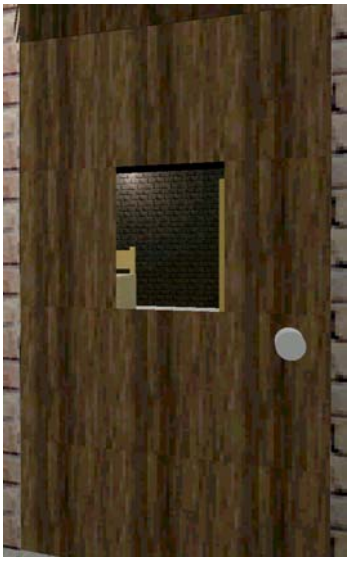
Table & Chair

Other models

Door

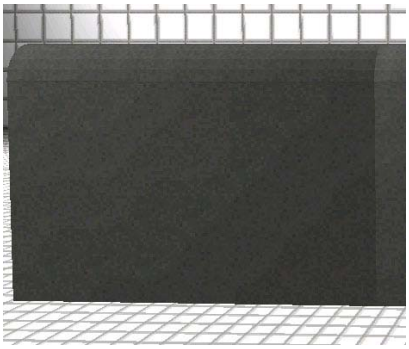
There are in fact three different doors in the game.

1. Simple door made of four cubes. Problem with this door is that the textures are placed on each cube, this destroys the fine wood grain in the texture.
2. Same as 1 but with an extra back so we can create two sets of textures on it.
3. Single cube which has a cut out. The difference is the increased number of polygons, but the texture is placed perfectly on this model.



Shower head

Shower room divider



3.3.4 Animating Objects

So far we only created static objects in the game. But there is some Artificial Intelligence in the engine we use. The function we use is the turret, which the author Brackeen included some examples of. We have modelled a security camera which tracks the player's movement. The "intelligence" is calculated in the bot.java under the 3Dshooter directory.

The math is pretty simple. The camera gets the player coordinate and turns the shortest way towards the player. The camera consists of two parts one part that is fixed to the ceiling and another that turns towards the player.

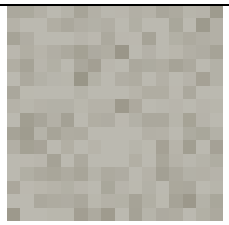
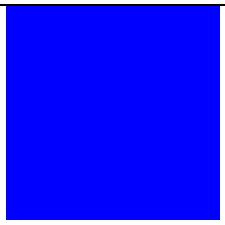
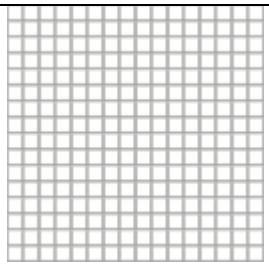
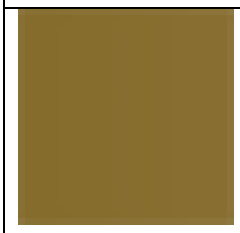
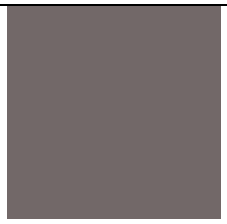
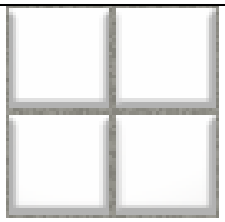
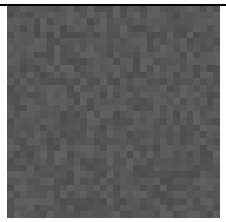
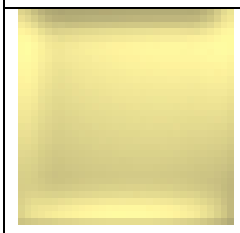
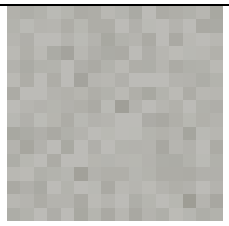
The implementation of camera is pretty simple. You first define the object like you normally do, by defining textures etc.
In DasGameTest.java you define a bot group then you place the object in the map and last you define which part of the object is the turret.

Textures
Most tings look very plane without textures. Textures give an object a completely new feel. Creating textures is a tough job when they are going to be tiled like it's done in our game. We made the simple textures ourselves. The more detailed ones we found on the internet.

We encountered some strange problems with the engine when importing textures. If we created a multilayered Adobe Photoshop file and saved the file as an PNG8-file using the save for web

function, the engine would give us this error: **`java.lang.IllegalArgumentException: LUT has improper length!`** After trying different methods of exporting to PNG we found that Photoshop probably has a small bug when exporting to PNG, we did a workaround in Photoshop and manually indexed the colour, then exported to PNG using the save as option and choose none interlace. After that everything worked perfectly.

Here is a list of the textures we made ourselves.

 light grey or chrome	 Metal	 blue	 Shower floor tiles
 Leather	 Shower head	 Shower room tiles	 Metal bars
 Padded cell	 Shower divider		

Here is the list of textures we used from the Internet.

			
http://www.webpagebackground.com/sample/lightwood.htm		http://www.planetquake.com/simland/pages/tpegypt/im	

		ages/mat/wood17.jpg	
			

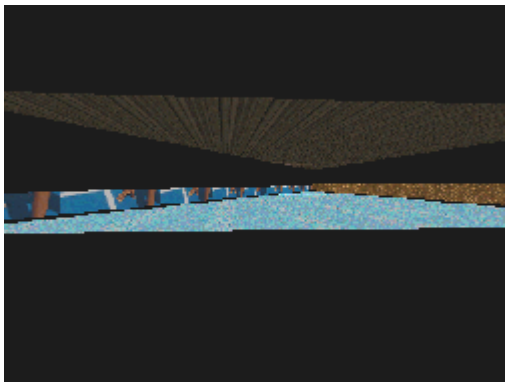
3.3.5 Implementation of our levels

3.3.5.1 The Portal

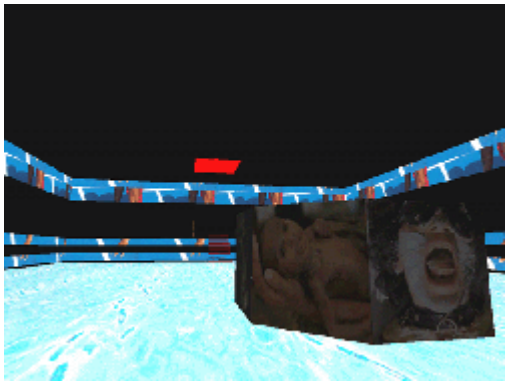
With the knowledge of how the maps in the 3D engine are working we set to produce A Portal-zone which would resemble a Rhizomic environment. The task at first seemed straight forward but we did not anticipate the limitations in the 3d engine regarding the implementations of large rooms.

We will illustrate the process with a number of screenshots from the different maps leading up to the result implemented in the current version of the game.
Below and on the following pages you will find the screenshots; all named and numbered according to the associated map-file, which can be found on the cd-rom attached to this report.

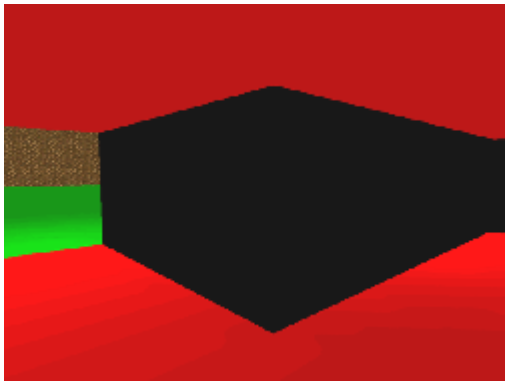
Screenshot 1: basic.map



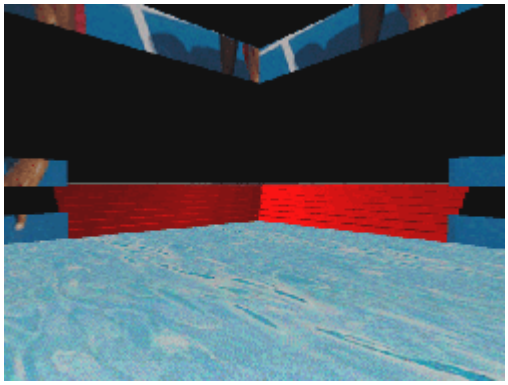
Screenshot 2: basic2.map



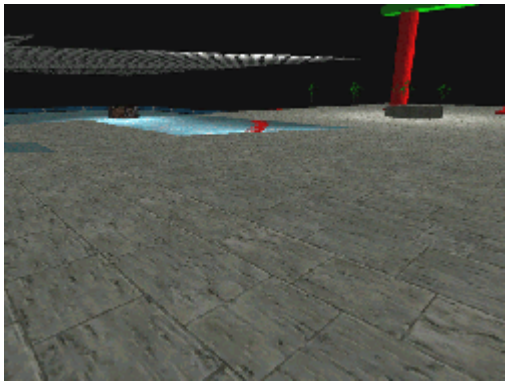
Screenshot 3: basic3.map



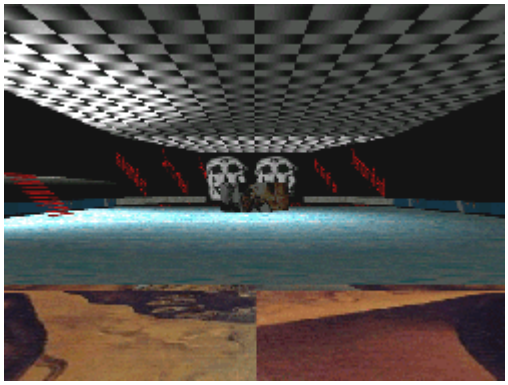
Screenshot 4: basic4.map



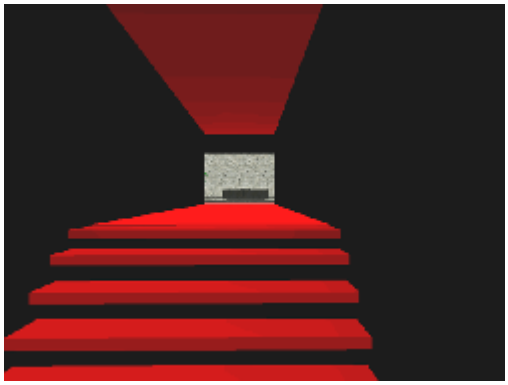
Screenshot 5: basic5.map



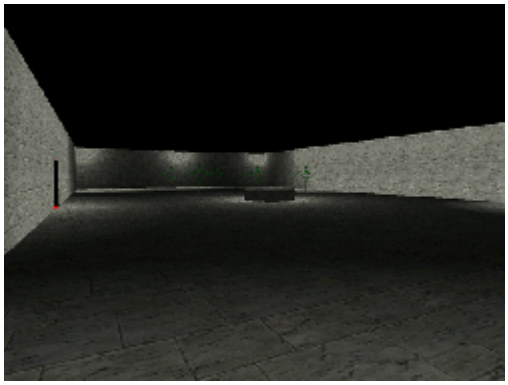
Screenshot 6: basic6.map



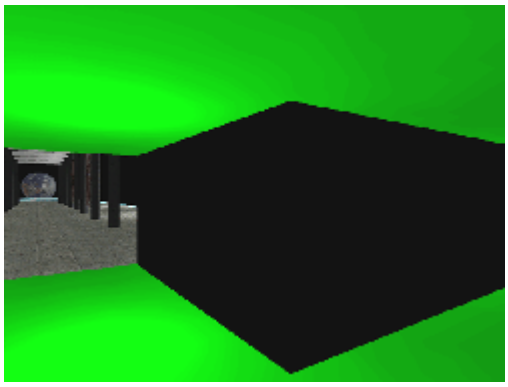
Screenshot 7: basic8.map



Screenshot 8: basic9a.map

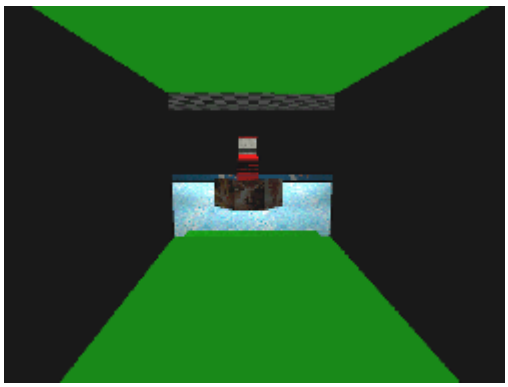


Screenshot 9: basic9b.map



Screenshot 10: basic9c.map

Screenshot 11: basic9d.map



Screenshot 12: basic9e.map

We have to different threads in the development of the portal; one is actually a result of the other we have plateau one and plateau two and that is in total agreement with the theories behind rhizomes which generally refer to a structure as build upon plateaus.

The first plateau is illustrated above in form of screenshots from the maps basic through to basic9. We will briefly describe what changes we made from map to map.

The map of basic.map is basically a test of how to create a simple, square, room with two different textures green and red used for ceiling, floor and walls. On top of that we also tried to make 'holes' in the walls so the player could see out in the black void.

In the map of basic2.map we have extended this knowledge for the creation of a triangle-shaped room with four different kinds of textures: floor ('water'), walls (default picture from windows package and stones) and ceiling (wooden planks).

The basic3.map is where we started working with object files. The object (an octagon, named QuadOctBig.obj) has an image as texture on each side. In the background of the screenshots you can vaguely observe a staircase that is used to connect adjacent rooms with different floor levels to one and another.

In basic4.map we dismissed the idea of different floor height and created a room removed from the 'main' room that connected to via a tunnel. In the shown screenshot we have walked into the tunnel and are almost through and can see into the 'hidden' room; which has a green floor and stonewalls. In this map test we also test the way the point light source is working. An example can be seen in the screenshot from basic4.map in the middle of the right hand side, where there is a 'lighter' spot in the corner of the red floor.

In basic5.map we went back to the idea about rooms on different levels in conjunction to each other. The test still showed that the stairs were not accessible because of collision detection. We chose to dismiss the idea about the tunnel connected rooms because implementing rooms with walls as such is not in keeping with the idea behind Rhizomes.

We continued work on the idea of different level rooms in basic6.map and we 'overcame' the previous non-existing possibility of going up a staircase. The stairs are build with rectangle objects with space in between the steps which meant that we overcame the problem with collision detection. The screenshot for basic6.map is showing the view from the north-west corner. It shows the plateau where the player looks towards the staircase straight ahead. Once again we have experimented with the point light to create interesting atmospheric surroundings.

In basic8.map we decided to stick with the plateau on the left/west of the main room. We also added two rooms in conjunction with the main room; these became pentagonal and to allude the mood of Salvador Dali surreal mind. The staircase leading to the west room creates problems when entered (especially not when seen on a computer with 'only' 256 Mb RAM) because of the heavy update load of 'complex' graphics. This problem we solved by shielding the staircase in a room, which can be seen in the next map.

The end of the first plateau experiments is the basic9.map, which showed us to what extend we can drive the 3D engine. We quickly discovered that one of the mayor disadvantages is that the engine works perfect when creating small enclosed rooms but performs rather poorly when we need large open and connected spaces. When we started work on the Portal we had an initial idea about creating large nested rooms, by doing that we forced many crashes and slow downs of the 3D engine. This we did especially in the last part of the first plateau experiments where we pushed the 3d engine to the limit. We have chosen to show five screenshots because of the effort that was put into this map where we created an immense zone, which were – at that time – most likely to be the 'end-result'.
To conclude the first plateau we will briefly say that this experiment was probably the most successful one in the long row; mainly because of the rather interesting east room with the pillars and the gallery inside which could be entered by the player.

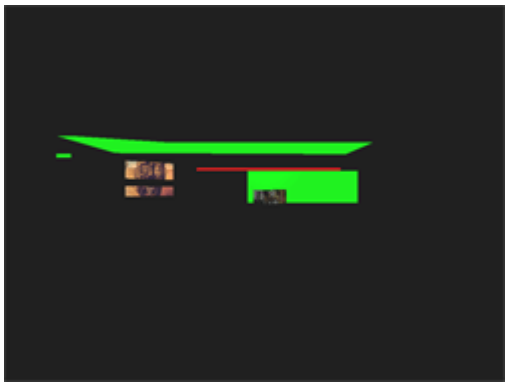
Fortunately we did uncover a new approach to the Portal which we previously mentioned as the second plateau.

The literally hyper-jump we did from first plateau to second plateau can be seen as a mayor shift in considering our conceptual starting point for the Portal in general. We, so to speak, erased the black

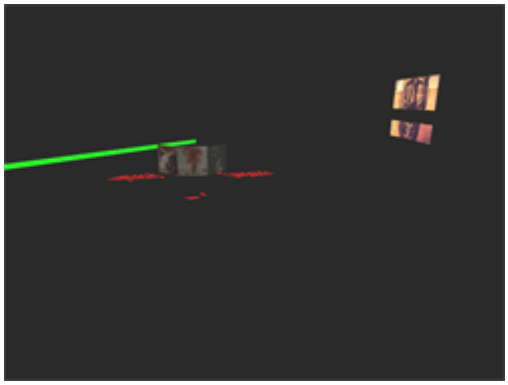
board and started out from scratch with the black void; this black void you get when you don't create any rooms.

Below you will find some screenshots of the second plateau that illustrates the progression and development of the 'end-result'.

