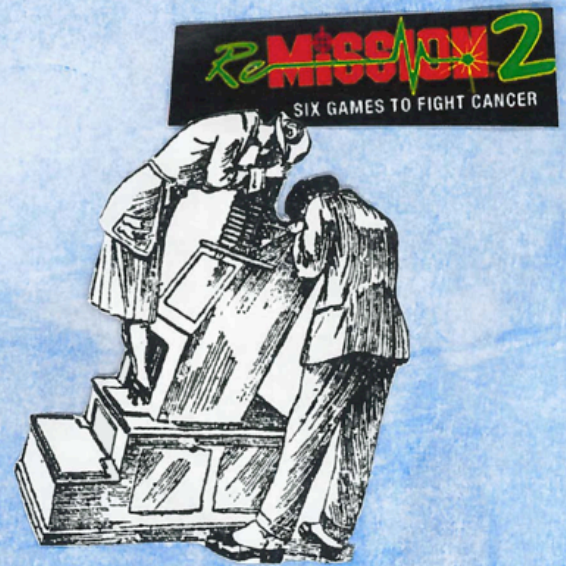

Level Up

A Media-Archaeological Study on the Rhetoric of Progress about Serious Health Games

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ABSTRACT

Examining the progressive and optimistic rhetoric about serious games in healthcare as a starting point, this thesis analyses the rhetoric of progress in medical media instruments and applications as recurring discursive building blocks in media history. It argues that the narrative of serious games history - a rhetoric that operates from within fixed values and beliefs about technological innovation - is part of a longstanding tradition in medical media history that shares particular ideological and imaginative premises about technology. Embedding the assumptions of serious health games within the tradition of medical media, the myth of transparency (Van Dijck 2005), present in medical's visual culture, is used as a lens to focus this media-archaeological analysis. The method proposed in this thesis is conceptualised as material discourse analysis, a novel approach that combines Erkki Huhtamo's discursive theory from the Anglo-American school and Friedrich Kittler's material theory from the German school of media archaeology. Using the microscope and the x-ray device as two media-archaeological case studies, the study illustrates several continuities and discontinuities in the ideas and ideals surrounding optimistic rhetoric, which contextualises a specific historical understanding of serious health games discourse. This study has several key findings: first, the optimistic rhetoric of progress about serious health games is a historical construction. Second, technological discourses are part of a recurring pattern of innovation driven by the desire for better vision and more knowledge. Third, games are heralded for their ability to immerse the player, but the novelty of optical technology has always been a site for pleasurable immersing practices. Lastly, the idea that games have the ability to visualise the body is part of a modern idea that instruments can capture objective truth. One important discontinuity is that ludic activities - pleasures of the flesh - and scientific practice - ratio of the mind - have converged in present-day serious health games rhetoric. The value of such a media-archaeological study of games in healthcare is twofold. First, the realisation that present-day rhetoric of serious games in healthcare can be understood by analysing how specific discursive building blocks transcend different technologies and histories. Second, this inquiry reconceptualises the history of serious health games from a longstanding relationship between humans and optical instruments.

Keywords

Serious games, healthcare, rhetoric of progress, media archaeology, material discourse analysis, x-ray, microscope

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And of course to our cat Simon, who, as always, does not care what I do just as long as we play together. I anticipate your dirty paws on my face tonight.

Looking into the novelty years, transitional states, and identity crises of different media stands to tell us much, both about the course of media history and about the broad condition by which media and communications are and have been shaped.

Lisa Gitelman, *Always Already New*

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Introduction

"The team at Hopelab developed a series of games that helped with adherence [in taking chemo medication]. It helped by actually dramatizing the nature of fighting cancer and fighting the existing cancer cells to keep the remission in check. How do they do it? They have a recipe for successful behaviour change".

Excerpt from the announcement of *Re-Mission 2: Nano-Bot's Revenge* at South By South West 2014 (SXSW 2014, n.d)

In 2014, South By South West, a festival for media and technology, announced a keynote presentation for a game which intended to increase medication intake. The quote above describes the game *Re-Mission 2: Nano-Bot's Revenge*, a mobile game which can be downloaded for free from different app stores, or played directly via a web browser. As the quote above shows, by enhancing the experience of fighting cancer cells, players will be stimulated to take their medication. Adherence to medication is one of the main issues addressed in the game (SXSW, n.d.). *Nano-Bot's Revenge* takes place inside the body. The levels in the game take place in different parts of the body and represent the cancer types commonly found there. Played from the protagonist's perspective, the player is Nano-Bot, and has to prevent cancer from spreading to the rest of the body. It is a point-and-click game where the main objective is to destroy the cancer cells using different types of weapons. *Nano-Bot's Revenge* is one example of a serious game, 'produced, marketed, or used for purposes other than pure entertainment' (Egenfeldt-Nielsen, Smith, Tosca 2013, 230). Games and game design elements are increasingly used to improve health or teach about one's disease. Other serious health games, such as *Cancer Game* (Wei Wei 2011) or *Code Fred* (Unit 9 2013) also try to visualise bodily functions and provide information about healthy or unhealthy behaviour. Targeted specifically at adolescents and young adults with cancer, the aim of *Nano-Bot's Revenge* is to motivate 'patients to stick to their treatments by boosting self-efficacy, fostering positive emotions, and shifting attitudes about chemotherapy' (Re-mission 2 2013, n.p.). The underlying assumption of these games is that playing can create cognitive changes.

Problem Statement

Games have become serious, and their educational value is a hot topic in popular and academic discourse (Ritterfeld, Cody & Vorderer 2009; Gee 2009; Egenfeldt-Nielsen et al. 2013). A sub-category herein is serious health games, which attract a growing number of practitioners, game designers, medical professionals, educators and researchers.¹ Indeed, an increasing number of disciplines are drawn to the potential of serious games in healthcare, including health advocates, medical experts such as doctors or nurses. Although recent research is invested in proving the effectiveness of serious games in healthcare (Lieberman 2009; Van Der Spek 2011; Thompson 2012; Khalil 2013), as I will illustrate later on, these studies are rested on deeply ingrained ideas about technology's potential to improve our being, which are actualised in claims about games' potential to provide immersive experiences and ability to simulate corporeal processes. Subsequently, it can be argued that the way in which serious games are received as an educational tool for health issues necessarily follows from a rhetoric of progress. This rhetoric of progress, conceptualised by play scholar Brian Sutton-Smith

and influenced by the fields of pedagogy and psychology, assumes players develop their social cognitive and behavioural abilities through gameplay (2001, 219). To be more specific, the rhetoric of play as progress is fixed on proving the instrumental value of play (Sutton-Smith 1995, 279). Games and play researchers tend to group within networks that cluster in 'persuasive discourses' attempting to validate their own existence (ibid. 277). Indeed, this is seen in serious games as well, where rhetoric is subject to shared beliefs and claims about the instrumental use of play and games, driven by their technological performance (Michael & Chen 2005; McGonigal 2010; Schouten 2013). Problematic about this deterministic discourse is that '[t]here may be no escape' from it (Sutton-Smith 1995, 282). Although Sutton-Smith argues we should try to move beyond this framework, he refrains from providing an alternative approach (ibid.). I argue it is possible to break open this rhetoric by looking into the specific historical context of serious health games. Therefore, by visualising dominant ideas and ideals about serious games in healthcare and how they are part of a recurring discourse, I propose a specific tactic that analyses the rhetoric of progress about serious games.

The belief that games improve one's health brings with it a moment of *déjà-vu*, the realisation that optimistic and expectant rhetoric of technology is part of a historical discourse. Many scholars have expressed a sense of *déjà-vu* while studying present-day media phenomena (Gunning 1991; Boddy 1994; Huhtamo 1997; 2011; De Vries 2012). In studying this history, myths that technology changes our lives for the better express themselves in discursive building blocks such as ideas, imaginations, and fantasies about the use of technology (De Vries 2012, 89). A dominant myth surrounding the use of media in medical culture is the idea that bodies are transparent and readable (Van Dijck 2005, 15). In medical culture, optical instruments such as the microscope or x-ray device have played a constitutive role in the formation of norms concerning the study of the human body. Conceptualised by Van Dijck as the myth of transparency, the idea of progress is rooted in the constant struggle for better vision to penetrate the body. Although Van Dijck traces the cultural history between medical instruments and media, she does not consider games or play in her analysis. An investigation of serious health games discourse that traces myth in different medical media instruments would be valuable on at least two levels. First, the myth of transparency could serve as a guiding principle to focus the investigation on the historical context of rhetoric of progress about serious health games. Secondly, this research could investigate transparency considered from the context of serious health games and look into the entertainment and ludic practices surrounding medical media, thus providing specific insight into the applicability of the concept. Subsequently, questions about the relationship between discourses of medical media instruments and serious health games need to be raised. More specifically, an investigation into the discursive building blocks that are present in the rhetoric of progress of these discourses. Answering these questions contributes to comprehending present-day rhetoric about serious health games.

Research Questions

The main question I aim to answer in this thesis is: to what extent are the historical discourses of the x-ray, microscope, and serious health games determined by the rhetoric of progress? Using the microscope and the x-ray device as two media-archaeological case studies I aim to analyse continuities and discontinuities in the ideas and ideals surrounding optimistic rhetoric in order to provide an alternative understanding of serious health games discourse. In order to answer my main question I will systematically discuss the following sub-questions: (1) what are the dominant claims

and assumptions in serious health games discourse; (2) how can serious health games assumptions be studied as discursive building blocks; (3) in what way are these building blocks visible in other medical instruments; and lastly, (4) what are the continuities and discontinuities between these building blocks and serious health games discourse? Answering these questions will provide a valuable intervention on a theoretical, methodological, and analytical level, which I will explain in more detail in the first chapter.

Literature

The existing literature on medical media culture is spread out in different fields of media studies, and focuses on medical instruments and their visual culture, for instance, the intersection between media and medical culture (Van Dijck 2005), the historical relationship between medical instruments and the moving image (Cartwright 1995) and medical visualisations throughout history (Stafford 1991). As I will discuss in chapter two, these studies have variably underplayed the importance of entertainment and ludic practices in the cultural history of medical instruments. Only Simone Natale (2011) and David Parisi (2012) have attempted to bridge the gap between medical instruments, entertainment, and playful interactions by analysing their interrelated cultural history. Simone Natale (2011) has investigated the early reception of the x-ray device as a visual spectacle and as a means for public entertainment. David Parisi (2013) provides an alternative history of electro-tactile games by analysing ludic and medical interactions of electro-tactile machines. Both authors attempt to explain rhetoric of the present by excavating lesser known imaginations and ideas around medical technologies. This thesis builds on the discourse of media history by explaining the present rhetoric of serious health games. Of course, there are other discursive building blocks that also influence serious health games discourse, but this thesis focuses on historical continuities and discontinuities between medical media technologies.

Method

The methodology used in this thesis is media archaeology, a field concerned with excavating alternative media histories. One of the principles of media archaeology is to rethink the linear chronological collection and organisation of historical data, by providing an understanding of time as cyclical. In this notion of cyclical time, discursive building blocks, conceptualised by archaeologist Erkki Huhtamo (1997; 2005; 2011) as *topos*, appear and reappear in different historical discourses about technological progress. As a result, an archaeologist's position is decidedly disruptive, consciously aiming to provide a counter voice for the dominant hegemonic narrative of technological novelty and innovation (Huhtamo 2005, 15). Therefore, the aim in this thesis is not to stipulate an evolutionary model of serious game history, with its accompanied claims of revolutions and breakthroughs, but rather; it intends to explain that assumptions and ideas surrounding serious health games today are informed by discursive building blocks. By retracing the steps of the *déjà-vu* moment, this media-archaeological study is valuable on two levels: first, the realisation that the popularity of serious games in healthcare can be explained by revisiting old ideas, dreams and expectations on medical instruments. And second, rethinking the history of serious health games as a longstanding relationship between humans and technology.

A challenge that arises when using media archaeology as a methodology is the vastness of the field, which is not always clearly demarcated. Roughly speaking, a division can be made between the Anglo-American School (Huhtamo 2011), which focuses on the discursive analysis, and the German school of thought (Kittler 1990;

Ernst 2011), which focuses on the material aspects of media, for instance how material affordances of a medium reconceptualise perception and perspective. I aim to position this research as a combination of these two schools. As I will explain in chapter two, in order to accomplish this I propose the novel method of material discourse analysis, which tends to the written language and material practice of optical instruments.

Subsequently, the main method in this thesis is a material discourse analysis, paying attention to both the discursive and material aspects of the instruments under my investigation.² Analysis of a discourse involves studying the utterances and situated meanings contained within it. There are many ways to perform discourse analysis (Foucault 1972; Foucault 1973; Van Dijk 1988; Fairclough 1989). The suited interpretation I have chosen to use in this thesis is from game scholar James Paul Gee, who discerns certain building blocks that constitute the interrelated network of components or aspects that give meaning and create meaning to each other (Gee 2001, 83). In this method, the first two building blocks are adapted from Gee's framework. First, the *semiotic* aspect, which is the language and images used to create a specific interpretation of knowing the body. Secondly, the *activity* aspect; that is the 'specific social activity or activities in which the participants are engaging; activities are, in turn, made up of a sequence of actions' (ibid.). Recognising how affordances of technology influence perspective, I have added a material building block in this method. Therefore, the last building block focuses on the *material* aspect; how the material practice of optical technologies disrupts and creates a specific corporeal perspective, which is based on the concept of 'skilled vision' by scholar Christina Grasseni (2004). In chapter two I will explain the application of this method in more detail.

Comparing serious health games to the x-ray device and the microscope may seem daring, and perhaps comes across as taking discursive leaps. However, a significant part of a media-archaeological approach is studying dominant ideas and ideals surrounding technology, which are - in the words of media archaeologist Siegfried Zielinski (2006, 31) - trans-historical. As a result, in this thesis I cut across disciplines and discourses by following the myth of transparency in different instruments and practices. Using discourse analysis as a method, another aspect necessary to reflect on is the danger to rehash media stories (Ernst 2011, 240). Structuring research in a linear manner runs the risk of writing a "first this, than that" story. Aware of this critique, I will also focus on the non-discursive material aspects of the instruments I investigate. This means that my research for this project will be a combination of the Anglo-American and German school of media archaeology.