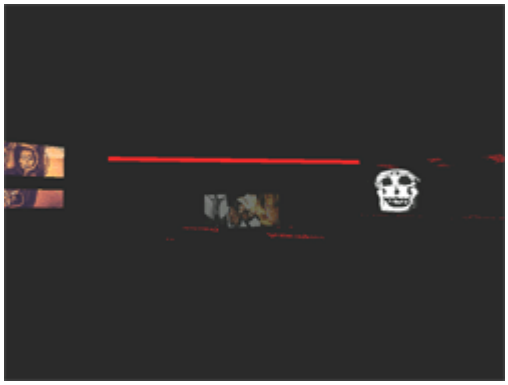
Screenshot 13: NewStart.map (a)



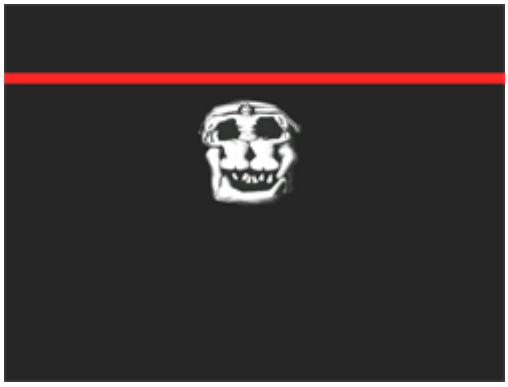
Screenshot 14: NewStart.map(b)



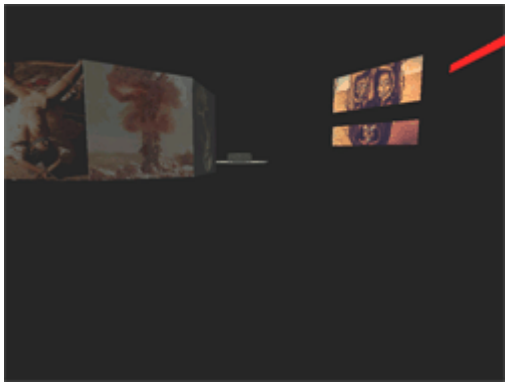
Screenshot 15: NewStart2.map (a)



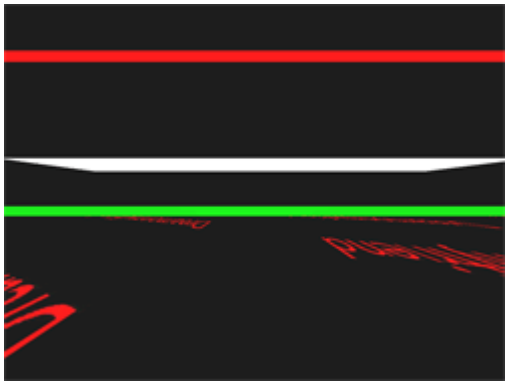
Screenshot 16: NewStart2.map (b)



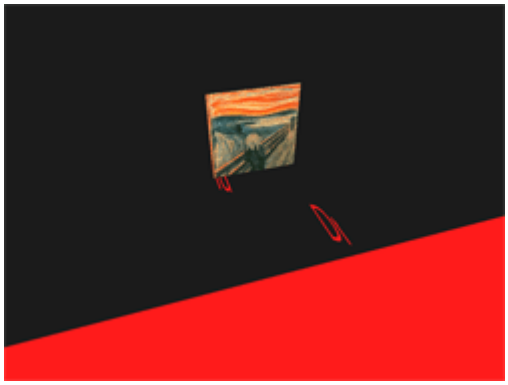
Screenshot 17: NewStart3.map (a)



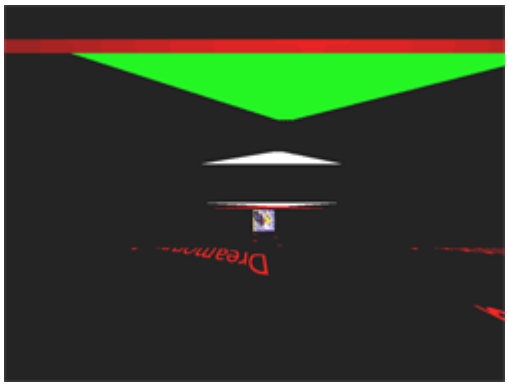
Screenshot 18: NewStart3.map (b)



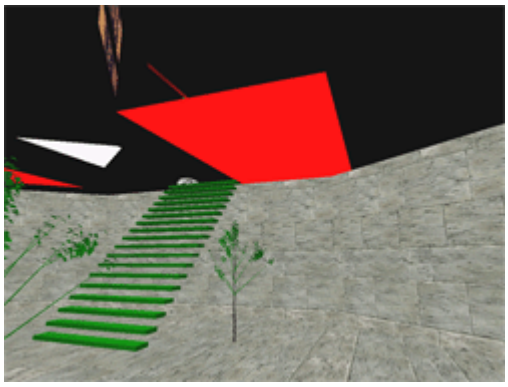
Screenshot 19: NewStartAgain.map (a)



Screenshot 20: NewStartAgain.map (b)



Screenshot 21: NewStartAgain2.map (a)

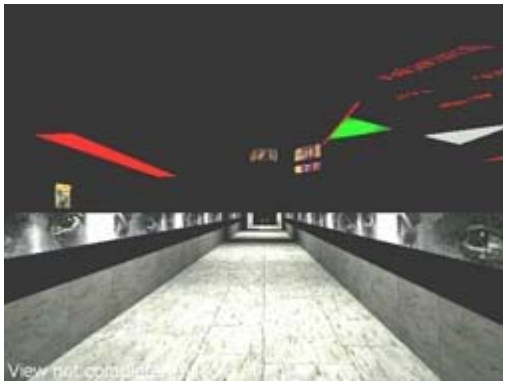


Screenshot 22: NewStartAgain2.map (b)

Screenshot 23: NewStartAgain3.map (a)

Screenshot 24: NewStartAgain5.map

Screenshot 25: NewStartAgain6.map (a)



Screenshot 26: NewStartAgain6.map (b)

In the first experiment NewStart.map we create a ‘simple’ universe where the black void or emptiness was a mayor part. The map consists of four ‘simple’ rooms with objects also seen in the previous developments: a Dali-painting and the octagon. What is interesting in this first attempt to – really – incorporate the ideas concerning Rhizomes is the red line in the ‘middle’ of the universe: when entering the area around the line the player will be ‘elevated’ up in the space that the line occupies.

Then in NewStart2.map we incorporate two new rooms: a room with the painting of the Dali skull – as seen in Screenshot 7, and a room with a text-texture, saying ‘Dream On’; mapped both to the floor and to the ceiling.

In the map of NewStart3.map we did implement a tiny room with a well and with point lights scattered in the little room.

The new elements in NewStartAgain.map are the following three elements:

A new room on top of the red line room;
A ‘hallway’ room ‘underground’ leading to:
A room with the painting of Edvard Munch “The Scream” (1895)

In the next experiment in the second plateau NewStartAgain2.map we made it possible for the player to walk in elevation. On top of, or rather 'down under' we created a square room beneath ground level with tree and a green staircase leading up but with no escape.

Going on to the next step in the evolution of the Portal, NewStartAgain3.map, we implemented a new room – the villains room – which is a simple long room covered with stone texture and six pictures of the biggest villains in newer history (Pol Pot, Adolf Hitler, Idi Amin, Saddam Hussein, Mao T'sung and Josef Stalin. The thought behind this room was to illustrate a fear room in the Portal zone. (It is open for debate wither Mao belongs in this company)

The big changes in NewStartAgain4.map are the adjustments of the point lights scattered around in the Portal zone's different rooms, and a long, long room with pictures on the walls and a big fist in the end.

The last two maps NewStartAgain5.map & NewStartAgain6.map are the final experiments with the Portal zone the difference between these two maps are found in the east room where the room in map5 is less complicated and therefore does not max out the 3d engine. These two maps are also our default maps. In the final hand-in code they are referred to as Portal1.map & Portal2.map

In the map of NewStartAgain5.map we made an experiment by incorporating one of the rather complicated rooms from the first plateau. This made the game crash – on a 256 Mb RAM machine – because of the heavy load of object, which made the re-drawing process very slow and made the game go haywire if the player did a too sudden move.

The 'final' map, NewStartAgain6.map, is a summary of the experience gathered: We have taken all the 'good' things from the other experiments and put these together in a Portal zone map which is as near as we can get to the ideas of Rhizomes at the moment; the mayor limitations lies in the 3D engine of our choice.

How we can overcome these limitations we will further elaborate in the sixth chapter Future development. Here we also cover the missing links in the handed-in game: sound, music, AI, video

sequences; and also uncover all thoughts about how the game could incorporate the ideas of hyperfiction, virtual reality gaming and network gaming.

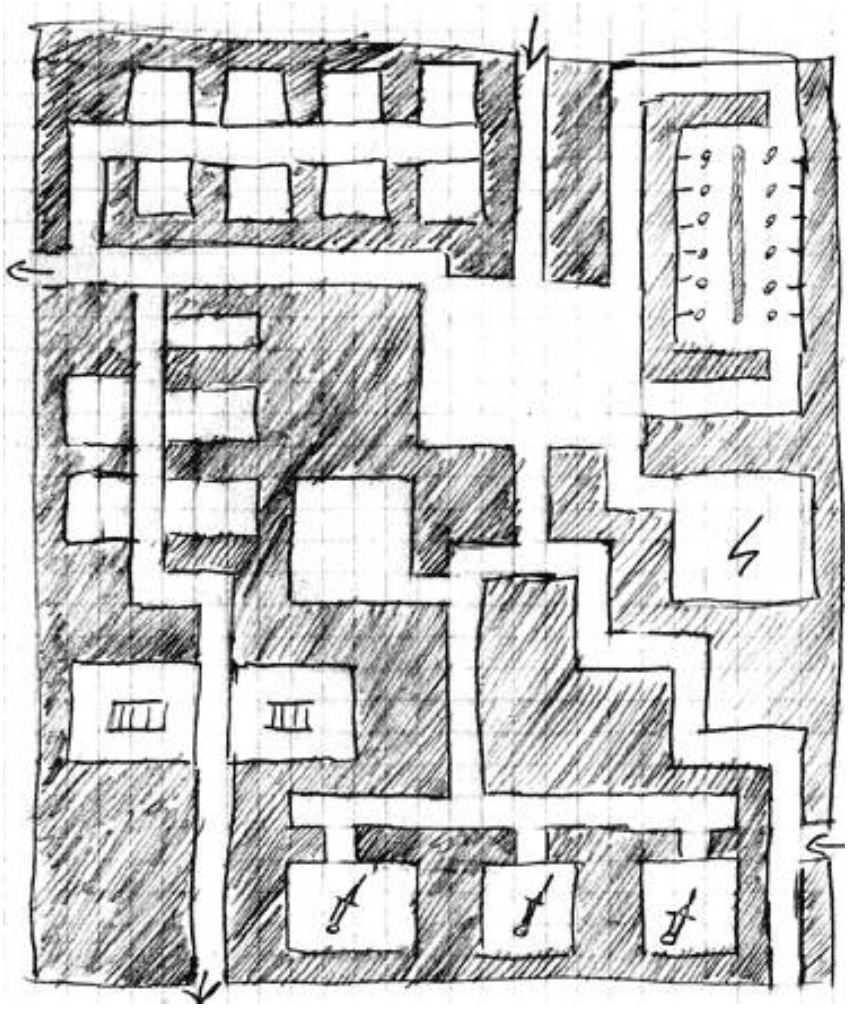
3.3.5.2 The Labyrinth of Fear

This map was made in several steps.

Step 1 – Idea

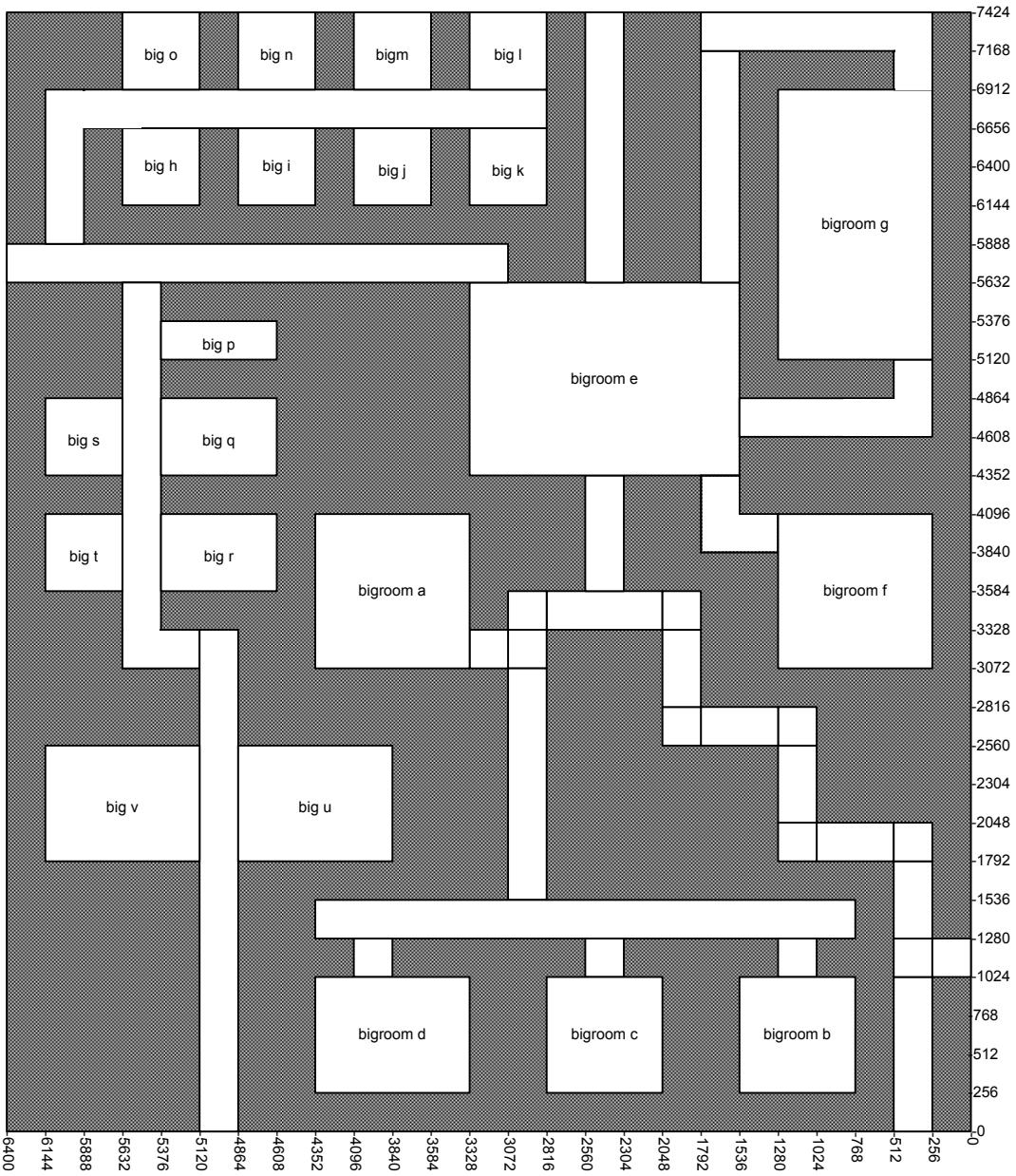
The idea of this was to lead the player through a maze and scare him as much as possible. The concept is described in more detail under section 2.5.3.1

Step 2 – Visualisation



This shows a rough sketch of the layout of the basement level of the insane asylum. The sketch were made on a 5 mm. squared paper which gave us the possibility to create a scale model of how the maze was supposed to look.

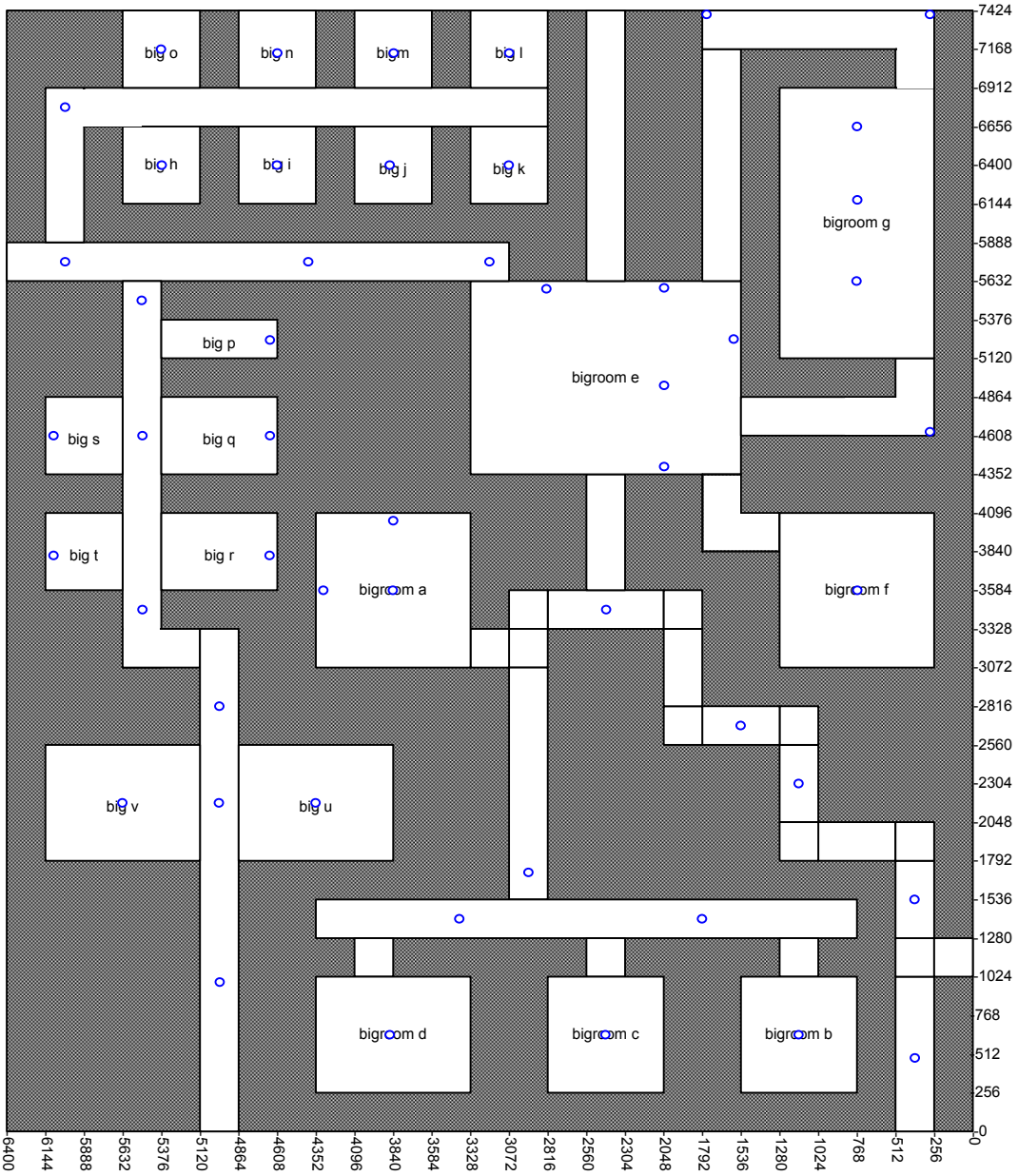
Step 3 – Implementation of level



This is a schematic of how the map is defined in separate rooms. Each white square is a separate room in the map file. Ex. Code for the room from in the lower right corner looks like this:

```
# room1a
ambientLightIntensity .03
room start
usemtl roof1
floor 0
usemtl roof2
ceil 256
usemtl wall1
wall 0 1024 0 0
wall 0 1280
wall 256 1280
wall 256 1024
```