What sources are there to excavate and why? The first analytical choice I made was to consider the rhetoric of progress as a modern concept. Therefore, I mostly focused on sources from late nineteenth and early twentieth century. However, since the microscope is an older technology, I also looked into texts from the seventeenth century. In the selection of primary sources I abided by the three discursive building blocks I mentioned earlier. In order to examine the first building block, I focused on early use of the technology and searched for primary texts that were written by or about the inventors of the x-ray and the microscope. For the microscope I visited the special collections library in order to examine books written by Anthoni van Leeuwenhoek (1686) and Johannes Zahn (1685). Moreover, I used online databases such as *The Gutenberg Project*, *Google Books*, and *Archive.org* to find digitised primary texts such as *Micrographia* (Hooke 1665). For the x-ray I also made use of these online databases and found texts such as Wilhelm Roentgen's article 'On a new kind of rays' (1886), or *The Progress of Invention in the Nineteenth Century* (Byrne 1900). For the second type of building block, I searched for examples of ludic practices and the entertainment value

of optical technologies. Therefore, I systematically excavated newspaper articles, advertisements and audio/visual sources around the late nineteenth and early twentieth century. For this I mostly used the Dutch database *Koninklijke Nederlandse Bibliotheek*, but also secondary sources such as scholarly articles written about the x-ray or microscope. Lastly, for the third type of building block I aimed to find texts that described how the technology was used in medical culture, therefore, I searched for medical textbooks and articles that advocated the use of photo-micrography and skiagraphy, for which I used the earlier mentioned online archives.

Structure

In seeking to answer the question stated in this thesis, my research is divided into two sections: in part one I shape the theoretical background and framework needed to conduct my media-archaeological study, then in part two I present two chapters of case studies where the ideas and rhetoric of serious health games are examined, and return to a discussion of my main question in the last chapter. To be more specific I will explain the structure per chapter.

In the first chapter, I aim to answer the first sub-question and start by presenting a review of the theoretical field in media studies that concerns itself with studying the recurring rhetoric of progress surrounding media technologies. By presenting two perspectives on historical analysis, namely "traditional" history and "cultural" history, I problematise the rhetoric about serious games and criticise a linear notion of progress that favours chronology and continuous claims of newness. By examining the notion of progress in serious game rhetoric, I argue that this discourse positions serious games as new because of their computational advancement. In addition, highlighting the need for a specific alternative understanding of this rhetoric, I claim that assumptions of serious games need to be examined in their explicit context of use. Zooming into the context of healthcare, I then proceed to define four ideas and assumptions about serious health games. These assumptions are: (1) serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties; (2) playing serious health games will make the player forget his pain; (3) serious health games are simulations of real world phenomena; (4) playing games about the body creates a deeper understanding of the body.

Then, in order to advance I will need to answer the second sub-question that investigates how assumptions about serious health games can be studied as discursive building blocks. I argue they can be studied as *topoi*, which I illustrate by introducing the concept of *topos* as conceived by Erkki Huhtamo (1997; 2005; 2011). Subsequently, in the second section I will insert theories of medicine's media culture (Cartwright 1995; Van Dijck 2005) and examine the myth of transparency. This myth, present in medical culture, is visible in optical technologies and representations, which find their way into healthcare. Continuing, I argue that the *topoi* of health games are connected to the myth of transparency. Lastly, I bring together the study of media-archaeological *topoi* and medical culture, by proposing the method of material discourse analysis.

Proceeding, in the second part of my thesis I will analyse in what way the previously mentioned *topoi* are present in medical media instruments. In chapter three and four, I commence with an analysis of the microscope and x-ray as media-archaeological objects. Using the three building blocks as a structuring principal, I systematically discuss the language-in-use and material practice of these technologies. In the first section I analyse the rhetoric of progress in the microscope and x-ray's early ideation phase, and illustrate how optimistic rhetoric is deeply imbedded in the quest for better vision and technologies that extend the senses. Then, I proceed to illustrate how

the powerful topos of making the invisible visible emerges in discourse, but differentiates between technologies. In the second section I highlight how ludic practices and entertainment activities emerge around these optical technologies, and is connected to the pleasure of discovering of a new world perspective. After illustrating ludic and entertainment practices, the third section concentrates on the justification process of these technologies in medical culture, and the rhetoric used to describe its usefulness. Analysing these sections will shape the trans-historical discourse of transparency, which is rendered visible through studying themes as topoi.

In the fifth chapter I bring together the analysis of the media-archaeological objects and discourses, and the sub-conclusions of part one by highlighting the continuities and discontinuities of these recurring discursive building blocks. I systematically discuss the four claims made about the rhetoric of progress, and specific patterns and breaks emerge. In analysing the rhetoric of progress, a recurring pattern emerges that instruments are valued for their technological novelty of sharper and better vision. However, a discontinuity is the acceptance of ludic activities and knowledge transfer in the scientific community. Furthermore, the assumption that playing serious health games will make the player forget his pain can be partly explained by the deeply ingrained fantasy of being immersed into novel worlds, which is actualised in the topos of making the invisible visible. There is an inherent pleasurable experience in discovering novel perspectives on the body. In contrast, this immersive experience was not institutionalised by medical culture, where the topos of making the invisible visible was used as metaphor to point to the functional use of the technology. Third, the rhetoric of progress is part of a longstanding idea in medical culture, which assumes that technological instruments have the ability to visualise and capture the unmediated truth. However, the processes used to capture these visualisations vary greatly, as micro-photography and skiagraphy are representations made with chemical processes of light reflecting on a negative, and simulations are programmed visualisations, made by creating images on the computer. However, there is a material discontinuity between the chemical process of capturing, and the digital process of creating an image. Lastly, the belief that playing games about the body creates a deeper understanding of the corporeal is connected to the topos of "seeing is curing" (Van Dijck 2005, 7). This topos is part of a tradition that places visualisation within the process of treatment, where it is expected that visualisations will lead to greater understanding of corporeal processes. However, whereas visualisations in treatment using micro-photography and skiagraphy are mediated by an medical expert, corporeal knowledge in serious health games is shared via mechanics in the game, disrupting the process of knowledge transfer.

Lastly, in my conclusion I return to the key outcomes of my research by summarising the most important findings, which explain how serious health games rhetoric can be understood as topoi that reappear throughout medical culture's history. In the conclusion, I reinforce the claim that serious games rhetoric can be understood by analysing the specific context that it is implemented in, focusing on specific breaks or patterns in discursive building blocks. Then, I proceed by discussing the academic relevance and valuable interventions made on a theoretical, methodological and analytical level. Next, I consider the limitations of this research, and discuss possible limitations of over-interpretation. Lastly, I look forward and discuss possibilities for further research. Although it is interesting to analyse the social-ideological framing of serious games, it has not been the focus of this research to do case studies of specific serious health games. Further research to address the claims made in this thesis could be analysed by performing a close-reading of specific serious health games such as *Re-Mission*, or *Nano-Bot's Revenge*.

This thesis offers two important insights. First, the realisation that today's enthusiastic reception of serious health games can be partly explained by revisiting old ideas, dreams, and expectations of medical instruments. Second, this inquiry reconceptualises the history of serious health games within a more longstanding relationship between optical technologies and humans.

Part I

From Rhetoric to Topos



Illustration 1: Screenshot of the game Re-mission 2: Nano-Bot's Revenge (2014)

In the introduction I argued this research makes three valuable interventions. These interventions are: First, (1) the theoretical consideration that specific assumptions and imaginations of serious health games are part of a recurring discourse of progress always surrounding media technologies. Secondly, (2) my approach of a material discourse analysis is a valuable methodological positioning within the field of media archaeology. Lastly, (3) my analytical intervention focuses on a trans-historical comparison of recurring topoi in media history.

Therefore, in this part I highlight the theoretical and methodological framework needed to support these claims. To achieve this I will answer the first two sub-questions. The first chapter is dedicated to answering the first sub-question: what are the dominant claims and assumptions in serious health games discourse? In order to answer this question I will illustrate how the history of serious health games is narrated around technological progress, and frame this discourse within the theoretical field that concerns itself with the optimistic reception around games and play research. Raising the need to analyse the historical context of serious games in healthcare, I will zoom into specific ideas and assumptions concerning the use of serious health games. This serves as a theoretical background for the second chapter, in which I will answer the second sub-question: how can serious health games assumptions be studied as discursive building blocks? My argument is that the concept of topos, conceptualised by Erkki Huhtamo (1997; 2005; 2011), is useful as a starting point, but needs to take non-discursive building blocks into consideration as well. Therefore, I propose the novel method of material discourse analysis, which focuses on both the semiotic and activity aspects, and material practice. By answering this question I will position myself in the field of media archaeology and provide the methodological approach needed in order to conduct my analysis of the microscope and the x-ray device in part two.

1 Serious Games, or; Serious Expectations

The first chapter focuses on the theoretical value of this research, which is my claim that the rhetoric of serious health games can be understood as part of a discourse of progress that chronologically frames media technologies as novel, heralding the new as revolutionary due to its technological affordances. Supporting this claim subsequently provides the answer to the first sub-question posed in this thesis, namely; what are the dominant claims and assumptions in serious health games discourse? In order to answer this question I will first frame this research within the theoretical field that concerns itself with optimistic and evolutionary rhetoric of media (1.1). Then, the second section illustrates the narrative history of serious games, where I raise the need to reconsider the episteme of serious game research (1.2). Subsequently, considering that assumptions in serious health could be themes that travel between discourses, the third section zooms into a specific subset of serious health games and illustrates dominant ideas and ideologies present within this discourse (1.3). This overview will provide the starting point for the main analysis in chapters three and four.

1.1 The Advent of Progress in Media Technologies

In this section, I would like to turn attention to a longstanding scholarly debate on the rhetoric of progress in media studies. In order to construct a theoretical framework to place ideas surrounding serious health games into perspective, it is necessary to discuss how media are framed within a narrative of progress that focuses on continuities (1.1.1). Then I will highlight how metaphors are used to describe different media developments,

and are used to promote and persuade the reader (1.1.2). These metaphors are charged with ideological assumptions of what the medium represents. After outlining the broader discussion in media studies it becomes clear that this enthusiastic and evolutionary belief is also present in the field of game research. By reflecting on the recurring optimistic reception of different media forms, my proposition is to understand serious game rhetoric within this theoretical field.

1.1.1 Evolutionary Patterns

Media are described in a narrative that favours an evolutionary mode of history. This becomes evident when taking a closer examination of the longstanding discussion in media studies, which revolves around the reception of media developments. The way in which games are discussed and received in society is a research topic that has seized the interest of many scholars in the last decade (Huhtamo 2005; Parikka & Suominen 2006; Parisi 2012). A common interest in this field is the recognition of recurring patterns in the introduction of different media forms. Strikingly, some scholars identify a pattern in the way media are discussed with a recurring sense of optimism and anxiety about the application of new media forms (Lister et al. 2009, 61-69). On the one hand, there is always a progressive and optimistic conceptualisation of recently introduced technologies, while, on the other hand, the rhetoric also focuses on possible negative and harmful technologies.

Examples of the optimistic reception of games are easy to find. Although there is also a predominant discourse on the negative effects of games (Griffiths & Davies 2005; Goldstein 2005), serious game rhetoric is strikingly optimistic.³ For instance, in the last years, serious games have been heralded for their persuasive power and their immersive experience. Game scholar and designer Jane McGonigal argues serious games have the ability to create cognitive changes to social problems (McGonigal 2010, n.p.). The ability of games to 'make people happy' and solve 'complex challenges' can be harnessed to improve the real world (McGonigal quoted in Zetter 2010, n.p.). This creates the impression that games are a sort of Holy Grail, with the ability to foster cognitive changes in attitudes. Through her claim that 'reality is broken' (ibid.), McGonigal argues that playing games has the power to fix this reality; effectively saying that serious games provide a *revolutionary* experience. While I will return to the ideas and assumptions of serious games in the third section of this research, McGonigal's argument is one example of the enthusiastic reception of serious games.

In an attempt to elucidate why this sense of optimism has come to linger around the advent of new media technologies, media scholars recognise an evolutionary model present in the "newness" of media (Zielinski 2006, vii). 'Ingrained in this model is a flawed notion of survivability of the fittest, the slow assimilation of the most efficient mutation' (ibid.). What draws our attention is that the new is conceptualised as a better version of the previous. This type of configuration is considered by some scholars as the traditional understanding of media history, which aims to reconstruct history by presenting historical evidence such as dates, places and persons (Brennen 2011, 95). It structures events in a chronological manner, focusing on continuities.

This type of linearity perceives events in history to be linear and teleological. Why is this problematic? Because this re-affirms specific (hi)stories and a canon that favours specific scholars, technologies, and events, while other discursive relations are lost in translation. One scholar to realise the difficulty of this episteme was the French philosopher Michel Foucault. In the late 1960s, Foucault published *L'Archeologie du Savoir* (1969) translated in 1972 as *The Archaeology of Knowledge*. In it, he openly

criticises narrative history and the artificial notion of continuity: '[a]nd the great problem presented by such historical analyses is not how continuities are established... but one of transformations that serve as new foundations, the rebuilding of foundations' (1972, 5). This complex quote refers to two problems Foucault has with a chronological account of history.

First, it supposes that there is a 'well-defined spatio-temporal area' between events or phenomena that present the possible existence of a 'system of homogenous relations' (ibid. 9). This means that all events have a causal relation to one another, that they are teleological in nature, and defined by a distinct essence or affordance. This well-defined area leaves little room for alternative voices, places or technologies that have failed to become popular. Secondly, it articulates history into 'stages or phases', contained within its 'own principle of cohesion' (ibid. 10). In other words, histories are formed in distinct phases to mark the difference between the one and the next. Rhetoric has its own episteme, characteristics, and traits. I will return to this critique when discussing the narrative of serious games in the next section.

Second, the principle of cohesion so often found in histories of the new is the emphasis on technical qualities such as 'speed, capacity, and performance' (Marvin 1988, 4). Indeed, the explanation of a medium seems to lie in the ability to elucidate a difference between characteristics. Problematic about this notion of technological progress is that it neglects the range of social meanings a technology might have. Indeed, as media historian Carolyn Marvin argues, these technological characteristics are secondary to the social meanings that can elaborate themselves (ibid.). One way to examine the specific ideas and meanings surrounding technology is to analyse the ideologies surrounding them.

In short, understanding the social status of different media forms is a central topic in media studies. If the new is a label, then it is wrapped in a package of progressive rhetoric. In order to define a medium, it is placed in a historical context. The problem with the dominant mode of enquiry, as Foucault emphasises, is that it structures events as linear, focusing on continuities. Technology serves as a mediator between one event after another and is characterised for its technical performance. The problem, however, is that technology neglects the discursive construction of media, and its own social meaning.

1.1.2 Metaphors We Imagine With

Whereas the previous sub-section problematised the traditional historical embedding of technological novelties, we have not yet addressed the meaning of this optimistic narrative. Therefore, I want to focus on the specific ideological framing that surrounds media technologies. In this sub-section, I will illustrate the recurring pattern of fulfilment that seems to recur in media discourse. These desires and ideologies are present in the metaphors we use to describe media.

Ideology can be understood as the 'dominant ideas of an individual, group, class, or society, the way meanings are socially produced' (Brennen 2011, 201). In the enthusiastic reception of media forms, these social meanings also represent specific ideas and desires of what technology can achieve. Focusing on the language used to describe technologies directs us at the dominant ideas and assumptions surrounding its possibilities.