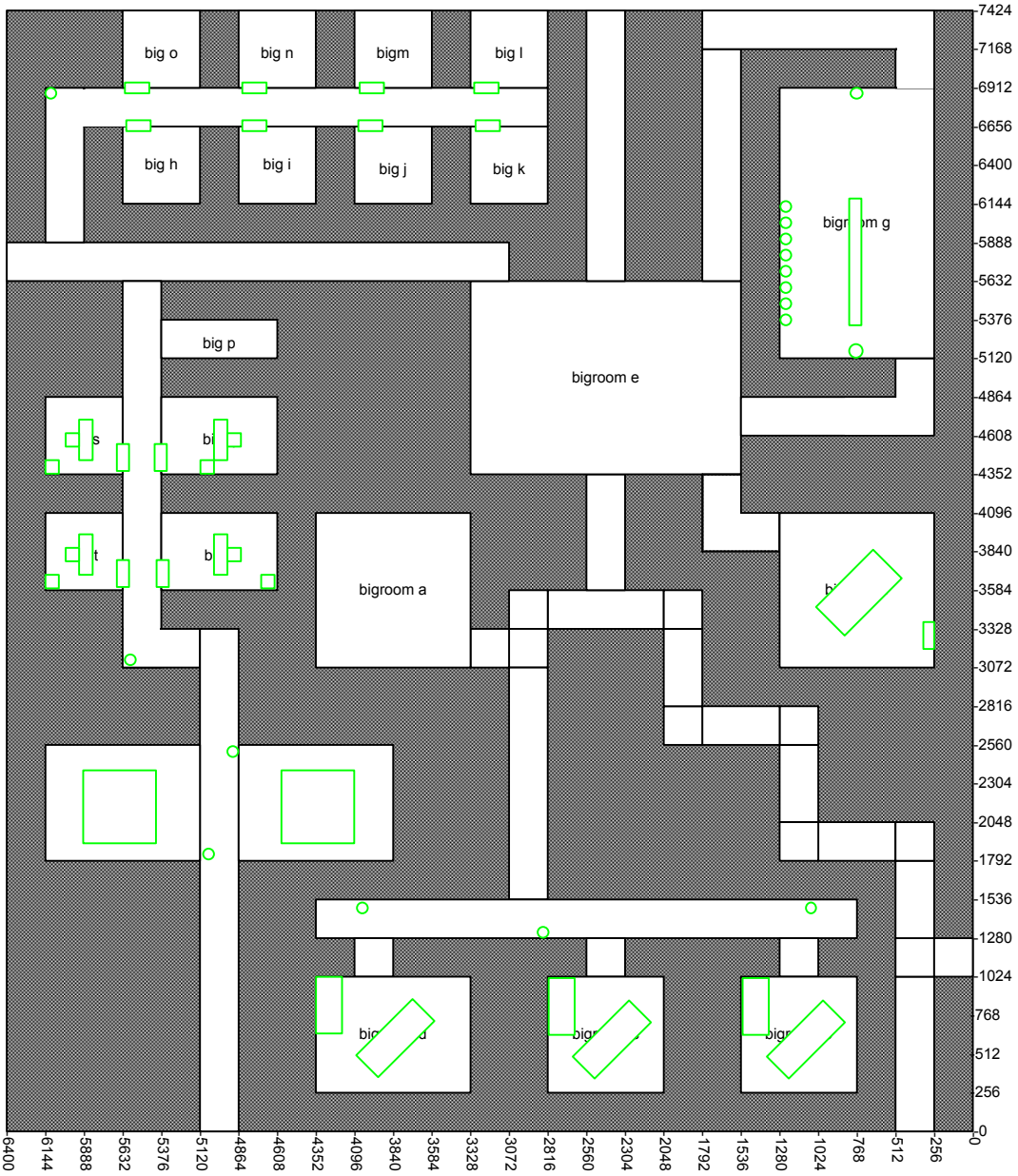
Step 4 – Defining lights



The same map but with small circles which symbolize point lights in the game. Code wise the light is define by a set of coordinates and extra values, for more information look at section 3.3.1 example of the first light in the lower right corner of the map:

```
v 384 256 512
pointlight -1 1 384
```

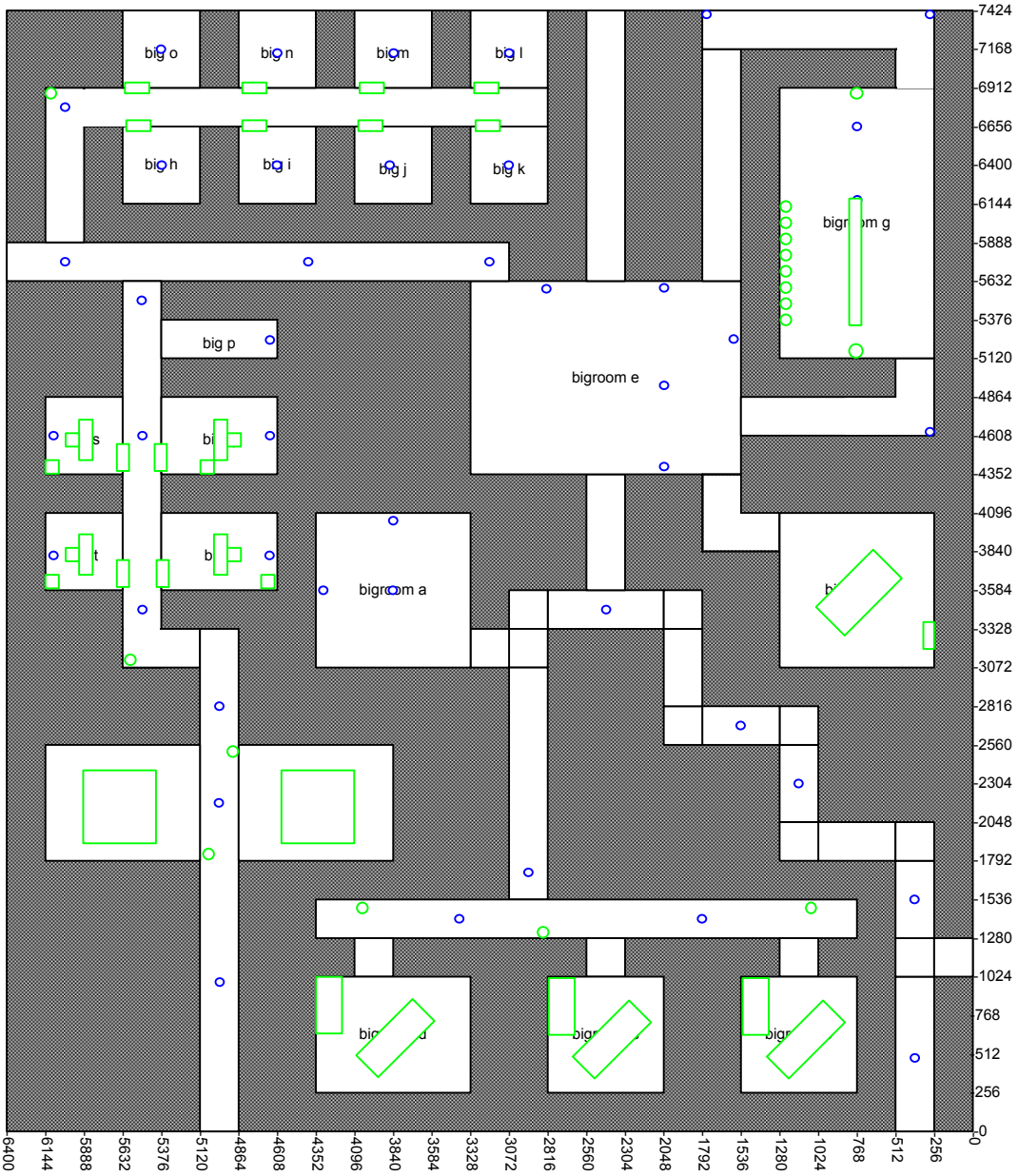
Step 5 – Placing objects.



The green squares and circles represent objects placed in the game. The objects are placed like the lights in the game example the table at 768x3584:

```
v 768 60 3584
obj null electrobord.obj -1 5.14
```

The final Map.



Screenshots of the labyrinth of fear

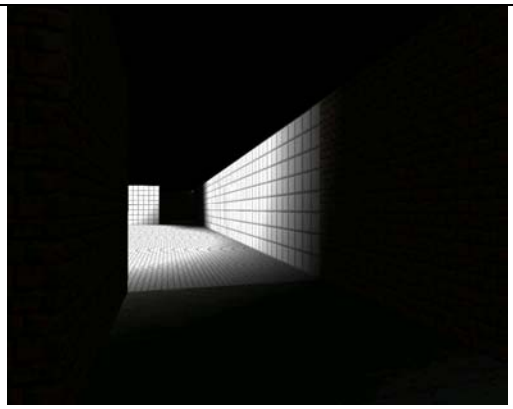
Start of the labyrinth

Go left or continue forward

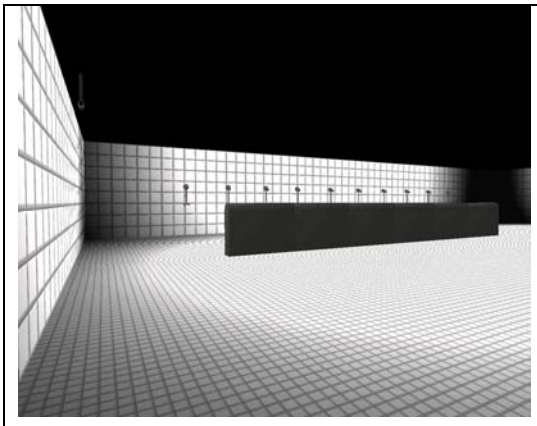
The big room

Electro shock treatment

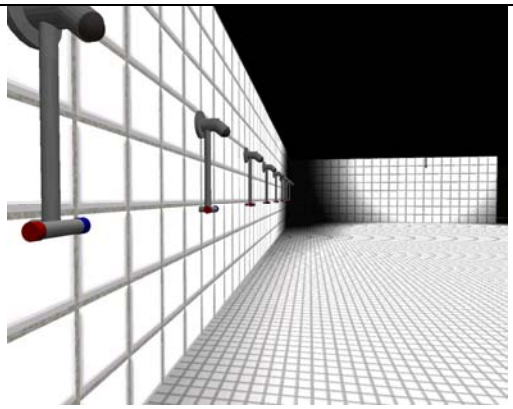
Pathway to the showers



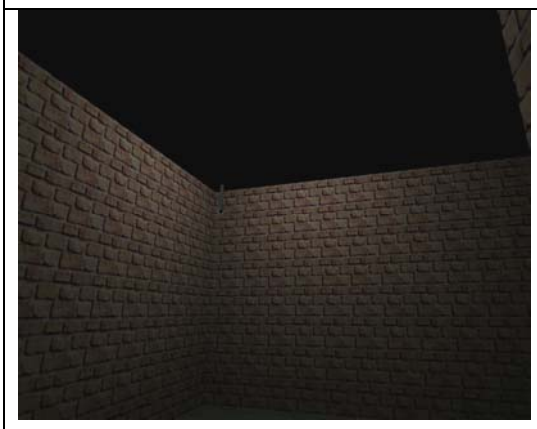
Entering the showers



The shower room

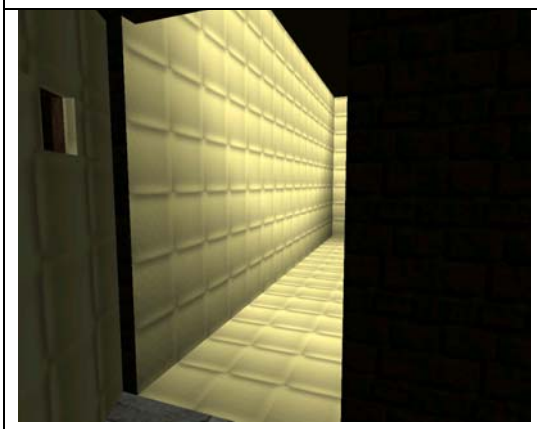


Close-up of the showers



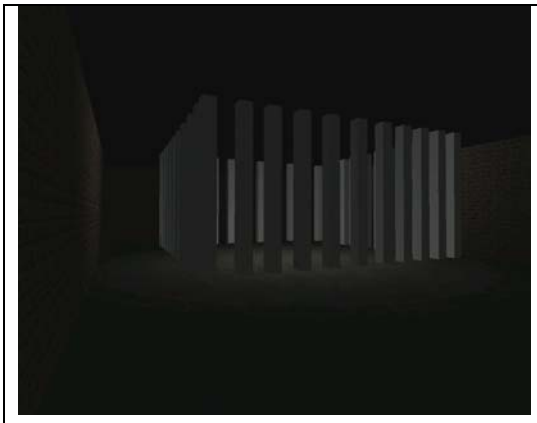
Security cam watching you

Doorway leading to the rubber cells



A look inside a rubber cell

Looking through a office door



The jail

Surgery table

3.4 Other elements in the game

Third party elements in the game

There are several reasons to use third-party elements in our computer game. The main one is to ease the load on what we have to develop our selves. In case of the level about fear, the insane asylum, we have to create an environment that the player recognise, this is done by using an environment people know from movie and have a rough idea how it is in real life. By incorporation movie clips, sound effects etc. from movies or television, the player will recognise some of them and this will affect him.

There is one important thing we need to know before using other people's material: The copyright law. We know this and have decided that our game is a limited concept game and therefore will only be distributed to a limited number of people. This dose not mean that we can use copyrighted like we want, but rather that we will use it for demonstrating our idea, and should a full blown game be made from our work, copyrights should be taken into account.

Code wise we have used a lot of third-party code. Our 3dgame engine came from a book. Other third-party-code we use is the code which we use to show video clips on 3d surfaces in the game. The code was made by sun to demonstrate how versatile their JMF and J3D was.

3.5 Evaluation

Due to the limitations in the 3d engine we did end of with a lot of compromises and short comings when it came time to implement the different ideas.

One on going problem was the amount of polygons the engine is capable to handle. This had a profound effect in the development of e.g. the portal where the frustration rose proportionate to the exposure of the les than perfect situation regarding the performance of the 3d engine. It is in its place to mention though that the difficulties related to the first versions of the portal led to the result that we find closer related to the theme of rhizomes in second version of the portal.

A source of problems with the 3D engine stem from the fact that the engine is a software render and does not utilize the 3D graphic accelerator hardware instead it relies solely on the CPU.

Of course it is the responsibility of the project group to compensate or ratify the project when technical obstacles present them self. Regarding this matter there is no doubt that the project has lacked the proper management in order to compensate and steer the project towards acceptable solutions.

4. Critical analysis

4.1 Hypermedia games

4.1.1 Theoretical background

There doesn't exists any complete theory about computer games [Jesper Juul, 1998, p15.], we have chosen to see computer games as texts and analyzable objects, according to that, we have chosen to use the theories we have obtained in our hypermedia lectures to analyze, structure and develop our game, *SleepWalk.*

What are the relations between hypertext & computer games?
Allmost any non-linear text has the same construction, it consists of a program, and material and an output *(look at the model below)* [Jesper Juul, 1998, p39.].

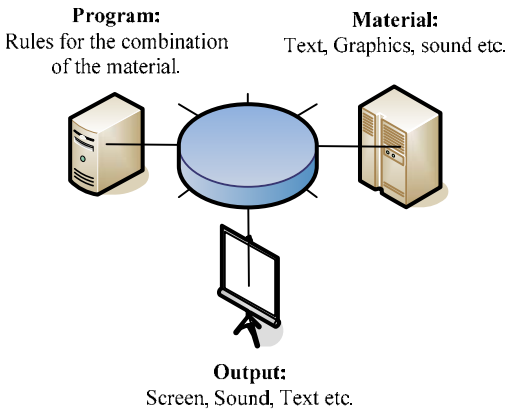


Figure 1 - Universal model of non-linear texts

- *Program (engine):*
  - The program consists of a set of rules and functions that manage the combination of the materials. These rules and functions also handle what the reader/player have access to and what he will be presented for.
- *Material:*

- The material can be all most anything, in *Sleep Walk* we have focused on e.g. video, sound, lighting, objects and colours. By combining these materials in our program we are supposed to create our game maps *(fear, anger, joy greet)*[10].
-

- *Output:*
  - The output presents the combination of the materials rendered by our program.

The hypertext theory is based on pieces of text presented in a linguistic way, computer games on the other hand are based on graphics. The relation between the two media is that both of them are an interactive event, which is based on a set of defined rules [Lindley, Craig A., 2002,p4]. In both hypertext and computer games the players/readers input influence the output, furthermore the player must be active, make choices and use his imagination to keep the game running.

Both hypertext and computer games consist of three levels [Arcadia, Falcone, 2003]:

1. The text as written or "engineered" by the author
2. The text as presented, displayed, to the reader
3. The text as constructed (mentally) by the reader

To illustrate the players role in a hypertext or a computer game look at the model below.

[10] For further information - Read "Implementation of the theme" page xxx.

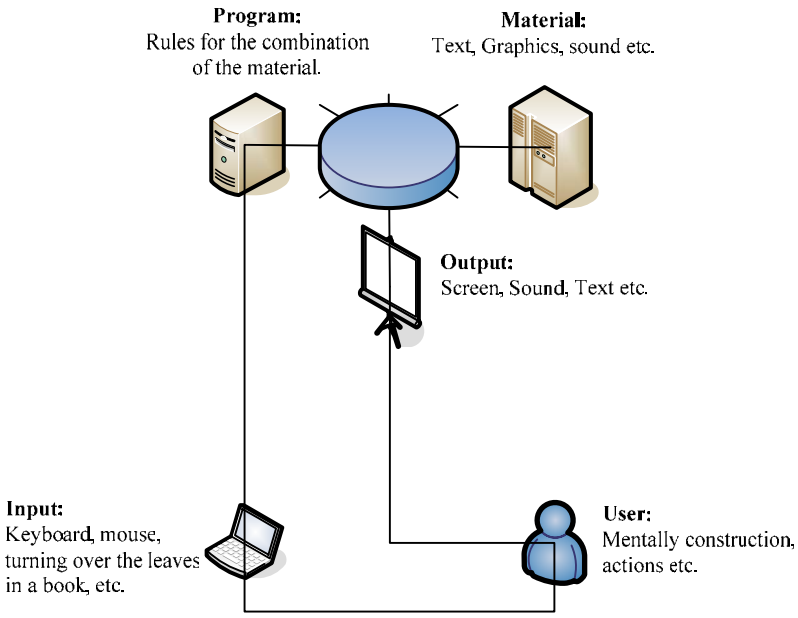


Figure 2 - Reading of a non-linear text.

As figure 1 this model consists of a program, materials and an output. But in this model we have illustrated the interaction between the program and the user. The program combines the materials and presents an output for the user, according to the users mentally construction of the material he will react, his reaction caused an action that lead to an input, the program will analyze the input and combine new materials for the output and so forth.

This model supports Espen Aarseths terminology on cybertext which assumes a feedback loop, where the user make choices based on the presented combination of the materials, these choices creates a new combination of materials and so on.

In a time based computer game *(such as action games)* the program continually will process the users input, but in stationary games the program waits for the user inputs to process new material *(text)* – no user inputs, no game/text development.

In our research for *Sleep Walk* we played the classical stationary hypertext *(hyperfiction)* game Zork.

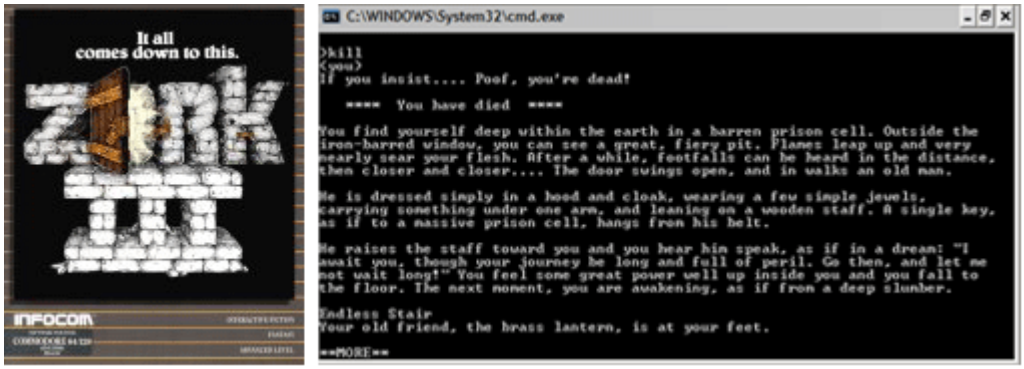


Figure 3 - Cover & screenshot from Zork

But what separates computer games and hypertext from non-linear books?
Both computer games, hypertexts and non-linear books are based on interactivity the main difference is the treatment of the user input, in a non linear book it is the reader who treats the inputs, in a computer game or a hypertext on the other hand, it is the computer that treats the inputs, a big advantages of computed processing is that the computer can combine different materials to a new output.

4.1.2 Advantages and disadvantage in hypermedia games

Why develop a computer game? It is much easier to write a book! We have classified books and computer games into two different tools:

- Books:
  - Books are written to tell stories, using:
    - Narrative structures
- Computer games:
  - Computer game are developed to entertain, using:
    - Interaction
    - Freedom to explore
    - Challenging the player
    - Judge the players performance

Advantages in computer games

In our situation and according to our ideas of the development of Sleep Walk, a computer game seems the only right way to present it. *SleepWalk* doesn't tell a story in a traditional sense, the mission for the player is to explorer the 4 different themes.

The structure of *Sleep Walk* is complex, in *Sleep Walk* there doesn't exist any structured pattern for the game play and the narratives. The complex structure is supposed to influent the player not being in control, just like you can't control your dreams.

- *You can't learn how to play SleepWalk!*

Sleep Walk would not work as a book, movie or even a hyperfiction text; because it is our goal to influence the player with our materials which consists of video clips, sound clips, colours etc. and it would not work to just write it in plain text.

Disadvantages in computer games
Computer games don't support good storytelling[11]. In our case it isn't that important because we don't focus on the narrative.

Do you want to tell a story? Write a book!

Another disadvantage in computer games is that it requires great skills in:

- Programming
- 3D modelling
- Sound design
- Etc.

4.1.3 Implementation of the theme

We have used the theories from hypermedia to develop our game maps and to structure the game in a non-linear fashion. On one hand we have had a lot of ideas that needed great skills in the field of

[11] For further information about narratives in computer games please read the appendix "Narrativs in computer games?".

java programming and at the same time we have had a lot of problems in the implementation of the various ideas.

4.2 Technical discussion

The engine we are working with can of cause be compared to other engines. According to the author Brackeen it is like Wolfenstein3D[12] but with better textures. The engine is based on java, which gives advantages and disadvantages. Some of the advantages are cross platform compatibility, the ease of modifying the code. Disadvantages are slow performance compared to games programmed in C++, programs made in java need a java virtual machine to be executed.

When we compare the genre of out game to other genres there's no direct comparison. But we can compare parts of our game with other games.
The basic navigation is like your standard 3D-shooter. The overall navigation is more random as is some times the player chooses where he will go, and other time he is forced in a direction or moved to another place in the game.
A comparison with this could be in Diablo 2[13], where it's possible for the player to jump between worlds using the waypoints the primary difference with our game is that the player has no idea where he is and is not presented with a map of the levels.
The insane asylum level can to some extent be compared to the start of Max Payne 2[14], or the game American McGee's Alice[15]. In American McGee's Alice the player wanders around a strange world without any idea of the goal of the game.

4.3 Human Computer Interaction (HCI)

When assessing a computer games qualities towards Human-Computer Interaction (HCI) you have to take many elements into consideration. We have chosen to deal with those two elements we find

[12] 3D realms 1992 - http://www.3drealms.com/wolf3d/

[13] Blizzard 2001 - http://www.blizzard.co.uk/diablo2/

[14] Rockstar Games 2003 - http://www.rockstargames.com/maxpayne2/

[15] EA Games 2000 - American McGee's Alice

most applicable for the game *SleepWalk;* namely *User interface* and *Usability*.

To assess *SleepWalk* as a 3D game, from the point of qualities within the area of HCI, can be done in the best way by opposing the game to another (3D) game. We have chosen the game *Myst III: Exile* [Ubi Soft (r) Entertainment, 2003]

4.3.1 User interface

The user interface of the game *Myst III: Exile* is quite intuitive and has according to Murray Peterson has "*node-base movement, with full panning viewpoint at every node."* [Peterson, 2002, /myst3.txt] The node-based movement refers to the way the player can navigate in the game; the player can only go where there are (active) nodes to be found. At these nodes the player can pan in the picture in a full 360 degrees viewpoint.

In the game *SleepWalk* it possible to navigate anywhere in the zone of the Portal; in the matter of the other implemented zone *The Labyrinth (fear zone)* this is not the case: the player is limited to go where there are rooms.

The user interface in Myst – see illustration 7 - *Screenshot of the user interface in* SleepWalk *and* Myst III: Exile - is intuitive in the way that it gives away what the player can do/are supposed to do in the game: The mouse cursor has been replaced with arrow and a hand telling the player which ways she/he can go and what elements are active and available for interaction. This is opposed in *SleepWalk* by the lack of plane navigational hints that lead the player where he might/ought(?) go in the zone and to where the hot spots are located. For the purpose of comparison we have opposed the interface of *SleepWalk* aside with the interface of *Myst ///: Exile* below.

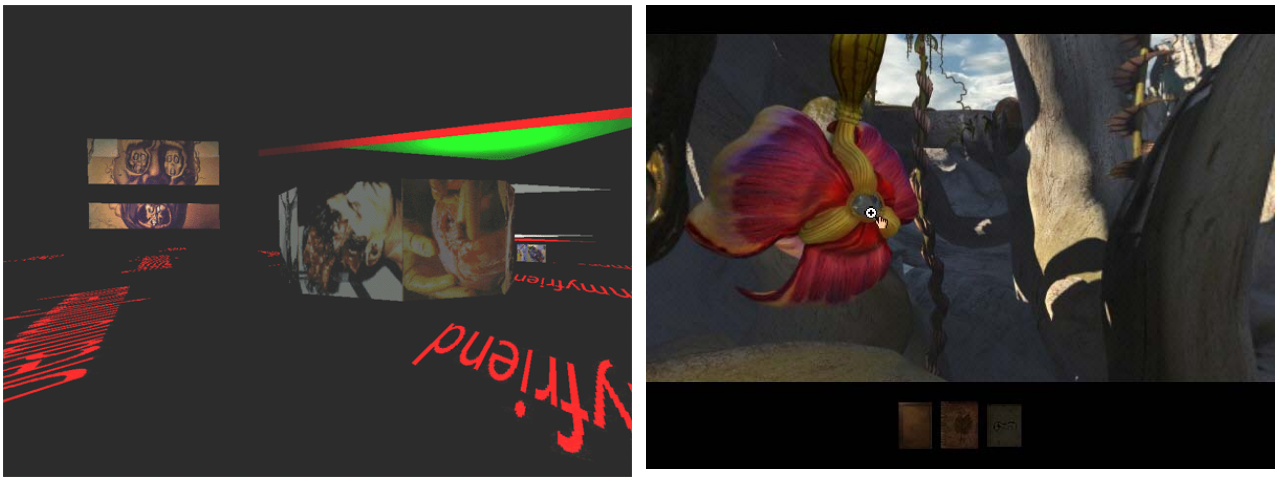


illustration 7 SleepWalk interface opposed to Myst III: Exile

As it is seen on the screenshot of *Myst III: Exile* the player has the possibility to guess what he can do in the game: where there are hot spots to encounter, story to read, help to get etc. There is helping-hand in *SleepWalk*: there are no hints at all, the interface is stripped for virtual any help the player might be in a need for.

This is in opposition to the fact that the user interface in *SleepWalk* is quite simple and straightforward intuitive in the sense of a first person perspective game. That is the most used movements: forward and backward with the up- and down arrow keys, panning freely in the game with the mouse and 'escaping' the game with the 'esc'-button. The 'hidden' buttons are not so obvious for the player because the are not essential for playing the game: the space bar are used for jumping and '-' and '+' for minimizing and maximizing the screen size.

There are at no point, as in *´Myst III: Exile,* no visible connection between the player's interaction with the environment and the outcome. In this case we are referring to the – suppose-to-happen - changes in the game; moving to another zone. The only way the player gets the impression that his action is leading to a re-action is by the meter; as described in the conceptual section in chapter two. This feature has not been implemented in the hand-in version, but will perhaps be implemented in a later version. The meter in the interface gives the player a supposition that the interaction taking place in the game has an impact of where and what he might experience in the game. This is to an extend true: the player's interaction *does* have an impact on the 'end-result', but the player cannot decide what these results should be.

This has a lot to do with the next paragraph where we analyse the usability of the games.

4.3.2 Usability

Before doing an assessment of the usability in the game *SleepWalk* we must first point out what usability actually is.

According to one of the big guys in the field of usability it is *"...the capability to be used by humans easily and effective..."* [Richardson et al., 1991, p. 22]. Where *easily* means that it will be assessed to a specific level and *effective* is the assessment of the human accomplishment to a specific level.

With this terminology stated we can easily see that the game *SleepWalk* are lacking usability.

Be holding the conceptual thoughts about the game up against the actual game you will see that the game is true to the concept: the player have absolutely no clue of where and what he has accomplished up till this very minute.

The only thing you might argue is usable for the player is the meter showing something is happening while playing the game; but then again this is only for the sake of sighting. The meter does not tell the player anything at all and therefore has no value in the matter of usability.

4.4 Qualitative assessment

In the section of the *Critical analysis* we will be looking at two elements in terms of the qualities in the game as we see it been presented for us now.

We will assess *SleepWalk's* qualities from two viewpoints:

6. *Playability;* and
7. *Narrative*

4.4.1 Playability

To get around the case of *playability* in *SleepWalk* we will put out the question of Richard Rouse III "*Do a computer game need to be 3D?"* We find this question essential in the quest of assessing the games playability qualities because 3D games get, from our viewpoint, most of the attention towards games today.

To answer our question we will, by the words of Richard Rouse III, try to uncover what is a 3D game. According to Rouse III a 3D is a game *"in which the player is able to move "anywhere" in a given space*" [Rouse, 1998, p.1]. With this terminology Rouse states the same place that the "*computer dynamically recalculates what the player's view of the world should be, and draws it accordingly."* With his scheme of things Rouse III goes on and declares that *Super Mario 64* and *Quake* are 3D games; and *Myst* (An old version of the game) is not 3D because *"they are all static images and the player cannot move freely through the world"* [Rouse, 1998, p.1]. Today Rouse III would, probably, state that the newest version of *Myst (Riven)* is 3d. According to Rouse' believes we can say that *SleepWalk* is a 3D game.

Though we are accustomed to both 2D and 3D games we are most likely to praise the 3D games as the 'big' thing in computer games. Not that we, in a general picture, look away from the 2D games, which are on the marked and still are being developed; on the contrary we find still find, though as a minority group, 2D games being developed. These games are for the most developed on platforms such as Macromedia Flash and Director, which are mostly used for developing 2D graphic games. Rouse III uses the analogies about the difference in playability of a chess game at the cost of three dollars with plastic pieces bought at the local drug store and the fancy marble chessboard with beautiful chess pieces. As Rouse III points out you would not necessary play a greater game of chess just because you are the proud owner of a nice looking chess board [Rouse III, 1998, p.2ff].

In the case of the game *SleepWalk* we have assessed that it can be seen as a 3D game. Now the question is: Has this, the fact that is a 3D game, made the playability of a higher quality?

To answer this question we must first of all see what the player actually can do in the game.

We have chosen to split this task up in two:

- *What where our intentions?*
- *What did we achieve?*

In the fist matter we had in mind that the playability would lie in the way the player decided he would play the game: As a wandering-around-game (as *Myst* [Ubi Software(r) Entertainment, 2001] in a way are) or as a sort of 'solving' non-mysteries game.

Did we achieve that? We did achieve that the player can wander around in the game. But because of the technical limitation it is not possible to go from zone to zone. This will be implemented in a later version of the game. The non-mystery 'solving' has been implemented to the extend that the player wanders around and might be looking for traces and clues to a 'solution' or an 'end-result'.

4.4.2 Narrative

The narrative in the game has been developed upon the theories of Rhizomes, as discussed briefly in chapter two and more in the in-depth appendix *Rhizomes in Computer Games.*

The implementation of Rhizomes has been difficult because of a lack of understanding of the conceptual approach towards Rhizomes. Briefly we will state that because of the heavy theoretical approach Rhizomes are demanding it has been hard to make a common ground for the implementation of the theories. Therefore the game's narrative is clearly divided in two:

- *The Portal;* and
- *The Layrinth*

The order of the game’s zones is not indicating the importance or value assessment. This bullet list is to show that there are to kind of narrative styles, which in the long run might attract other players than the one who wants an alternative kind of game style.

In the *Portal* you will find traces of Rhizomes in the way the environment will appear to the player when entering the game and playing it: the zones are islands in the great vast of blackness. These zones are in their own way connected to them self and in future development connected to other zones in both the same zone (the Portal) and other (i.e. the Labyrinth).

In the *Labyrinth* the narrative style is a kind of puzzle solving, just without the puzzle. The player can wander from room to room via hallways and see different objects in the rooms.

We will from here continue with the future development ideas of the game.

5. Future development

After the description of the actual implementation, in chapter 2, and the critical analysis of the game and its structure we will in this chapter try to pin point where we would emphasize the future development of *SleepWalk.*

We split this into four main areas:

1. *Possible extensions*
2. *Relations with other areas/projects*
3. *Non-implemented features*
4. *Engine development*

5.1 Possible extensions

In the first section we will try to give the reader an idea of which directions we could extend this the game.

The list is almost inexhaustible as a result of the conceptual background of *SleepWalk*; the structure of Rhizomes.

We list here some of the extensions we see for the game (not in a chronological order):

- Massive Multiplayer Online Game (MMOG)
- Online community
- Editor

We see the game *SleepWalk* as a MMOG as a possible future extension. The game will be a pay-per-play game, where the players will buy the game, install it on their machine (PDA, PC, Mobile

phone etc.) and register online on an associated web site. As a player of the game you can decide for yourself if the game you play is on- or offline.

The player will have the possibility to interact with other players online: by exchanging thoughts and dreams the community might grow. The community is thought as a dynamic place, where you, as a player, can meet with other dreamers and create you're your own dream scenarios, which then can be put online for others to see.

For that matter we have an idea about developing an *Editor.* The two elements, the community and the editor, are inspired by the game *Cube* [Oortmerssen et al., 2002-2004]. *Cube* has the very nice feature that you can make your own scenarios, in the game, and publish them on a server for other players to encounter. This is briefly t the online community and editor purpose: to extend the amount of sample (dream)-universes you can encounter as a player of the game.

The basic idea is that when you purchase *SleepWalk* you will get access to a web site where you can register with your profile, (dream)-preferences etc. You can then collect points (=time in other dreams) when people encounter your dream(s). The editor will preferably be a real-time 3D interface based on an engine, which will run smoothly on virtually any machine. The basic idea is simply that any player can design his own dream universe and that players can enter each other's dream worlds. This form for gaming will create the possibilities that different worlds have different rules and the game will therefore transcend it self to a new and different dynamic entity.

From this point we will continue to the next point in this perspective view on the game *SleepWalk* which is concerning:

5.2 Relations with other areas/projects

In this section will we elaborate on in which area we see the game as a possible part of other projects.

The area, which immediate jumped in to mind, is virtual reality in the sense of a total experience of being there your self: 3D sound, 3D visuals, odours and sensibility. All these senses mixed up to an experience beyond the ordinary would give the user a new sensation of what dreams also could be made of.

Ideas to projects that could be of interest as an expansion of *SleepWalk* are seen below.

1. Developing a new 3D engine in which you can import 3D scenarios made in e.g. Maya developed by Alias Systems[16] or 3D Studio MAX developed by Discreet[17];
2. Corporation with InteractiveSpaces[18] in Århus
3. Corporation with the VR Media Lab at Aalborg University[19]

Following these three ideas we foresee that we can strengthen the game concept so that the game, in its pre-MMOG versions, can be a more fulfilling experience for both the team of developers and for the players.