Specific associations, metaphors, and images create a certain image of what technology is. Focusing on the optimistic reception of technology, there have been several utopian revolutions in the media landscape. At the advent of envisioning optimistic futures, metaphors are used to make these changes understandable for a

larger audience, but also dictate how they are perceived. As Mirko Tobias Schaefer points out, the personal computer, the Internet and wireless communication 'entered popular discourse with a rhetoric of promise which envisioned a brighter future' (2011, 25).

Think for instance of the metaphor "Web 2.0." Web 2.0 is praised for its 'architecture of participation' (O'Reilly 2005; Jenkins 2006). This metaphor, popularised by Tim O'Reilly, was created to explain the technological difference in the operating logic of different Internet services. '[H]arnessing collective intelligence' (O'Reilly 2005), Web 2.0 is based on collecting and reassembling user-generated data. Information of users is gathered and services are delivered in return. As the name might suggest, Web 2.0 is considered to be the second coming of the World Wide Web (WWW). The second coming, implying to be the new and improved version of the first coming of the WWW. This example shows how metaphors like Web 2.0 are used to promote technological improvements. It turns our attention to the ideological meaning of technology, embedded in different social and cultural expressions.

Analysing the metaphors used in media rhetoric shows how we are enchanted by technology's seductive promises. Fresh technological impulses are understood as the next best thing and existing technologies are positioned as inadequate (De Vries 2012, 166). Therefore, it is important to be aware of these promises, and to know that technological cultures are 'teeming with dreams, visions, hopes, goals, expectations, and imaginative practices', and to understand that this enchantment is a larger part of us than we would like to understand (Bailey 2005, 17).

These expressions can be captured by analysing the rhetoric of a particular group of people. I understand rhetoric as a 'persuasive discourse' or 'implicit narrative' which is used by a specific group of people to 'persuade others of the veracity and worthwhileness of their beliefs' (Sutton-Smith 2001, 8). This rhetoric, according to game scholar Brian Sutton-Smith, is a narrative with a specific type of language, values and theories woven within it. Therefore, rhetoric expresses the way specific media such as serious games are placed within a larger network of value systems (ibid.). Thus, rhetoric is not about defining an essence, rather; it analyses what type of discursive and epistemological framework the rhetoric is an assumed part of. Metaphors, like the one I described earlier on, are part of the fabric of this rhetoric and can be analysed for their underlying values and assumptions.

Foucault (1972) reminds us that language is always an exercise of power and that information is never merely stated, rather; it is a complex web of persons who decide what information to enclose, how to structure it, and how to phrase it. Progress, is indeed one of the dominant subject-matters in the history of different media technologies. The question that remains is: what is the rhetoric of serious games, and what are its underlying assumptions?

In short, these observations have raised two important interrelated issues regarding an understanding of serious health games: the first is that progress is a part of a linear historical narrative focusing on continuities, where technology is understood as development marking the shift between distinct phases. The second is that claims about progress share particular ideological and imaginative premises, which can be examined by analysing the metaphors and rhetoric surrounding these media forms. Now that the theoretical field of enquiry is shaped, I will proceed in the next section by analysing ideological rhetoric surrounding serious health games.

1.2 Breaking With Game Tradition

So far the discussion has shaped the theoretical field of media studies concerning the rhetoric of technological progress. The aim for this section is to place serious game rhetoric within this field. Therefore, I will highlight how the term "serious games" is explained by several academics.

Let us examine to what extent the notion of progress prevails in serious game rhetoric. Strikingly, it appears that the history of digital games is defined by its most successful games and scholars. As Brennen argued (2011, 201), traditional historians conceptualise history in terms of important events, and in the case of game studies, in terms of the most popular games or platforms.

Traditionally when scholars try to define serious games, they tend to narrate their origins within the development of computer games. Despite the debate on which term to use when talking about serious games, the working definition I choose to use is 'games that do not have entertainment, enjoyment, or fun as their primary purpose' (Michael & Chen 2005, 21). There has been much academic debate about the categorisation of serious games, and there is a strong connection to education, which I will return to in the next section.⁴ More importantly, several scholars who have attempted to trace the origins of serious games argue their popularity is linked to technological development (Djaouti, Alvarez, Jessel & Rampnoux 2011; Ritterfeld, Cody & Vorderer 2009; Egenfeldt-Nielsen et al. 2013). Although not explicitly mentioned, when deconstructing the history of serious games and their reception, the narrative is discursively tied to developments of computational technologies, which is - as I've argued in the previous section - because this linear account of progress which is trapped in a recurring sense of newness.

The narrative history of serious games seems to consist out of different phases. The origin of serious games is traced back by several scholars to the first person who coined the term (Bogost 2007; Djaouti et al. 2011; Egenfeldt-Nielsen 2013; Deterding 2015). The term was seen around the time of the Cold War, during the rise of computer technology and the early development of computer games. In chapter eight of *Understanding Video Games*, Simon Egenfeldt-Nielsen, Jonas Heide Smith, and Susana Pajares Tosca trace the history of serious games back to Clark C. Abt and his work *Serious Games* (1970), which addresses the educational value of games. Making a similar argument, scholars Damien Djaouti, Julian Alvarez, Jean-Pierre Jessel, and Olivier Rampnoux (2011) in 'the origins of Serious Games' consider Abt to be the first to have defined this field. Many other scholars also mention Abt as a founding father of serious games, placing his book within the narrative history of serious games (Michael & Chen 2005; Bogost 2007). In the first chapter 'The Reunion of Action and Thought' Abt offers a concise definition of how he defines serious games: '[w]e are concerned with *serious games* in the sense that these games have an explicit and carefully thought out educational purpose and are not intended to be played primarily for amusement' (Abt 1970, 9). This working definition of serious games bears a striking resemblance to the earlier mentioned definition proposed by Michael and Chen. However, after Abt published his book, the term disappeared from academic discourse.

The second phase of serious games emerged around the turn of the millennium. Whereas the idea of serious games since Abt has been strongly tied to education, in the early 2000 discourse started focusing on the implementation of serious games in other aspects of everyday life, such as work, healthcare, sleep, and movement (Egenfeldt-Nielsen et al., 230). Several figures such as Ben Sawyer have played an important role in materialising techno-optimistic rhetoric about serious games. In their book *Serious*

Games (2009) Ute Ritterfeld, Michael Cody and Peter Vorderer invited pioneer Sawyer to share his origin story on how the term serious games arrived back in academic discourse. Sawyer explains that around 1999 he teamed up together with game developer Trevor Chan - designer of the games *Capitalism I & II* - and former Stanford CFO William Massy to develop the game *Virtual U*, which is a simulation-based game to explore management issues in universities (2009, xi). 'The experience of *Virtual U* was at first unique: at the time we didn't call what we were doing serious games' (Sawyer 2009 xiii). However, as Sawyer admits later on, in an attempt to expand the development of other games together with game developer Dave Rejeski, they felt the need to explain the relevance of using games in educational settings in order to 'cheaply plant the seed that might lead to further funding and work' (ibid.). Rejeski wanted the article to have 'a bit more punch,' so he added the term serious games to the title of their paper (ibid. xiv). Driven by the economic prospects of video games, serious games returned back into academic discourse.

Additionally, after the positive reception of the paper, Sawyer continued to promote serious games by writing articles and organising events and press releases under the flag of the Serious Games Initiative. Following suit were projects such as "Games for Health," or events such as the Serious Games Summit. Most importantly, the key success of serious games is the technological progress made in these years according to Sawyer, as he implies that technological development is driven by computational technology: '[w]hile we could dwell on certain aspects of games that drove the growth of serious games [...] the key underlying current was that games were more rapidly taking advantage of what Moore's law and Metcalfe's Law were doing on a fundamental technology level' (Sawyer 2009, xiv). Marketing the term serious games, the reason for the term's popularity according to Sawyer is the technological development of smaller chips, which enabled fast and mobile technology.

In their article 'Origins of Serious Games,' Djaouti et al. (2011, 4) claim the 'conjunction of *America's Army's* popular success and Sawyer & Rejeski's efforts to promote such games, makes them identify 2002 as the starting point of the "current wave" of Serious Games'. Since then, many scholars have heralded the success of serious games by praising the technological advancements of digital technology (Prensky 2001; Michael & Chen 2005; McGonigal 2010; Schouten 2013). Indeed, the 'digital game-based learning revolution' is here, and 'immense changes in technology over the past 30 years, of which videogames are a major part, have dramatically [...] changed the way those people raised in this time period think, learn, and process information' (Prensky 2001, 1-6). While scholars such as Prensky herald games for non-entertainment purposes as revolutionary, other scholars are also noticeably positive about the technological determination in the games industry: '[t]he retail video game industry has historically been driven by technology' (Michael & Chen 2005, 3). Although it cannot be denied that games have benefited from advancements in computational technology, it would too limited to reduce their success to technological progress.

Returning to the critique on the traditional narrative of history I highlighted in 1.1.1, we see how serious games are framed within a dominant epistemological framework. The dominant mode of explaining serious games creates a specific rhetoric within a discipline. As Foucault (1972, 10) argues, a specific canon frames a narrative of artificial notions of stages of phases. In the previous discussion on serious games, the resurrection of the term serious games is marketed by scholars such as Sawyer and Rejeski, and the advent of the technological progress used to sell the dream of the game revolution (Prensky 2001; McGonigal 2010).

Game scholar Erkki Huhtamo conceptualises these historical narrators as "cryptohistorians" 'who like to represent electronic gaming as something unprecedented, a unique phenomenon heralding an imminent transition into a culture of interactivity' (2005, 15). This reminds us of Carolyn Marvin (1988, 4), who argued the new is stated in terms of its technical specificities. The face that indicates the distinct phases of serious games is computational technology, which discursively binds the history of serious games to this medium. Games are formed by the platforms on which they are played, which are developed one after another in a linear continuous fashion. Although I agree that the materiality of technology influenced the development of serious games, it is only a partial answer. As I illustrated in 1.1.2, hidden assumptions and desires are present in terms used in popular and academic discourse to describe the specificity of media forms. Think of the earlier mentioned Web 2.0 metaphor. Thus, what is not told in this story of origins? The answer is: the social and ideological assumptions underlying serious games rhetoric.

Subsequently, I propose a different approach. As media critic Vivian Sobchack (2011, 236-8) notes, every medium is a discursive construction between being there and always having been there, but excavating those discourses and technologies that go against the grain of dominant rhetoric brings forth an alternative presence, presenting discontinuities and forces other than the Holy Grail. This method will be explained in more detail in the next chapter, however in order to investigate an alternative understanding of serious health games, I will first need to define what these specific ideas and assumptions are. Now that I have placed serious game discourse within the theoretical field that concerns itself with analysing the rhetoric of progress, in the next section I am able to return to answering the first sub-question: what are the dominant claims and assumptions in serious health games discourse?

The most important sub-conclusion that can be drawn after analysing the origins of serious games is that the narrative is framed within a specific, chronological rhetoric of technical revolution. This combination of techno-optimistic discourse is framed within specific terms such as serious games, and scholars such as Marc Prensky or Ben Saywer, herald the educational value of games, claiming they are driven by technological advancements. As a result, the origins of serious games and their popularity are explained through a chronological discussion of people and technological breakthroughs. However, this dominant narrative raises the need to investigate underlying assumptions and ideals surrounding serious games. I argue these can be found by examining the specific context of serious games. Therefore, in the next paragraph I will zoom into claims and assumptions made about serious games in the context of healthcare.

1.3 Playing For Treatment

In the previous section I argued that attempts to frame the origins of serious games fall back into a dominant rhetoric of games, people, and technological advancements. On its own this is not a novel observation, as many scholars have recognised a recurring rhetoric of progress in the advent of media technologies (Marvin 1988; Gunning 1991; Boddy 1994; Huhtamo 2005). It is not the actual historical repetition that gives the feeling that we have been here before, rather, it is deeply ingrained in the way we speak, write, and think about new media forms (Lister et al. 2009, 69). Indeed, the examination of different assumptions and ideologies of serious health games is the first step to excavating an alternative understanding of recurring building blocks in serious health games discourse. Therefore, in this section I aim to answer the sub-question: what are the dominant claims and assumptions in serious health games discourse? I argue there

are at least four claims surrounding serious health games: (1) serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties; (2) playing serious health games will make the player forget his pain; (3) serious health games are simulations of real world phenomena; (4) playing games about the body creates a deeper understanding of the body. In order to answer this question I examine scholars who can be considered to be authoritative voices in serious game rhetoric, and focus specifically on the type of serious health game mentioned in the introduction, namely: games developed to use to support the treatment of illnesses such as cancer. My argument is that there are at least four assumptions surrounding serious health games rhetoric, which will be discussed systematically.

1.3.1 Double Logic of Serious Games

First, taking the term of serious games seriously, the noticeable is the oxymoronic nature of the term. On the one hand, the term game suggests a design for entertainment purposes. On the other hand, serious goals to educate and change behaviour are designed into the game. This view on games can be characterised as an instrumentalist approach to games, which emphasises the fact that games can be programmed to simulate specific messages.

Assessing the language used in the arguments of different scholars who have written on serious health games such as *Re-Mission*, a pattern emerges. There are specific beliefs used to support the claim that games are an effective tool for healthcare, and to use in the process of treatment. For instance, in a recent article "Designing Serious Video Games for Health Behaviour Change" (Thompson 2012), games are said to be a 'popular form of entertainment', and a 'potential powerful channel for reaching large numbers of both adults and youth with health-enhancing messages' (ibid. 807). In it, the author Debbe Thompson refers to the success of games such as *Re-Mission* as an example of how '[o]btaining knowledge and enhancing skill can easily be integrated into a video game' (2012, 808). The success of this cognitive attitude adjustment rests on the entertainment value of the game, since 'players expect that a video game will be fun and entertaining' (ibid. 809). The entertainment value of the game *Re-Mission* lies in its 'high interactivity' between a player and the game and its 'capability of attractive graphics', which include animation and virtual reality (Beale et al. 2007, 264).

As I discussed in 1.1.2, the phrasing of these terms is important, and how they are used in this context. Terms such as 'attractive graphics' or 'high interactivity' actively construct meaning on what the entertaining characteristics of games are and what they represent. The entertainment value is considered to be vital in the success of serious games, and is enabled by the technological capabilities of computational power. As Foucault argues, language is an act of translation, where the images at once show and conceal discursive repetitions (Foucault 1973, xvii). The repetitive pattern is that technological affordances of graphics and interactivity are presented as instrumental progress.

Moreover, optimistic rhetoric is visible in other networks as well. One example is design professor Ben Schouten's introduction to the conference proceedings for the 2013 edition of the European Games for Health Conference, which brings together 'researchers, medical professionals and game developers to share information about the impact of games, playful interaction and game technologies on health, healthcare and health policy' (2013,v). In the preface, Schouten also heralds the advancement of technology, as playing serious games allow players to interact with 'advanced computational power', and 'persuasive technology' in order to 'empower the (cognitive)

skills of the player' (ibid.). These technological abilities, among others, are what makes 'contemporary games and play so successful especially in Healthcare' (ibid.).