In the last section of this chapter about the future development of *SleepWalk* we will deal with elements which have not been implemented in the game which we handed in on the 28th of May 2004.

5.3 Non-implemented features

In this section we give the reader an overview of features we already described in the section of the concept of the game and intended to implement but failed to do so.

5.3.1 Hyperfiction implementation

[16] Please refer to: http://www.alias.com for details on Maya

[17] Please refer to: http://www.discreet.com for details on 3D Studio MAX

[18] Please refer to http://www.interactivespaces.dk for details on InteractiveSpaces

[19] Please refer to: http://vrmedialab.dk for details on VR Media Lab

The implementation of elements of hyperfiction in games can be seen realized in plenty of games on the Internet. We mention as one example the game tropical America found on following web site http://www.tropicalamerica.com, which we in the report – *Hyperfiction in Computer Games – A Hypermedia Report*[20] - defined as a hypermedia game. This we concluded in the report for several reasons, but one of the main reasons is that the structure of the game has a narrative structure that resembles that of a hypermedia production where you can say that the player rearranges the structure and therefore the narrative in the game according to the possibilities defined by the author of the hyperfiction. Please refer the above-mentioned report for further details on the subject field of Hyperfiction.

5.3.2 Music

When starting out with conceptualising the game we talked a lot about the importance of music in a game; especially a 3D game. In our view the incorporation of music can in general trick the listener to think that something big is waiting for the player to come.

We would like to incorporated music as a ground element in the future versions of *SleepWalk*. Off cause there is no doubt that we prefer to compose our own theme and then create some pieces with variations based on the feelings encountered in the various zones. For now though the music we have in mind when we think of a dream theme is i.e. the compilation 'for film' edits 1-8 from the German music publisher Freibank [Various artists, 1997-2004]. The reader can listen to samples of these compilations online at http://www.freibank.com/a/forfilms/ff1.php; especially we would like to draw attention to *for film edit 2* which have many tracks of interest for our dreamy concept.

5.3.3 Video

As mentioned during description of the concept of the game we wanted to implement video sequences in the zones to enhance the experience for the player when he wanders around in the, at times, surreal surroundings. Unfortunately we did not succeed in the attempt, therefore video sequences has high priority in the further development of the game.

[20] Can be downloaded from http://www.medialogi.net/projects.asp

5.3.4 Artificial Intelligence

As it has been of very great importance for the making of the game the lack of Artificial Intelligence (AI) has been a loss for *SleepWalk*. In the future developments of the game we see agents with AI scattered around the zones. These will as previous described gather points based on what the player decides to do in the zone: what movies to see, what painting to examine, what sounds to navigate after etc.

5.4 Engine development

There are several problems with the engine that have to be solved before we can fulfil the ideas we originally had.

Trigger function
With the engine came a method for creating triggers which involved Beanshell scripting, which could have been an easy way of working with triggers, but we have yet to get this to work and so we have thought of other ways, one of which is to track the players X and Z position and use this to set of events, but it has yet to be implemented.

Map change
Since each of our levels is in separate map files it is necessary to switch between these whenever we jump from level to level, the switching of maps should be relative easy but how we control this is currently not solved and that's why it isn't implemented.

Sounds
The engine came with several classes to handle sounds and playing of these, but these were not implemented in the engine, but we believe that this should not be to hard as we for some part just have to change a little in the classes and then of course getting them to work with our levels.

Background music

We wanted to include music but the same problem as for sounds is present and we are not at all sure if the engine can run this without some serious drop in the performance, but this has yet to be seen, we do not consider the background music as important as the sound effects, as the effects is more important to the events taking place in the game.

AI control for joy symbol

Our idea was to have some symbol represent the joy zone which the player only briefly get to experience after some of the first horrible encounters. This should work as if the player should be able to catch it 3 times but then the rest of the game it should not be possible for the player to catch it, and to do this we have thought of using the AI A star path finding, of which there was an example with the engine we use, which should make it possible for later implementation.

Video playback

We had an idea of using video in our game, and we also found a way of playing video as a texture on a 3d object, which required the JMF framework, but considering the way texture works in our engine we don't believe that it is possible to playback video with our engine as it currently is, so we may have to try other ways which is yet to be explored.

6. Conclusion

We started this project with the intention to *"generate another kind of computer game"* and we wanted to "*generate a concept where the player in the computer game have no boundaries and are without any clear sight of a beginning and ending."*

The intention was also to "*uncover the mysteries of games with another perspective than the traditional win-loose scenario."*

The problem area is as following:
"Is it possible to make the player of the game go back to the game again and again to explore the dream universe we have created?"

Our main approach in solving the above problems is based on the combination of extensive research in the areas concerning the ideas from the fields of e.g. hypermedia/hyperfiction, Rhizomes and Critical Games and the accumulated knowledge obtained thru the trial and error process during the implementation of the ideas in the game.

The main drive were to intrigue the player of the game to (re-)think what a game is, before, during and after the game play.

We can conclude, from the extensive research during the project, that the basic ideas concerning Hypermedia/Hyperfiction and Rhizomes, can be implemented, theoretically, in our concept.

On the practical side we can conclude, that if we should do some further development on the game, this should probably be done by working with a more advantage 3D engine.

Appendix 1 - In-depth: AI in computer games

By Thorbjørn Hedegaard

In this I will go through how AI in games are getting "smarter" or more how the learning aspect of AI is getting more focus. I will look into how to design a learning AI for computer games and the for and against arguments.
Since the early times of the AIs it has always been a goal to get the AI to learn, because this would make the AIs more powerful and autonomous, able to solve increasingly complex issues. This has also been the case for AIs in computer games, but the problem with Aisin computer games have and still is to some extent that performance is an big issue and a AI that has to learn tends to be a heavy load on the performance. This is becoming less and less of a problem because of faster computers and the demand for more realistic behaviours of agents or NPCs (non player character) in games.

Learning

Learning can generally be split up into two different goals optimization and adaptation, in optimization the way is to have knowledge of all the variables involved in the problem and the criteria to evaluate the solution, an example is to try and find the solution to a known puzzle that doesn't change over time, it is also called the static solution. While with adaptation the problem will change over time due to hidden factors that affect the behaviour in non predictable ways, the goal is probably clear but not how to get there, example could be and NPC being put into a totally unkown environment. It could also be that the problem is well identified but that the goal could change over time, like a NPC feelings could change for a player from positive to negative after the NPC has experience certain action from the player. That means that for adaptation to be successful is has to involve using facilities new ways and to take into account unforeseen factors like changing problems and goals.
In games however it is mostly static as the problem is fully known from the game and the world is very predictable if not even very deterministic. For dynamic many of the information may be discarded by the designer for efficiency and simplicity, but rarely will totally unknown parameters arise. The best result will mostly not be reached with a single of the two but by a combination since the static problem often gives the best result, while the NPC shouldn't be struggling to adept to all

situations, it is sometimes but rarely necessary because it is mostly better to have one that handles a most with a good AI optimized statically.

What to learn

Here it's often split up into these two areas facts and knowledge, and behaviours and procedures.
In facts and knowledge the world is understood with facts or statistical predictions like "if I jump, I'll fall down again" or "if I shoot 7 times, I'll die", this can become quite accurate given enough experience.
The other part is behaviours and procedures, which could be a NPC learning to control movement, use a weapon and to move through doors, this can be important for the NPC to learn how to use the behaviour in a general situation.
These can overlap as wording is very important, an example could be shooting which is a behaviour, while knowing where to aim is a fact, which means that behaviour can be learned as facts, so when we go down it all is information no matter what we may call it.

Approaches

There are two phases in the game where the learning can take places during development or offline and after the game started or online. When offline it is often assumed that the problem is static and a solution can be found automatically. Online learning is when the player starts the game, in this form it is used as part of the design to make more elaborate worlds and believable creatures. While online seems the most appealing it often can be solved offline which also will benefit the performance.
There is also two ways of learning information which is batch and incremental, batch uses large data sets to extract relevant facts, and this is generally very effective and can be easily optimized and provide some really good solutions, because of the scope of examples examined. Incremental takes samples one at a time and then tweak the internal representation by small amount, which eventually will lead to a good solution. This is seen as not as good as the batch since data is forgotten and this affects the quality of the results.
Batch is generally used offline and incremental online since incremental uses less memory, but batch could easily be used online as well, but this should be considered at a case by case situation.

Methodologies

These are the ways that the AI are to learn, these are training, imitation, trial and error, shaping.
In training the AI must be provided with examples to learn from, which often is something that has been analyzed and then the AI gets the solution, here the AI should be able to learn from the set examples and interpret them and use this when no examples are present.
Imitation is like training in that data samples are required, but here the data is observations from a random player in the game.
With trial and error the idea is not to provide any guidance on what to do but instead to rate the quality of actions or behaviours depending on size, learning is achieved by attempting to increase the reward received.
Shaping is generally using the three first to get through a series of trials with the most fundamental at the start and more difficult later one.
In games training is the most common because of its predictable result, but imitation is more and more common to use for small problems, trial and error is the most powerful but also the hardest to make.

Conclusion

We have seen some general concept for learning AIs in games, and there is still much more to learn in that field as there has yet to be any real research, but it is coming and the smarter AI are becoming more and more of a important part of modern computer games, and where this will take us is anybody's guess, but it seems that the dream of true human-like AIs are coming closer, and one day we will have a AI like HAL 9000.

Appendix 2 - In-depth Games as political statements

By Mikael Ifversen

A new breed of games has emerged according to Shuen-Shing Lee who in his article "I loose, therefore I think" calls the games for art games with socio political contents and further states that in a way there content and satire is as different compared to the games we know as they are interesting [Lee]. The games are distributed through the internet and steadily find audiences that are interested in this art form and there socio political statements. We refer to these types of games as critical games.

Differences between critical and mainstream games

Lee introduces us to the games he calls you-never-win games which he argue can be considered tragic in terms that it doesn't matter how hard you try to be the good guy, you are doomed to loose [Lee][21]. These games are often pseudo political games which deal with serious events in real life.

Let's begin by taking a closer look at two games namely Stef & Phil's New York Defender and Fracas's Kabul Kaboom.

In New York Defender the immediate goal is to save the twin towers from planes trying to crash into the buildings. The player does that by shooting down planes with an antiaircraft gun. In the light of 9-11, this game, which is designed as the more planes you shoot down the more planes will appear on the screen and eventually hit the towers, arguably illustrate society's vulnerability towards modern day terrorism [Thompson].

. The game Kabul Kaboom is set in Afghanistan under the bombing raids during the US hunt for Osama bin Laden. Here the player has to catch the falling hamburgers and avoid the falling missiles. It is an artist commentary to the paradox of dropping food supplies to the civilians in order to ease there suffering in the midst of the daily bombings by the same military force. Frasca

[21] Lee here refers to comments by Frasca stating the lack of serious content in video games including life and death issues.

definitely answers his own call towards the lack of serious issues rooted in computer games [Frasca 2000].
Kabul Kaboom is working due to the powerful irony expressed in this stylish game where hamburgers in the sky clearly symbolize the American values along with the bombs, also the designer incorporates elements of Picasso's "Guernica" in order to communicate a sense of misery and tragedy towards the player [Lee].

According to Lee there are several factors that differentiate critical games from the standards dictated by entertainment consumerism.

In traditional game design you increasingly become part of the game, due to the relation between the action taking place in the game on one side, and the story in the game on the other side, you as a player expect that the effort you put in the game will lead you to another point in the story. Further more one of the primary rules of game developers is that it has to be possible to win the game or at least play towards a defined goal. New York Defender and Kabul Kaboom have eliminated the traditional win loose scenario by not having a score system so the competition between players is nonexistent and it leaves man against machine. The two games question the well known trial and error approach in computer games by leaving the player in a situation where retrying the game will not bring the player closer to a winning situation [Lee].

This is in the case of New York defender and Kabul Kaboom not possible to define the goal in terms of winning or loosing since the game is by default designed to make you loose, there is no advancement or other possibilities to win in a traditional sense. In the article "Online video games are the newest form of social comment" one of the designers of New York defender Jonathan Pitcher is quoted of saying *"The winner becomes the last one to lose"* [Thompson].

The critical games turn the traditional convention upside down, and after you realise that you can't win and your actions are futile you start thinking about the purpose of the game and connect with the game designer in a way where the game becomes a thinking event rather than pure entertainment.

There are other critical games which focus a lot more on the violent contents in the computer game industry and these kinds of games rely on the existent knowledge of games like Quake in order to convey its statement. One of these games, Arena, is based on Quake and actually uses the sounds of that game along with a white screen. You won't be able to connect the absence of visuals and fill out the blank space without knowing what kind of images usually is fitting for the sounds of this kind of game.

Another social critical game is Adam killer which leave you with thoughts of the shootings at Columbine and other similar cases where people go on a rampage and kill innocent bystanders. The game is designed as Half Life but has no monsters or other alien enemies; instead all the subjects are still standing civilians that do not pose any threat to the player. The real and surreal graphical elements on the screen disturb the player and present instead the critical social statement embedded in the game [Lee].

Socio political games with positive messages

The game September 12th is the first release from newsgaming.com, a group of independent game developers with Gonzalo Frasca as lead designer. From the get go one of the premises of this company is to create games there are more than entertainment and can be seen as a political comment to current events in the world. One of the developers of this game actually stated for some years ago that *"I started daydreaming about creating games that would complement news with editorial statements, like political cartoons do"* [Frasca 2003].
As you can see in figure one it is quite a limited set of instructions that are presented to you before game start of September 12th. It quickly shows that this is not your ordinary shooter game, on the contraire it is not a game rather it is a simulation and when you start this game you soon discover that there is a political statement present in this game and it is commenting on the present so called war against terror. It is hard to overhear the cries of the civilians, in this case women, after one of your missiles just killed what easily could be entire families. It is impossible not to kill civilians and the more dead civilians the more terrorists, this is the simple logic in this simulation even though some people find it to simplistic. *"The team at Newsgaming.com is guilty of creating the same kind of simplistic good/bad dichotomy that the mainstream media presents"* [Trundle]. As Frasca states he knew that he succeeded to convey his idea with this game when he started to receive the

electronic hate mail [Frasca 2003]. One can off cause discuss wither this game convey a positive message, it is a rather subjective political statement that comes across, but in any case the game is very popular close to 250.000 plays and does stir the ongoing debate about politics and games.

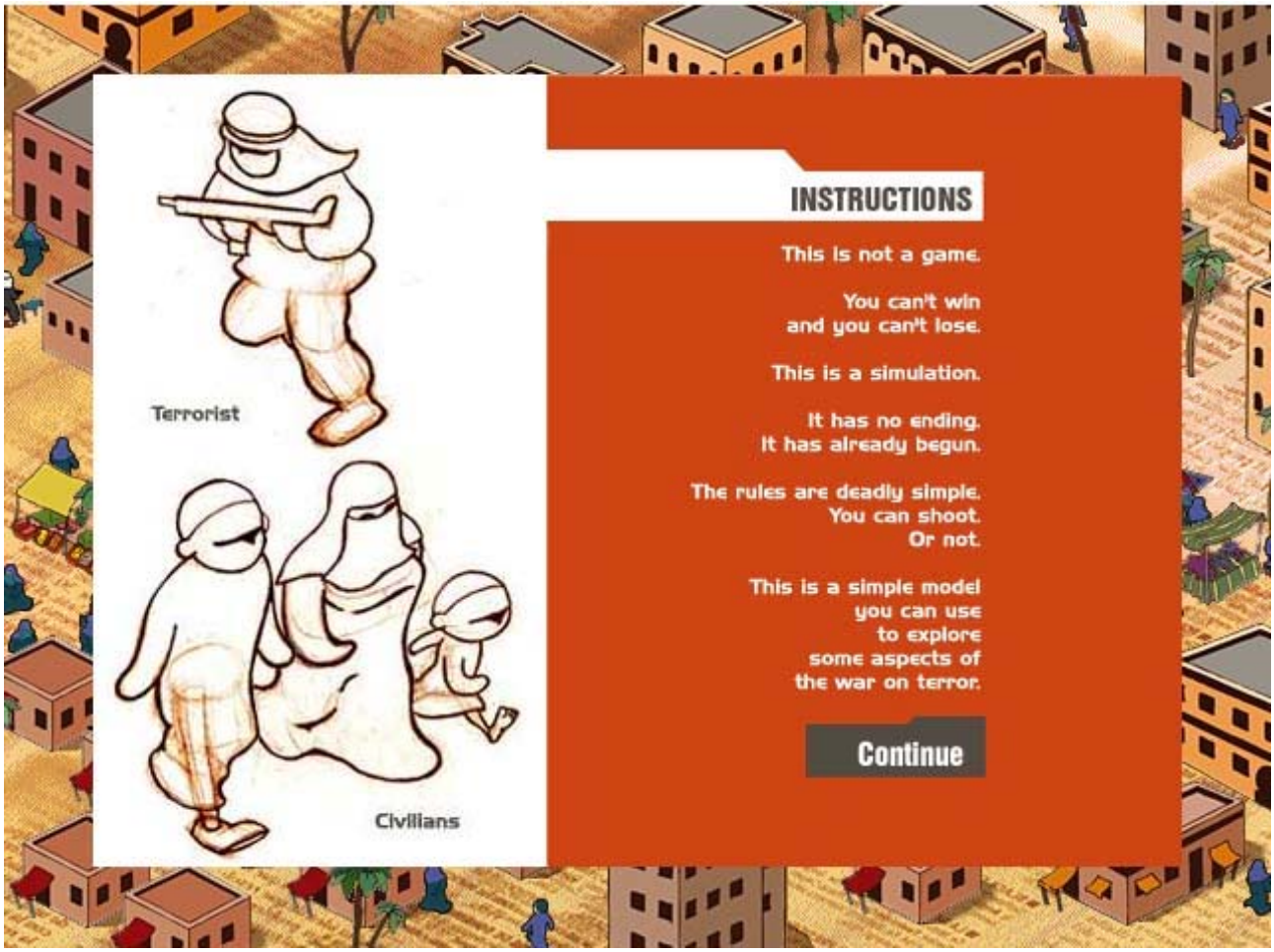


figure 4 The opening screen of September 12th

Another game by newsgaming.com is the quiet game Madrid which is a solidarity tribute to the victims of the terror attacks in Madrid earlier this year.