Not surprisingly, the rhetoric of serious health games is set within a specific ideological framework of technological progress. As Sutton-Smith argues, ideological rhetoric is present in every social or professional gathering (2001, 8.). This ideological language seems rooted in game language itself, which achieved through the level of control the player gets by playing the game. The player progresses through '[l]evels and repeated game-play' (Thompson 2012, 808). The terms "levels," "goals," "level-up" and "achievements" are part of game rhetoric that is considered to be common sense. While science has its own epistemological rhetoric - think for instance of the notions of objectivity or validity - every game also has dominant opinions and resolutions embedded within its social language. Thus, the first assumption that can be distilled is:

Serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties

In short, there is a double logic present in serious health games as they oscillate between seriousness and entertainment. They are assumed to be empowering and rhetoric is strikingly optimistic for their technological possibilities. Now that we have established that the entertainment value of serious games is acclaimed for its technological affordances, I want to investigate further what these technical specificities are.

1.3.2 Distraction Therapy

Second, perhaps the most imaginative assumption present in serious health games is the belief that playing games will make the player forget his pain. In serious health games, this desire is conceptualised by scholars David Michael and Sande Chen (2005), describing serious health games as 'pain-distractors' for 'physical and mental health', which can be used for 'distraction therapy' to relief a player 'suffering' from physical pain or illness (Michael & Chen 2005, 181-2). This desire for games to distract a player from his or her pain by playing is related to immersion. 'Immersiveness and perceived reality are also characteristics of digital interactive games that help make them effective environments for learning' (Lieberman 2009, 121). However, the concept of immersion is hard to pin down and strongly related to ideological notions of losing one's self within the game.

Immersion is considered to be a fundamental component of the gameplay experience (Ermi & Mäyrä 2005, 88). In fact, it seems that immersion is such an implied characteristic of (serious) games, that it is easy to miss the fantastic nature of the term. In *Hamlet on the Holodeck* (1998) Jane Murray writes about her interpretation of immersion:

Immersion is a metaphorical term, derived from the physical experience of being submerged in water. We seek the same feeling from a psychologically immersive experience that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely other reality [...] that takes over all of our attention, our whole perceptual device. (Murray quoted in Waggoner 2012, 1)

Here, immersion is related to diving in water, engulfing the senses with a closed environment. Indeed, the imaginative configuration of the immersion metaphor is strong. As game scholar Zach Waggoner argues, in the early years of the 21st century, immersion has been a buzzword in games rhetoric, as it has been picked up in popular

discourse to 'superficially and generally explain the ever-growing appeal of video games and other new media' (ibid.). Therefore, to be more specific, a distinction should be made between presence and immersion. Presence refers to the sense of "being there," in another world, in the virtual reality of the game. The concept of presence is a subjective experience, a psychological process that can only be quantified by the user experiencing it; it is the perceptible illusion of non-mediation (Lombard & Ditton 1997). While immersion is also described as an experience, it is more formalised in game studies for its technical specificities such as screen size, or "flow" in gameplay.

Significant to note is that the concept of presence is historically grounded in telecommunications (Sconce 2000; Ermi & Mäyrä 2005; De Vries 2012). Media scholars such as Jeffrey Sconce have traced the trans-historical ideology of presence in different media forms, and lay out a cultural network of relations between different forms of presence in television, radio, the telephone, and computers (2000, 4). The work of scholars such as Jeffrey Sconce raises questions about the cultural history of the ideas, assumptions and desires of serious health games. While it becomes clear that much effort is directed towards instrumentalising serious games for healthcare, the question of the historical context of the social meaning remains unanswered. Relevant would be to discover where the idea that immersive experiences relieve the player from pain comes from. Therefore, the second assumption I aim to analyse is:

The belief that playing serious health games will make the player forget his pain

In review, the assumption that games are pain relievers rests on the ideological and problematic term of immersion. Presence, which is strongly related to immersion, has a cultural history that travelled between different media forms in history. There seems to be something wrong about the use of games and play as transformative sites, providing autonomy or empowerment to their players. In the words of game scholar Sebastian Deterding, it simply instrumentalises games for progressive purposes (2015, 4). The instrumentalist approach 'delivers the "how" of behavioural change, without worrying too much about the "why"' (Egenfeldt-Nielsen et al. 2013, 249). As we have seen, there is a certain enchantment about the technology's double logic to provide an immersive and entertaining experience on the one hand and cognitive changes on the other. Although, to what extent are the measured effects a consequence of some sort of curiosity about visualising bodily performance in a manner that is novel for many people? An answer to these questions will be found when tracing the assumptions about serious health games throughout history.

1.3.3 Simulating the Body

Third, the characteristic of games to simulate reality is one of the main selling points of serious games. Serious games that focus on simulation and role playing games that embed a "real-world"-situation, [...] provide an opportunity to link activities in the virtual world with the real world and could be of particular salience to serious video games for health' (Thompson 2012, 808).

To illustrate, in 'Designing serious games for learning and health in informal and formal settings' US American scholar Debra A. Lieberman (2009, 121) focuses on what she calls a "health-mechanic," where game mechanics or narratives are designed in the game, which simulates the desired learning outcome. A simulation 'is a model of the world (or some aspects of it)' (Lister et al. 2009, 41), and is closely associated with virtual reality. The discursive entanglement between representation and simulation will be explained in more detail in chapter five, where I discuss the difference between

representation and simulation, however it should be noted that there is a difference between simulation and representation. For instance, simulation does not have to be a replica of in real life (ibid.). Simulations 'provide a world in which the player can make decisions and see or even virtually experience the consequences' (Lieberman 2009, 122). For example, in the *Re-Mission* game, one of the desired outcomes of the game is self-efficacy of the young patient. In order to accomplish this, the player is a character that 'shoots cancer cells with chemotherapy' (Lieberman 2009, 121). There are two simulations at play in this example.

The first type of simulation is the dramatised representation of the body itself: the body is the game world and the player is able to interact with the cancer cell in this game world. The other simulation in this example lies in the desired outcome, namely that players who play the game will stick to their treatment, and not so much in the authenticity of the player. Simulation is said to be one of the main characteristics to 'enhance learning' (ibid.). The technical affordances of the algorithmic system to 'simplify a system,' or to 'speed or slow up time' are mentioned as the valuable aspects of simulations (ibid.). Moreover, simulations - in relation to physical events - are considered a safe environment because 'any dangerous outcomes are depicted but not physically experienced' (ibid.). Important to highlight is that a distinct separation between the physical world ("reality") and the simulated world ("virtual reality") is made. The virtual is a safe environment to experiment, whereas the physical realm is limited to material rules and physics, with consequences that cannot be turned back.

At this point it is clear that simulation is limited to representing a process or environment in the physical world. However, what is relevant to acknowledge here, is the situated meaning of simulating practices. Meaning is situated in the context of which it is used in, and this specific type of serious health games are designed to aid in treatment. In other words, simulating the illness in some form or another to improve a player's health. In the earlier mentioned article by Thompson, serious health games are said to be 'designed to reduce risk' (2012 808). This prospect of technology assumes that the specific health goal can be designed into the game. It is implicitly presented as common sense that a mechanic can be designed to improve one's health. Therefore, the third assumption is based on the technical affordance of games to simulate one part of reality.