There are plenty of games that could be mentioned in the context of positive games. Ian Bogost who founded Persuasive Games mention games like Real lives 2004 and Civilizations 3 as games with positive messages in Real Lives you get to explore life in different cultures under different circumstances; this can very well contribute to a greater understanding of hardships that people

sometimes endure in other cultures [Terdiman]. It is a company called educational simulations that are behind the game and they describe the game on there web site as *"a unique, interactive life sim that enables you to live one of billions of lives in any country in the world"*[22].

Hate - and other negative loaded games

It can't come as any huge surprise to anyone who spends time on the web that there exist games out there that feature quite less positive messages.

In an article published on wired news several right wing organisations states that using the game platform to convey there messages creates a feeling of legitimacy due to the mainstream media platform that a computer game represent [Terdiman].

There is nothing new in hate games on the web but what is happening is that the open source platform makes it possible to generate some very high level games that are capable of competing with the established games in terms of functionality and graphical contents. One of the games to receive a lot of attention at the moment is game called "Ethnic cleansing" and is released by the white supremacist group National Alliance [Eng]. Here you see there sale pitch for the game: "*The most politically incorrect video game ever made. Run through the ghetto blasting away various blacks and spics in an attempt to gain entrance to the subway system, where the jews have hidden to avoid the carnage. Then, if YOU'RE lucky.... you can blow away jews as they scream "Oy Vey!", on your way to their command center".*[23] One of the features in this game is that the game is showing posters and signs from the group as well as integrated video clips of the founder as a part of the game. Below you see two screenshots from the game down loaded from there web site.

[22] http://www.educationalsimulations.com/index.html

[23] http://www.resistance.com/ethniccleansing/catalog.htm

figure 5 You can dress as a clan member

figure 6 Integrated video propaganda in the game

The consensus towards this game is that there is nothing you can do legally to stop this kind of game and people who have worked on the development of the open source code for the game engine are publicly denouncing the affiliation between there product and the game. Yet again by keeping the game in the open you kind of demystify the game and have a better chance of arguing against such games. According to Jason Della Rocca of IGDA[24] *"This is a double-edged sword here," says Rocca. "The same way these guys took open source [and] used it to create something bad, the flip side is that someone could take these tools and create some great love story."* [Eng].

Games as the one just mentioned above does not qualify as a social critical game since it is nothing more than a sophisticated vehicle for the same well known propaganda rhetoric you can expect from those groups.

Games and the American president

We now return again to a more innocent type of games and can ascertain what must be a first that the presidential campaign in USA has embraced the use of computer games.
It was the democrat candidate Howard Dean or rather his campaign people that first saw the need for a game as a campaigning tool. Frasca and Bogost are believers of political games and were up to the task of creating a game for the campaign [Carless]. According to Bogost *"The idea was to communicate a conceptual idea about growing a grassroots movement from the bottom up"*

[24] http://www.igda.org/

[McClellan]. The game is deemed a success because of the positive feedback and that approximate a 100.000 people played the game.
On the other side of the spectrum we have a game that supports President Bush on the cost of John Kerry. It is also a flash game but this one is much simpler and is simulating the old space invaders, hence the title Tax invaders. There are really no information about the thoughts behind the game if any, it does look mostly like someone was reusing some code. Another anti Kerry game is even cruder looking, it is a boxing game where Kerry box with himself and the text states that Kerry flip flops on issues, Don King did the voice over on this game which is the most interesting part of the game.
Since you can argue that the use of political games in an election campaign is just another form for advertising and it has been tried seriously this year there is little doubt that this will be a tool that will be used in future political campaigns.

Positive games and the future

We will have to look at the mechanism of the games in order to get an understanding of the hate games. When the people behind some of the mentioned hate games states about violence in there game "*they were no more violent than other video games on the market"* [Eng] they are obviously right. What they do is that they use a totally accepted game form and replace who ever the bad guy is with there own figure to be killed [Terdiman]. Frasca too mentions the game mechanism and Hollywood's token villains such as Arabs and Vietnamese whom the player is suppose to kill at will as elements in a tradition that sustains the status quo and does not further the development of games with a positive message.

It has become clear to me during this research that all the attention and focus on conscience and games will transcend to mainstream games over time. There is also an academic research bonanza in the works and several institutions provide game educations which again will lead to some game developers will celebrate positive as well as alternative games.

In the mean time we can in the words of Clive Thompson enjoy the treat that "*Flash games are like online graffiti, quick and dirty personal messages delivered in the language of the web"* [McClellan].

Appendix 3 - In-depth: Rhizomes in computer games?

Written by Adam Jensen – supervisor: Conor J Curran

The main focus of this text is to show how the theories of Rhizomes – primarily - can be implemented in a computer game; also I will consider emerging fields of artistic endeavour whose conceptual philosophies share similarities with those of Rhizomes.

The structure of this appendix will be as following:

- What are Rhizomes?,
- How can Rhizomes be implemented?,
- Why should Rhizomes be implemented, and
- Why are Rhizomes such a good idea?

In the first section I will uncover the mysteries of Rhizomes. This I will do by making a connection from Rhizomes to Neural Networks.

To make a clear picture of where Rhizomes have been use I will describe some real-life or virtual-life examples in the form of projects within the artistic areas of (*Software) art, music, films and computer games;* for the purpose of exemplification.

Then, in the last section, I will try to uncover, why Rhizomes should be taken into consideration when planning your computer game etc. Last, but not least, I will try to answer the question *Why are Rhizomes such a good idea?*

What are Rhizomes?

The paradigm of Rhizomes stems from Deleuze & Guattari's book *A Thousand Plateaus: Capitalism & Schizophrenia* [Deleuze et al., 1987]. The term origins from the world of botanics and according to James K. Brown can it be defined as:

> *A creeping plant stem (not a root) growing beneath the surface, consisting of a series of nodes with roots commonly produced from the nodes and producing buds in the leaf axils [Brown, 2000].*

Rhizomes can also, according to Cornelius Holtorf [Holtorf 2000-4], be connected with archaeological theory in the sense of *"...the past and present are firmly interconnected and inseparable."* [Holtorf 2004-4: 3.3] Why Rhizomes are tightly closed to the past and present can be seen in the Time and Space domain, which are ideas of great importance in Rhizomes. I will, later on in this text, describe an example of how these domains have been used in conjunction with Rhizomes.

In the words of Deleuze & Guattari [Deleuze et al., 1987] rhizomes are made up of plateaus where in this sense a plateau is *"any multiplicity connected to other multiplicities by superficial underground stems in such a way as to for or extend a rhizome..."* [Deleuze et al., 1987, p.9]

Deleuze & Guattari declares six principles for Rhizomes, which I will – briefly – describe for the reader to get a better understanding of what the Rhizomes essentially mean.

The six principles are as following:

- *Connection;*
- *Heterogeneity:*
- *Multiplicity;*
- *Asignifying Rupture;*
- *Cartography; and*
- *Decalcomania* [Deleuze et al., 1987, p. 7 ff.]

In relation to the first principle – *connection* - Deleuze and Guattari says that *"...any point of a Rhizome can be connected to anything other, and must be."* [Deleuze et al., 1987, p. 7 ff.] This will in the context of the semiotics of a hypertext mean that a node[25] can be, and must be, connected to any other point on the Internet (as that is the most common known example of a hypertext translator).

A 'good' example of the principle *connections* are seen in the projects "_____*1*_____ - *20031011-12:23"* and " _____*2*_____ - *20031109-21:39",* by the artist Jimpunk [Jimpunk, 2003]. The projects are two online artworks, which can be seen as incorporating the principle of *connections* in the way you might or might not interact/react upon the pictures presented; by clicking over moving the mouse pointer across the screen. These reactions, or lack of these, will result in the production of new connections via the connected to other parts of the artwork. The artworks are expanding in these connections.

In relation to the first principle we will find the principle of *heterogeneity*. With this principles Deleuze and Guattari state that no matter the differences within semiotics – i.e. Language – *"A Rhizome ceaselessly establishes connections between semiotic chains..."* and *"There is no ideal speaker-listener, any more than there is a homogeneous linguistic community."* [Deleuze et al., 1987, p. 7]. This means – as I see this – that no matter the difference between subjects Rhizomes will not stop making connections. The concept of *heterogeneity* is of great importance to the practical implementation of Rhizomes. An example of where both *connections and heterogeneity* are in 'play' would be from the above-mentioned web site www.jimpunk.com on the index page of the web site. There are no apparently clear semantic and you can connect to the different pieces of artwork in the order you would like.

The principle of *multiplicity* has to do with the increasing and infinite number of connections: When the increments are taking place it can only happen because:

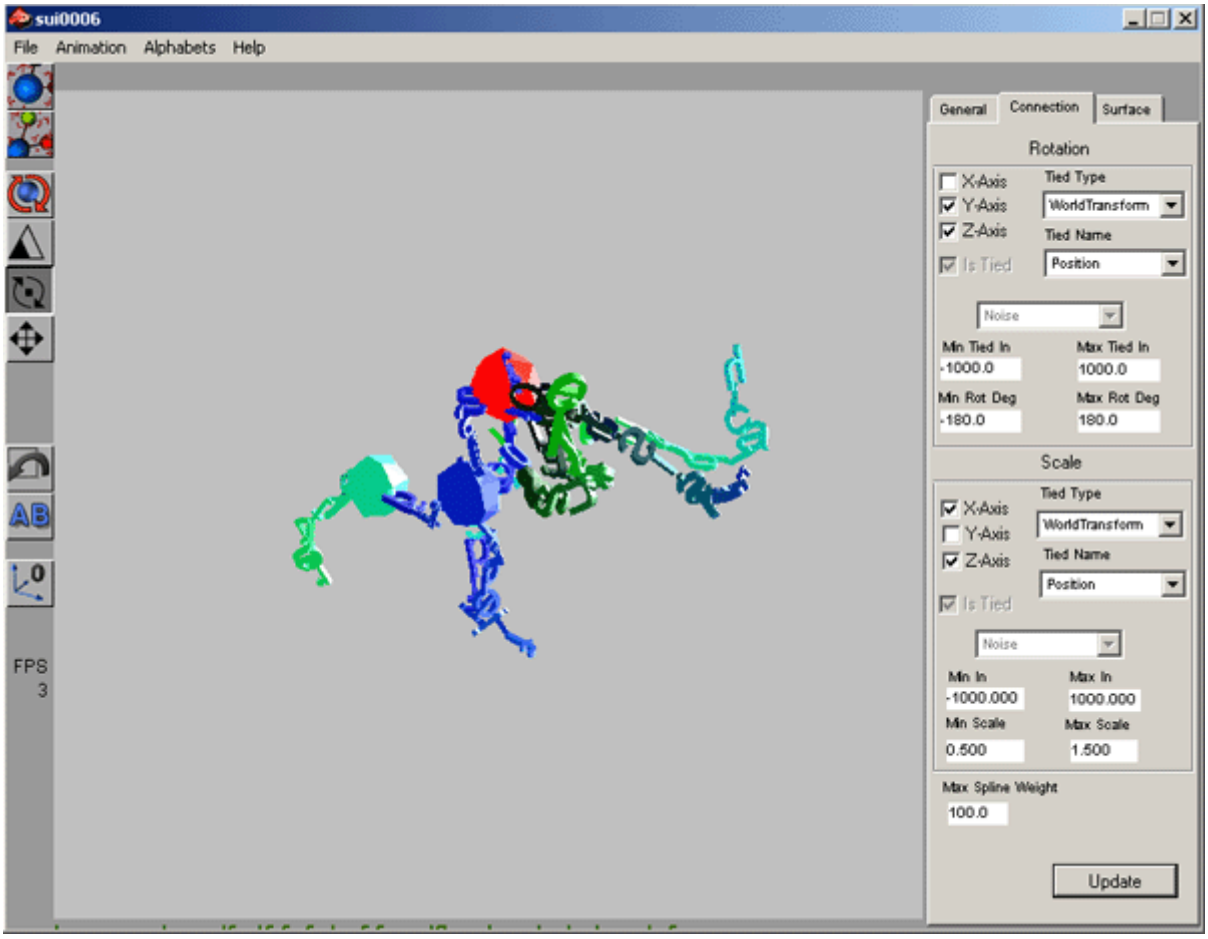
[25] A node is a virtual part of a hypertext: Overall it is a *"linked network of nodes which the readers are free to navigate in a non-linear way."* [keep et al. 1993-200].

> *"A multiplicity has neither subject nor object, only determinations, magnitudes, and dimensions that cannot increase in number without the multiplicity changing in nature (the laws of combination therefore increase in number as the multiplicity grows)"*
> [Deleuze et al, 1987, p. 8]

As the above citation implies the number of combinations grows in the Rhizome as multiplicities grows. Therefore it can be said that multiplicities within Rhizomes are a 'self-fulfilling prophecy': When increasing it numbers it increases the numbers of connections; maybe this is a simplified explanation.

An example of the principle *multiplicity* can be found in the artist Michael Rees and Chris Burnett's Software called *Sculptural User Interface* ® [Burnett et al., 1999-2004][26]. They made *"a software application that generates sculpture from language"* [Burnett et al., 1999-2004, /creative/CreativeCapital.htm]. Basically it is a piece of software where you can, by typing letters on the keyboard, create your own Rhizomic sculpture. Below you see a screenshot of the user interface and the result of a random typing on the keyboard.

[26] SUI ® can be downloaded from http://www.michaelrees.com/sui/ in both a pc and MAC version



Screenshot 27: Interface and result of interaction with SUI ® 1999-2004

Asignifying Rupture has to do with the 'self-healing' operation a Rhizome contains. Deleuze and Guattari describes this principle by stating that *"A rhizome may be broken, shattered at a given spot, but it will start up again on one of its old lines, or on new lines"* [Deleuze et al, 1987, p. 9], and gives the example of an ant colony: *"You can never get rid of ants because they form a animal rhizome that can rebound time and again after most of it has been destroyed."* [Deleuze et al, 1987, p. 9]. By this Deleuze and Guattari are saying that even though you might break a link in the Rhizome, the link will be re-constructed later on because of the structure of the Rhizome.

In the fifth principle *Cartography* Deleuze and Guattari says that *"...a rhizome is not amenable to any structural or generative model. It is a stranger to any idea of genetic axis or deep structure"* [Deleuze et al., 1987, p. 12], meaning that the Rhizome does not have any idea of what structural elements it consists. The map – as the principle is referring to - of one rhizome is not a tracing, which Deleuze and Guattari gives the example of a orchid: *"...(it) does not reproduce the tracing of*

the wasp; it forms a map with the wasp, in a rhizome" [Deleuze et al., 1987, p. 12] which is the essence of the *cartography*-principle. Further more it can be noted that *"The map does not reproduce an unconscious closed in upon itself; it constructs the unconscious."* [Deleuze et al., 1987, p.12]. Meaning that map is making *unconsciously* connections between the connections.

The sixth principle *Decalcomania* is "*the art or process of transferring pictures and designs from specially prepared paper (as to glass)"* [Encyclopædia Britannica, Inc., 2004, 'decalcomania'], which is referring to the matter of the Rhizome as not-being traceable; instead it is a map, as described in previous section. Because of the matter of what the two things have to do with they are not both applicable to rhizomes: *"The map has to do with performance, whereas the tracing always involves an alleged 'competence'"* [Deleuze et al, 1987 p. 12 ff.].

The two elements – *maps and tracing* – are being opposed in a dualistic way: The map is contrasted by the tracing and vice versa. In this matter Deleuze and Guattari point out that it is *"... a question of method:* the tracing should always be put back on the map" [Deleuze et al., 1987, p. 13].

The six principles share a lot common ground with the philosophy of connectionisms: the neural networks are connections within connections.

To set the scene for the neural networks angle in this appendix I will now very briefly give the reader an introduction to the principles of neural networks.

According to Robert Callan a neural network is *"a collection of units that are connected in some pattern to allow communication between the units"* [Callan, 1999, p.2]. Further on in the same place his explains that these units are also called nodes or neurons, which are simple processors with rules for input and output.
In a simplified explanation there has been two ways of looking at neural networks: the symbolic, the traditional view, and the more modern, the connectionist view.

The symbolic network, or traditional artificial intelligence (AI), are based upon a hypothesis which states that:

> "*…given a vast interconnected structure of symbols that represent knowledge of the world and a complex suite of symbol processes to operate on these structures the create new structures, a machine can be made to perform as a human"* [Callan, 1999, p.149]

The hypothesis has proven to be restricted to the extend of the capacity of the machine to be intelligent only in that specific area of knowledge it has been given. On top of this the machine(s) 'intelligence' will 'collapse' if only one connection if broken.

The opposed AI model, the *connectionist view*, looks at the task given and *"...learn a task by adapting to fed stimuli"* [Callan, 1999, p. 169].

I will now be looking closer at the two opposed views on neural networks, the *symbolic* and the *connectionist* view, and make a connection towards Rhizomes.

The *Symbolic* view upon neural networks opposed the view of *connectionism* can give us a more enlightened view of what Rhizomes are in a broader picture. Dongwon Lee amongst other – makes the opposition. In the field of AI we can – explicit – say that there are two areas of research within: The symbolic and the connectionist.

The *symbolic* approach uses the computer model of mind: the metaphor in this model is the computation. Mental activity in this model is the execution of a stored program. Opposed to this model is the connectionist wherein the model is the model of a brain. The metaphor in use is the nervous system. Mental activity to set a network into a stable configuration [Lee, 2002, #2]. Lee are attacking the connectionist models for doing *"nothing really useful"* [Lee, 2002, #2], and defending the model by saying that *"Intelligence and mind emerge out of highly connected groups of relatively simple units."* [Lee, 2002, #2].

Below here you will find a graphical representation, figure 1: *Symbolic vs. Connectionist view on neural networks/AL,* of the two opposed AI/neural network models to show how they, in theory, are working with the data input and output that is given to the system.

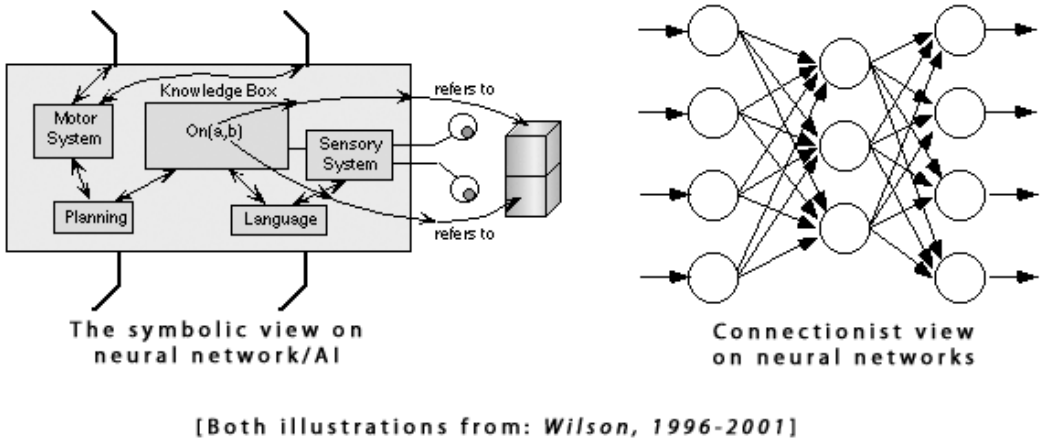


Figure 1: Symbolic vs. Connectionist view on neural networks/AI

How the brain model and the computer model works I will describe in the following.

Dongwon Lee are opposing the two models by three questions:

- *What is cognition?;*
- *How does it work?; and*
- *How I know adequate functioning of a cognitive system?*

Firstly cognition in the computer model is a "*rule-based manipulation of symbols"* [Lee, 2002, #5], whereas in the brain model it is *"(a)* ***emergence of global states*** *in a network of simple components."* [Lee, 2002, #5]. Secondly the computer model works "*Through the symbols (syntactic), not their meaning (semantic).",* whereas the brain model works through local rules which are changing locally. In the part of the adequate functioning of the cognitive system Lee states that in the computer model it is done "*When the* ***symbols appropriately represent*** *some aspects of the real world."* and the brain works best "*When the* ***emergent properties can be seen to correspond*** *to a specific cognitive capacity"* [Lee, 2002 #5]. As Lee also points out there are differences in disparity of levels in the rules, which accompany the two models; the symbolic rules are operating on high-level constructs, whereas connectionist rules operates on low-level constructs.

The model of connectionist and the model of the brain are very much in thread with the principles of Rhizomes. This because the ideas about the connections in the connections as I stated earlier on in the section about the six principles of Rhizome.

The connection between Rhizomes and neural networks are – to me – quite striking obvious: the Rhizomes are capable of keeping up appearance despite a missing/broken link; neural networks works in a similar way. Neural networks can function even though parts of the information that has to been processed are not present any more.

In the next section I will proceed with a discussion about:

How can Rhizomes be implemented?

The main purpose for this text on Rhizomes has been to investigate how Rhizomes can be implemented in a computer game.

For the sake of the overview I will describe some different examples, which encounters the spheres of Rhizomes.

I have, by examine different kinds of medias, realised that Rhizomes can be found in music, film, software (art), computer games.

In the matter of computer games I have found out the game *SIMS*™ [Maxis, 2000-], *Everquest* [Verant Interactive, 1999-] and in a general picture *MUDs* (Multi-User Domain or Multi-User Dungeon[27]). What these games have in common is the multi-thread approach. This meaning, as I see it, that the common ground they share is the approach of many story lines incorporated in the same game as it is being played.

Speaking of *SIMS*® I came across an artist, Brody Condon [Condon, 2001-2004], who is working with re-making existing games in his own, Rhizomic way. The game demo, as this is very much his

[27] Please refer to http://www.mudconnector.com for more details on MUDs

approach, I am speaking of is *White* [Brody, 2001] (Can be located on the attached cd-rom in the folder 'Related works' as the file *white.avi).* The way I see this game demo as a manifestos of Rhizomes is in the way Condon are presenting the *SIMS*® universe for us: The intro splash is a materialization of the idea of Rhizomes as plateaus from where things can or cannot be connected to. The game demo consists of four sections. Each section has its own Rhizomic qualities. The first little scene (duration: 10" - 26") is with a person (It is not noticeable if its is a female or male) dressed in white sitting on a swivel chair (the surrounding are quite dull: grey in grey); doing nothing else than looking from side to side and moving nervously back and forth. In the bottom right corner there is a kind of user interface, which could resemble a map of a room (the room in which the person is in?). There are – apparently no interaction in this scene. What *connects* us to the game of *SIMS*® is the diamond hovering above the person head indicating that the person is active. In the second scene (duration: 26" – 44") you see a person (maybe the same as in the previous scene?) walking along what could look like a building where you can see through the walls; into cubic-like 'rooms'. In this scene the user interface is the same as in the previous; this time it seems as if there are some kind of interaction. The person walking along comes to a hole in the wall and the scene changes to a video sequence of an installation room with four video projection screens. It looks like it is the same video sequences as mentioned above here, which are been shown on the video projection screens. The way, I see the demo game and installation is built upon some of the Rhizomic ideas, is in the way the game is related to both *SIMS*® and other artistic works of himself. By relating itself to itself and other islands it forms a Rhizome in the Rhizomes.

In my search for artistic works of Rhizomes, as that is my approach towards the basic idea, I came across a film, by the Danish Dogme film directors Søren Kragh-Jacobsen, Kristian Levring, Lars von Trier and Thomas Vinterberg, entitled *D-Dag (D-Day)* [Kragh-Jacobsen et al., 2000]. The film were filmed in the streets of Copenhagen from the time 23.30 on 31st December to 00.40 on 1st January 2000 and then broadcasted on Danish (national) television stations DRTV, TV3, TV Danmark and TV2 on the 1st January 2000 at 19.30 the same day (1st January). What made this film stand out were primary that it was filmed on several locations by four different crews with their own director, and broadcasted later on. The directors where placed in their own control centre in Tivoli from where they each had an actor and one camera to follow her or him throughout the shooting of the film(s). They had the camera at their disposal for 70 minutes. Secondly, the audience could choose what the film should be about: the four TV channels broadcasted the

different directors film. Therefore the audience also became active links or connections in the making of the film(s); this with the power their remote control. With this special feature the film crew became kind of secondary in the process of the filmmaking; you can say that they became merely tools of the audience. Thirdly, and not the least, the plot of each of the four directors, were dynamically changing because of the events that happened to the character they were "controlling". For the record I must admit I was preoccupied elsewhere at the broadcasting night so I have – unfortunately not seen the film(s); but I have heard from someone who actually did see them/it that it was no great success.

Within the art form of music I have found a mayor musical experiments encompassing Rhizomes in practical manner. The artist, of whom I am speaking, is named Stephan Dunkelman and origins from Brussels in Belgium [Dunkelman, 2002]. He made a compilation of music composed over nine (ten) years, namely the record by the name *Rhizomes* [Dunkelman, 2002, http://www.electrocd.com/cat.e/imed_0263.html]. The Rhizomic approach of these musical pieces is best described in the words of the composer himself:

> "*My work unites living Time and Space…it develops expressions of space for music…it modulates sound patterns (chosen for their morphological or imaginal qualities) by highlighting their roots in ways that energize them."* [Dunkelman, 2002, http://www.electrocd.com/cat.e/imed_0263.not.html]

As Dunkelman so precisely describes it the manner of *Rhizomes* (his own record) is a mixture of Time and Space relations and therefore it has, as the title implies, a lot to do with Rhizomes. For further detail on this project please refer to the above-mentioned web site, where it is possible to listen to excerpt of the record[28].

These examples I have described here are what I find descriptive for a little part of the big "void" of art form that is encompassing the concept of Rhizomes. I would like to bring the readers attention to a really nice web site with the sole purpose to promote different artistic approaches to art, which are dealing with Rhizomes in a broad sense. The web site is located at: http://www.rhizome.org. Most

[28] The files, which are connecting the listener to the streaming of the excerpts, can be found in the "Related Works" folder on the attached cd-rom

of the contents are located on the member site of the web site. But a nice feature at the site is that they open the sluice for non-members to be turned on and get enrolled for the small amount of circa 96 Danish kroner.

As the climax of this text I will try to answer the two – essential – questions:

Why should Rhizomes be implemented? Or:

Why are Rhizomes such a good idea?

To answer these questions I will first take a look at how the 'ordinary' narrative structure can be formed.

The narrative structure, which is most common today, and centuries ago, is the narrator model.

Briefly the narrator model consists of seven elements:

1. *Prelude;*
2. *Presentation;*
3. *Elaboration*
4. *Point of no Return;*
5. *Conflict escalation;*
6. *Climax;* and
7. *Fadetout* [Drotner et. Al, 1996, p. 243]

It is not my intention, in this text, to describe in details each element in the narrator model, but instead I will refer to the book of Kirsten Drotner et al. [Drotner et al., 1996] for a general explanation of the model. My focus here is to compare the 'ordinary' structural models for narrative to the model of Rhizomes.

In a simplified view the narrator models single elements will put together will bring the reader of i.e. a book, player of a computer game, film audience etc. a conform, or to be more precisely: a predictable product.

Another model of narration which according to Drotner et al. is an alternative way of building up a story line is the so-called *Stream-of-consciousness.* Drotner et al states that in this model: *"...you have in principle a narrative style with no action-related control of the plot but only* (controlled by) *the thoughts as they emerge in the main character"* [29][Drotner et al., 1996, p. 247]. This resembles Rhizomes in the sense of the emerging of elements as they pop-up in the mind/structure. In the sense of unpredictability of the thoughts in the mind of the character, these cannot be interpreted in the, ordinary, story. The model of *Stream-of-consciousness* can be found in some film, i.e., the thoughts, and with these the mental development of the characters, where they been made to the subject or plot; i.e. in many of Woody Allen's films (*Annie Hall (*1978) and *Play it again*, *Sam* (1972)) [Drotner et al., 1996, p. 247].

By implementing Rhizomes in i.e. a story plot you might end up with a story you did not expect in the first place. This because of the connections that can connects to other connections. All this will give a story that has evolved in a way the author(s) has not foreseen. The word *foreseen* is in this context essential because of the matter of story line development: Most of the film goers want the plot to be clear; this is a horrible generalisation, I know, but if you look at what kind of films which hits the top ten in box office sales[30] you will find films with the most simple plot developments.

The Rhizomes can give the story angle that could not be foreseen by both the author and the audience a surprise in the form of new stories within the base story.

In the matter of Rhizomes in a computer game I see potential for creating a more vivid and 'complete' story line. This is an opposition to what Jesper Juul states, in his master's thesis *A Clash Between Game and Narrative,* that:

> "…the computer game for all practicality can not tell stories - the computer game is simply not a narrative medium. In actuality we are facing a conflict between game and narrative: They are two separate phenomena that in many cases rule each other out." *[Juul, 1999, p.2]*

[29]This is our own translation of the Danish text.

[30]Please refer to http://www.worldwideboxoffice.com/ for a list of what films has the best sales worldwide.

This statement was made in 1999 and today Juul would probably not state the same if he had the knowledge about Rhizomes at that time (The word “Rhizome” is not even mentioned in the thesis!).

In my own opinion a computer game can gain quite a lot in quality; this because of the immensely amount of connections to and from the elements you can experience. As the example of the SUI® (Please refer to page iv) there are practical no limit for how many connections a connection can support.

If I today should develop some kind of hyperfiction, which i.e. could be in the form of a computer game, I would most certainly incorporate the basic ideas concerning Rhizomes. This because a story plot in a computer game can, no matter what genre you will encounter, as I have tried to show in this text, gain more than the development of a concept can accomplished or show.

Appendix 4 - In-depth: Game sound/music

By Torsten B. Fix

Introduction

The soundtrack has been an important part of computer games since the concept was invented in the early 1970ies. When you see computer games today its hard to imagine how much work there have been made in creating the gaming experience the payer is having. Programmers and musicians have made a lot of progress since the first computer game were made, today we have the computing power to deliver decent sound, but no where as good as the soundtrack your hear in movies.
In this section I will firstly give a little historical perspective to the game genre with some relation to music and sound. Secondly I will describe how a soundtrack are made in movies and how its made in games. Finally I will summarise it all.

History

The first real computer game was pong. Pong was very primitive compared to the games we see today, but the creators had started a genre that today is lager than the movie industry. Pong had, compared to the even earlier test games, some quite innovative features. The first and probably the most important, was the way pong was played. Back then a computer had a keyboard and was only controlled that way but pong used a primitive controller. Sound wise the game had some very simple sound effects that were played when the ball hit the block that sent it in another direction back to the opponent.
The first few years after pong, the games released were mostly pong clones. But in 1980 Atari came with the first 3D-game, Battlezone.

The remarkable thing about Battlezone was that it was in primitive vector graphics. But this allowed the player to move around in a real 3D environment. Besides the impressive graphics Atari also improved the sound. The sounds still were very computer-like but it gave a good illusion that the players was driving around in a futuristic tank shooting other tanks.

Pacman was released in 1980 where the first real game with music. Like described before was the sound only simple effects, but there was a theme when the waited for someone to play it. Whilst playing there was only sound effects like in the games before it.

The games back then were very dependant on how powerful the computer was, this haven't changed much today. The games released in the early 1970ies and 80ies were usually developed for one of three different platforms.

1. Game Consoles
2. Video Game Consoles
3. Home computers (PC)

Ted Stahl from the webpage: http://www.thocp.net/software/games/games.htm
Divides the video game console up into four ages:
The Early Years – 1958 – 1970
The Golden Age – 1971 – 1983
The Modern Age – 1984 – 1994
The Next generation – 1995 - ?

I've tried to make a brief timeline of the well know consoles and PC's.

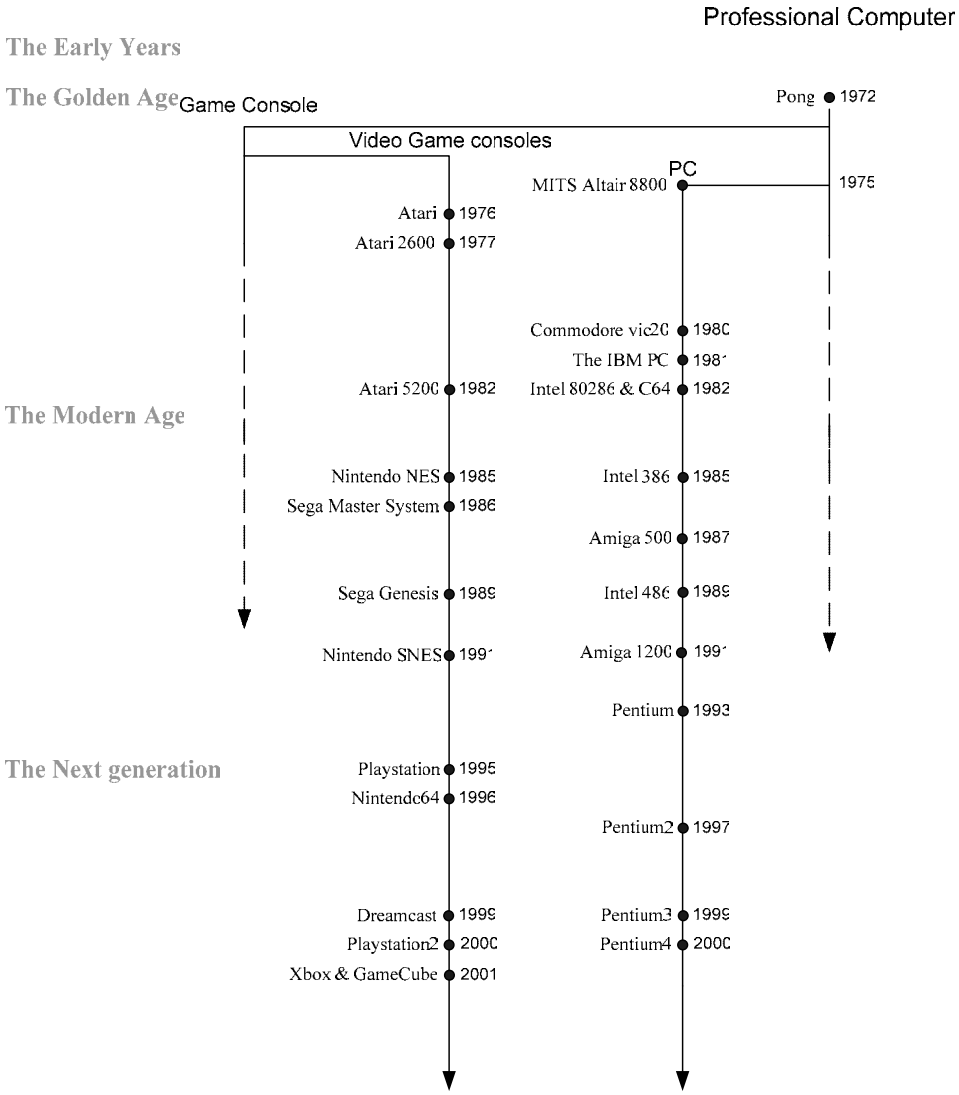


Illustration 8 - Graphic comprised of information from historic websites check reference section for site list.

Early 90'ties – The IBM-PC became the predominant game platform. The IBM pc is made by putting different hardware pieces together into a computer. This gives the IBM pc an edge over the Commodore AMIGA, by allowing the user to upgrade the individual hardware pieces instead of having to buy an entirely new computer.

Soundcard wise Creative Labs have great success with their SoundBlaster series. Game developers' adobes their standard. The SoundBlaster card where able to play 16bit CD-quality sound, but music was played through the midi part of the soundcard[31].

[31] http://www.creative.com/corporate/welcome.asp?sub=1995

1995 Microsoft released Windows 95 with win95 Microsoft developed an API called DirectX. Before win95 games usually were played in DOS, not under Windows. DirectX gave game developers possibility to write to the DirectX API and then it would do the job of giving the instructions to the different types of computer hardware. This meant that Creative Labs lost their edge in being the most supported sound card. Other and cheaper products could create a driver for win95 and it would work just as good as a SoundBlaster soundcard.

The next remarkable ting that happened to games on the pc was the invention of a 3D accelerator card. The accelerator card functioned by acceleration specific DirectX commands. This gave the 3D games a entirely new look. Where old 3d games had kind of rough look, 3D cards gave a very smooth appearance.

TombRaider - EIDOS

<---------2D---------> <---------3D--------->

Quake2 - Id-sofware

<---------2D---------> <---------3D--------->

Pictures from:
http://www.eng.uwaterloo.ca/~ejones/oldsites/fog/hardware/3daccelerators/index.html

Besides the look 3D cards gave the possibility to massively increase the complexity of the 3D game without decreasing the performance of the game. Sound wise not much happened in that era. Music and sound where still very dependant on the CPU speed, but some game developers came up with the idea of playing music directly from an audio track on the cd-rom. This method gave good sound quality, but it had quite a lot of drawbacks. For example when changing the track there was a small pause, this doesn't look like a real problem, but when use like the game Total Annihilation[32] where

[32] CaveDog 1997 http://www.totalannihilation.com/totala/

the music changed when enemies attack the player. Another problem was the CPU usage; some machines used a lot of CPU power when a program accesses the cd-player.

In the late 90's Creative Labs made a small revolution in the music area. They created an accelerated 3D sound card. Together with the soundcard they introduced 4 point surround speakers. This gave the player the felling of being completely "inside" the game. The 3D accelerator emulated the acoustics of a 3D environment. Here is a snip of the original website:

> ***Environmental Audio™ Enhances Existing Content***
>
> *Sound Blaster Live! lets users experience depth and realism beyond existing 3D audio. Sound Blaster Live! provides preset environments such as Hall, Cave or Underwater that can be applied to your existing games and applications for incredibly true sound. You can be listening to your favorite music piece in the room at one moment, and in the concert hall the next. Sound Blaster Live! provides game environmental settings that can make your existing games come "alive" instantaneously. Now, through our Live!Ware Program, you can even import additional game environmental settings and export your personalized settings to share with other Sound Blaster Live!/ Live! Value owners!*
>
> ***Multiple Speaker Output***
>
> *Sound Blaster Live! produces surround sound audio on the PC with built-in support for two or four analog speakers. Connecting Sound Blaster Live! to an additional pair of speakers such as PCWorks™, or Creative's PCWorks FourPointSurround allows users to enjoy compelling 3D audio on multiple speakers, overcoming the limitations of 3D audio on two speakers. Multi-speaker output also allows users to position any audio devices such as CD Audio, WAV or MIDI anywhere within the speaker environment. For example, in a 3D game title, users have the option to position the CD soundtrack to the rear speakers such that there is music being played in the background. With the option of up to eight multiple speaker support in the near future, you are no longer limited in your 3D audio applications.*

2 Copy-paste from www.sblive.com saved Dec 5 1998 (check cd-rom for file: sblive-product1998.pdf)

This gave games an entirely new sound environment. The bundled game with SoundBlaster Live! were Unreal[33] which had the 3D sound environment implemented.
3D audio have been developed a bit since SoundBlaster Live! Creative realised that in a 3D environment there may be obstacles like walls etc. that change the acoustics of the room.
In the latest version of EAX[34] Creative solved one of the major obstacles of creating realistic 3D sound. They created a way of computing how the sounds of another sound environment sound when they enter a second environment.

[33] Epic Games 1997 http://unreal.com/index2.html

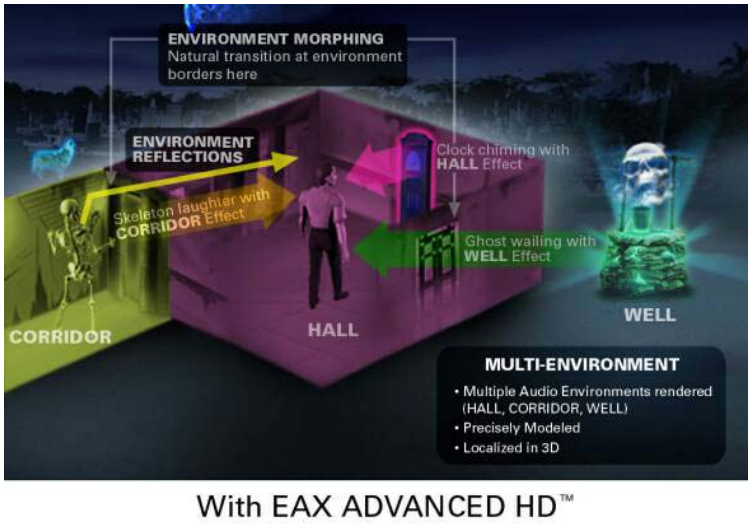


Illustration 9 - Latest technology from Creative Labs, image from the webpage:
http://www.tomshardware.com/video/20010927/audigy-11.html

In general 3D sound face the problems that 3D games face today: It's nearly impossible to model a 3D-game with all the details you see in real life.

The most impressive is how game developers use music today. PC's and home game consoles today are so strong that they are able to play sound in CD quality while the player sees incredible detailed graphics on the screen.
Pc's today have the possibility to delivering sound in 7.1 surround. Quite a lot of games support more than the old stereo output. 3D audios sound is still plagued of problems of modelling environments.
The 6th generation video game consoles like Playstation2, Xbox and Gamecube have the ability to deliver at least 5.1 Dolby Surround[35]. The quality the surround sound varies between consoles and games.

The most advanced games today sound wise are Uru - Ages Beyond Myst and Far Cry.
Uru has the perfect example of how to implement music together with what happens in the game. The blend between gamesound and music is close to perfect. Link to a pc demo can be found under game references.

[34] EAX – Name of Creative Labs' environmental sound control. http://eax.creative.com/eax.asp

[35] According to http://www.pcvsconsole.com/features/consoles/

Far Cry is the best choice when it come to realistic sound effects. Crytek have made tremendous effort in creating realistic environments and have even tried to model the doubler effect of moving objects. Link to a pc demo can be found under game references.

Soundtracks in movies compared to soundtracks in games

Creating a soundtrack for a movie

There is a good explanation on how they created the soundtrack on the Two towers extended DVD. Each of the following are mix downs of numerous tracks.

1. On set production sound
2. Foley
3. Effects
4. Dialogue
5. Music

When the movie is finished and everything is synchronized with what happens on the screen the soundtrack is mixed down into a DTS, Dolby Digital etc. soundtrack which is combined with the movie.

Creating a soundtrack for a game

The first thing the producer needs to do is to define what kind of soundtrack he wants. Is the soundtrack going to be interactive or non-interactive? If it's an interactive that could mean that a lot of effort needs to be made between the programmers and composers.

This could be a rough layout of a non-interactive soundtrack for a game.

Non-interactive

- Music

Interactive

- Sound effects
- Dialogue

- Etc.

The music just plays in the background while the player plays. When the player interacts with the game, sounds or voices are triggered

This could be a rough layout of an interactive soundtrack for a game.
Interactive

- Various music pieces
- Sound effects
- Dialogue
- Etc.

This music is also controlled by what happens in the game. Music could for example be linked to how much health the player has left or how much time is left.

Besides the interactive things producers are also required to think of the limitations of the machines their game will be played on.

In games sound effects are often reused, this requires sound people to sacrifice the very detailed and specific sound effects used in movies.
A good example is Foley. Foley are often made by making noise when watching a clip. These sound are very specific and can't be reused other places in the movie.
In computer games the equivalent to Foley could be footsteps which only are a few samples long but repeated over and over again.

Summary

There are a lot of similarities between soundtracks in movies and in games. With time soundtracks in games will without a doubt become more and more realistic. Technologies like 3D sound accelerators will help create a better and more detailed sound environment.

Appendix 5 - In-depth: Narrative structures in games

Do computer games tell good stories?

By Jes Brinch Jensen

Introduction

The growing market for computer games and the fast development in the computer industry has set new standards for computer games. It is not enough, just to develop a good looking game with amazing graphics anymore, if you want to differ from your competitors.

Because of the great selection of computer games, and the fact that the computer game industry has become a billion dollar business, the competition between the manufactures has reach a new level.

In the last 20 years computer game developers world wide, had focused on using computer games as a narrative media.

But do computer games tell good stories?

I will discuss and try to answer it in this paper. I will research the subject and read existing papers dealing with it, and finally conclude if it is possible to tell good stories in computer games.

What is a good story?

A *story* is a linearly ordered sequence of events set by a storyteller. A good story contains a narrative structure, the most common structure, is "*The Hollywood tradition of narration"*, this structure is based on the theories of the Greek philosopher, educator, and scientist Aristotle. Aristotle was one of the greatest and most influential thinkers in Western culture, even though his theories are more than 2000 years old, many of the modern theories origin from his [Golda, J.Gregory].

The narrative flow consists of minimum three acts:

1. Conflict/problem establishing.
2. Conflict/problem solving.

3. Conflict/problem resolution.

All most any *commercial movie/books*[36] begin (1. Act), with a conflict establishing, followed by the playing out of the implications of the conflict (2. Act), and completed by the resolution of the conflict (3. Act).

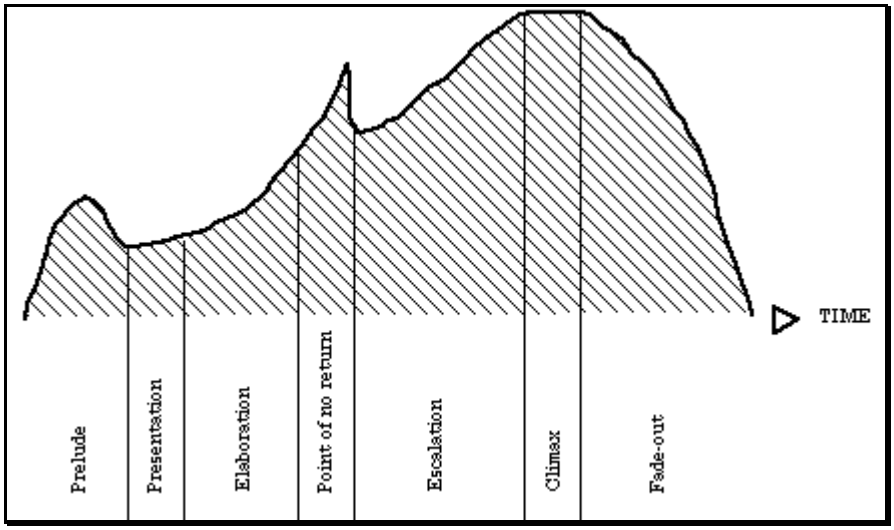


Figure 7 - Model of a basic narrative structure "The Hollywood tradition of narration".

The curve in figure 1 indicates the level of tension in a given time. As shown in the figure there is a clear connection between time and tension.

In the traditional narratology a story consist of three divided levels of time:

- ***Story (Fabula).***
  - Stories told chronologically.
- ***Discourse (Sjuzet).***
  - Discourse – telling about events.
- ***Time of reading -***

A basic narrative structure, are characterised by an elemental distance among the events told and the

[36] Most of the big blockbusters and other commercial movies use this narrative structure. But off course there exist movies that doesn't follow this structure, experimentally movies has never had a big breakthrough in any commercial connexion. These movies are often developed in order provoke or inspire film enthusiasts world wide.

discourse describing these events. When reading a novel, the storyline is constructed from the discourse that it is presented. Therefore, time of the narrated, time of the narration and time of the reading do not necessarily coincide [Greeff, M., 2001, p3].

"Narrative is a ... double temporal sequence... : There is a time of the thing told and a time of the narrative (the time of the signified and the time of the signifier). This duality not only renders possible all the temporal distortions that are commonplace in narratives (three years of the hero's life summed up in two sentences of the novel or in a few shots of a "frequentative" montage in film, etc.). More basically, it invites us to consider that one of the functions of narrative is to invent one time scheme in terms of another time scheme."

(Christian Metz, Genette, 1980)

What is a computer game?

A computer game is an interactive event, which is based on a set of defined rules [Lindley, Craig A., 2002,p4]. In computer games the player's inputs influence the output. Furthermore the player must be active, make choices and use his imagination to keep the game running.

Contrary to books and movies, a computer game is non-linear. This means that the player can follow his own path, and by that create his own structure.

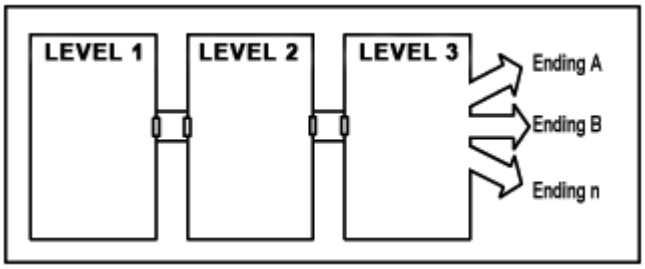


Figure 8 – Non-linear structures in computer games.

A computer seems to consist of three components [Smed, Jouni, 2003, p3]:

- **Challenge:** Rules of the game and, consequently, the goal of the game. When players decide to participate in the game, they agree to follow the rules. The goal motivates the players and drives the game forwards.

- **Conflict**: The opponent (which can include unpredictable humans and unpredictable random processes) obstructs the players from achieving the goal. Because the players do not have a comprehensive knowledge on the opponent, they cannot determine precisely the opponent's effect on the game.

- **Play:** The rules are abstract but they correspond to real-world objects. This representation concretizes the game to the players.

In relation to this I have a model for the playing situation *(figure 3)*, the model must be seen as a loop, where the input from the user continues generates a new combination of the material. The model consists of the following components:

- *Program (engine):*
    - The program consists of a set of rules and functions that manage the combination of the materials. These rules and functions also handle what the reader/player have access to and what he will be presented for.
- *Material:*
    - The material can be all most anything, in *Sleep Walk* we have focused on video, sound, lightning and colours. By combining these materials in our program we are supposed to create our game maps *(fear, anger, joy greet)*.
- *Output:*
    - The output presents the combination of the materials rendered by our program.
- *User:*
    - The user must evaluate (mentally construct) the output.
- *Input:*
    - When the user has evaluated the output he is assumed to react, his reaction leads to an input which is send to the program.

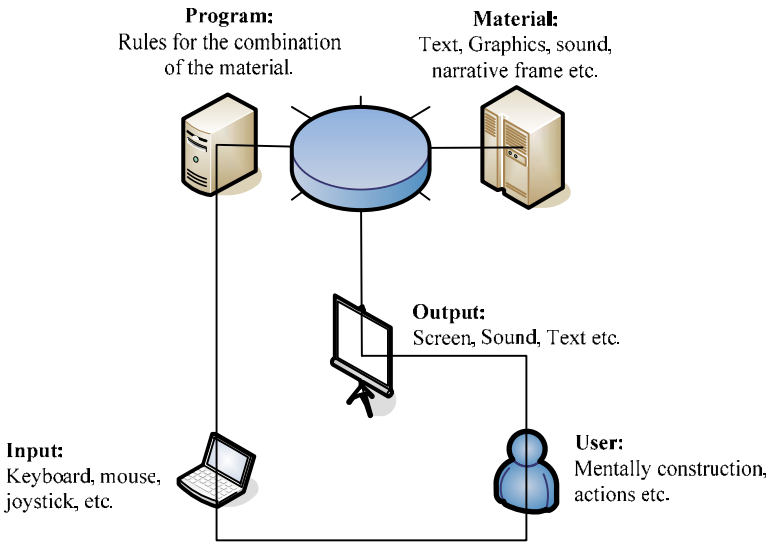


Figure 9 - Model for playing/reading a computer game/hyperfiction.

A good computer game!

There doesn't exist any recipe for developing a good computer game, there are constant discussions of what a quality computer game really is.

In the professional magazine *Game Developer*, Tzvi Freeman has put forward an assumptive list of traits of good and bad games, the first three points are these:

A good computer	A bad computer game
A good game empowers your imagination.	A bad game gets in the way.
A good game makes you feel in charge.	A bad game restricts you with artificial restrictions.
A good game is transparent. You only feel your own mind, the other players, and the ideas.	A bad game keeps reminding you that a game is there.

Table 1 - Good & bad computer games

These points are concluded by researching the most popular computer games. By comparing them he has observed, what they have in common. It is important to notice that each of these points has something to do with interactivity and freedom.

But what motivates a player, to play the same game again and again? By nature the human's curiosity has help us to become what we are today, we use this instinct when we play computer games. Our constant need to be better and develop ourselves is being challenged playing computer games.

Narratives in computer games

It is very attractive to combine narration and computer games. The developers have tried to do this by adding a narrative frame. A narrative frame typically consist of a story that will introduce the player to a problem and tell him have to solve it. According to that, the player at this point already know the end of the story, his part in the game is to come from point a to point b.

In the last years game developers world wide, has used big movies such as *Star War, James Bond & Lord of the Rings* in attempt to give computer games a touch of narrative. In many of these games the gameplay, is exactly the same, the only different is the narrative frame. This means that the narrative frame, especially in the action game, has always been considered unimportant. It's something used for selling the games, for having a way to refer to them.

In computer game where the user watches video clips and occasionally makes choices, story time, narrative time, and reading/viewing time will move apart, but when the user can act, they must necessarily implode: it is impossible to influence something that has already happened. This means that you cannot have interactivity and narration at the same time. And this means in practice that games almost never perform basic narrative operations like flashback and flash forward. Games are almost always chronological[Juul, Jesper, 2001].

This doesn't mean, that it isn't funny to play and that the player isn't entertained while playing a computer game, Rather that a computer game, not is as good as books and movies to tell stories.

In my research I ran into these statements, which actually describes the combination of narration and computer games very well.

"...the fundamental qualities that make a good game have remained unchanged and elusive. Consumers still flock to buy original, addictive, and fun games, leaving many flashy products with million-dollar budgets languishing in the $9.99 bin. These costly failures demonstrate that the consumer does not desire a cinematic experience, but rather a quality gaming experience."

Sid Meier, game designer

There's a conflict between interactivity and storytelling: Most people imagine there's a spectrum between conventional written stories on one side and total interactivity on the other. But I believe that what you really have are two safe havens separated by a pit of hell that can absorb endless amounts of time, skill, and resources.

Walter Freitag, game designer

The developers have been so focused on turning computer games into a stories, that they have forgotten to give the player a good experience.

Conclusion - *Do computer games tell good stories?*

In relation to my research, I have concluded that a good story consists of a narrative structure and divided time levels. A computer on the other hand is a non-linear interactive system where the action of the player constant decides the structure of the game.

It is then the strength of the computer game that it doesn't tell stories. [Jesper Juul, 1999]

According to my research, I don't see computer games as a good narrative media. But I believe that the developers focus on the subject, in near future will lead to new technologies and theories which will make narrative computer games a reality.

Appendix 6 - Contents of the CD-rom

Please refer to the text file enclosed on the cd-rom *readme.txt*

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