Serious health games are simulations of real world phenomena

To recapitulate, simulations are seen as one of the most important technical characteristics of games. In the context of serious health the general idea is that simulations can visualise specific corporeal or cognitive aspects of illnesses. Simulation is one aspect of virtual reality, and although it does not have to represent reality, the position is taken that the design of in-game goals can influence the outcome in real life. The rhetoric in the discussed articles is strikingly optimistic, especially about the idea that serious health games facilitate enriched learning. An answer will be found when analysing the constructivist ideology behind games such as *Re-Mission*, which I will elaborate on more when discussing the next assumption.

1.3.4 Designing for Health

Lastly, so far it has become clear that the dominant ideology concerning serious health games is that they are a new instrument which can be used in healthcare, and that this instrument can be designed to achieve specific goals. In other words, meaning can be *programmed* into the game itself. Game scholar Ian Bogost claims this logic is an

ontological trait of serious games, and that they are 'characterized by their capacity for operationalizing rules' (2007, 171). Defined by Bogost as procedural rhetoric, he identifies this term as the 'unique persuasive powers' (ibid. ix) of serious games and how these games use arguments to persuade players. The term was proposed by the author to signify the practice of using rule-based processes persuasively. His argument rests on the operational logic of games. Since they are always programmed to have the player reach a specific goal, these goals can also have educational value. However, the effectiveness of this operating logic lies in the idea that game design controls the outcome of the game. The meaningful experience for the player, according to Bogost, can be programmed into the game.

However, the tricky thing with programming a specific goal into the game is that it does not take into account that every game experience is different. Not surprisingly, several scholars have critiqued Bogost's theory of procedural rhetoric. For instance, Miguel Sicart argues the author undermines player expression in playing the game, turning play into an action not intended by the designer (2011, 7). Following this logic, specific game mechanics may not necessarily have to be actualised: a game can be played differently, changing the context intended by its makers. Thus, serious games are not always persuasive (de la Hera 2014, 7), because each experience is personal. This is especially relevant to notice for those studies that try to measure the effectiveness of serious games' design, because individual experience is hard to quantify.⁵

This idea that seeing or interacting with the game will lead to more knowledge and insight is founded on constructivist models of learning. This social model assumes that players are eager to learn under the right circumstances. One advocate of the constructivist approach is James Paul Gee. Recognising the subjective experience of serious games is scholar James Paul Gee, who argues players choose their own path for learning, depending on their cultural background (Gee 2009, 67). He makes a strong argument for the individual experience of the player, and despite the situated meaning for the player, Gee is strikingly optimistic about the possibility of games to provide a meaningful learning experience. 'Digital games are, at their heart, problem solving spaces that use continual learning and provide pathways to mastery through entertainment and pleasure' (ibid.). Gee emphasises the rule-based system of games, and stresses how the interaction of a player in this system means working towards a goal. A game is designed with a specific goal for the player in mind, and programmed within a rule-based system. The logic, according to Gee, is that educational goals can be designed into a game. In this sense, games are tools for constructing learning experiences.

Despite these apparent critiques on the persuasive nature of playing games, the rhetoric that play is meaningful still prevails. Whereas Bogost does not account for player agency in the game, Gee argues serious games create meaningful experience because of the ability of the player to choose his or her own way to interact within the game. Despite this player agency, there is still a pattern of optimism in the possibilities of serious games. And although Gee makes a strong argument, he does imply that there is some ontological pleasure in play.

Furthermore, the idea that play is meaningful is a pattern which is found in developmental rhetoric. 'Play represents a distinctive behavioural repertoire that is both highly rewarding and evolutionarily conserved' (Cole, Yoo, Knutson 2012, 1). Focussing on patterns of optimism in the rhetoric of serious games, proof can be found in the deeply ingrained evolutionary model of play and games. Investigating the rhetoric of play, scholar Brian Sutton-Smith is concerned about the way play is framed in different ways. Rhetoric of play 'expresses the way play is placed within broader value

systems, which are assumed by the theorists of play rather than studied directly by them' (Sutton-Smith 2006, 303). The rhetoric of progress stands out when focusing on dominant ideologies in play discourse. Pinpointing its origins in developmental psychology and evolutionary models, scholars tend to assume play is an innate biological feature of our being. Children's play or animal play is said to represent playful mimicry and meant to create social or cognitive growth. (ibid. 304). The idea that play is instrumental progress is a Western concept, but its relevance has more often than not been assumed rather than demonstrated (ibid.). Hence, the fourth assumption is:

The idea that playing games about the body creates a deeper understanding of the body

In sum, there are several observations of importance in this assumption. First, the idea that desired scenarios can be built into the games' mechanics is conceptualised as procedural rhetoric. I have also emphasised the problematic nature of this idea, because meaning gained from game interaction is a personal, situated experience. Also, serious health games rhetoric is influenced by the idea that play has cognitive and social meaning. It is argued that animals and children who engage in playful activities develop the skills needed in their adult life.

In this chapter I have argued how the narrative history of serious health games can be framed within the theoretical field that concerns itself with the optimistic and (often) utopian reactions that occur around game and play research. I highlighted how progress is part of a linear historical narrative focusing on continuities, where media technologies are understood as developments marking the shift between phases. Problematic when analysing the origin story of serious games is that it operates from an ideological rhetoric that revisits the same scholars, games and technological advancements. In this narrative scholar Clark Abt is positioned as the "founding father" of serious games, and Ben Saywer as the pioneer who brought serious games back to into existence. More importantly, the success of serious games is explained by emphasising chronological technological innovations of smaller and networked technology. As Sutton-Smith (2006, 304) has argued: every discipline, or group, operates from a specific ideological or epistemological framework. The problematic nature of this rhetoric, according to philosophers such as Foucault, is that this is an exercise of power and politics. Indeed, as I have argued, serious games rhetoric operates within a network of people and institutes, and focuses on technological progress. What is neglected in this rhetoric is the historically situated meaning of serious health games rhetoric.

The second observation was that claims made about the innovative nature of media share particular ideological and imaginative premises, which are actualised in the rhetoric and terminology used in the narrative. This analytical move created room for highlighting some of the ideas and assumptions of serious games in healthcare and led me to answer the first sub-question: what are the dominant claims and assumptions in serious health games discourse? I highlighted four assumptions and ideas: serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties (1); also, serious health games are simulations of real world phenomena (2); furthermore, the idea that playing games about the body creates a deeper understanding of the body (3); and lastly, the belief that playing serious health games will make the player forget his pain (4). I propose to examine the cultural history

of these serious game assumptions in the context of healthcare, which can be analysed from a media-archaeological perspective. Therefore, in the next chapter I will position this research in the field of media archaeology, which forms the methodological basis and the next building block for my main analysis.

2 Topoi in Serious Health Games

In the previous chapter, we saw that the meaning of media forms and practices can be better understood when related to its historical context. As I argued, contemporary literature on the origins of serious games tends to fall back into a dominant hegemonic narrative, which operates from technological capacities and within rhetoric of dominant scholars and games. This "cryptohistory" frames the popularity of games within its technical specificities (Huhtamo 2005, 15). And although it is important to recognise the ubiquitous and pervasive presence of computational technologies, it is only a partial story. The latter raises the importance of examining the social and cultural meaning of games in historical context.

In such a dominant narrative of framing serious games, the historical method from which serious health games can be examined needs to be reviewed and specified. This goal can be achieved with the help of media-archaeological theory, for it explores present-day assumptions and ideas as historical cultural building blocks. Such an approach will provide a counter-history to the mainstream narrative and a specific way to understand the media cultural situation of serious games (Parikka 2012, 6). However, the field of media archaeology is highly divergent and often forgets to position itself (Huhtamo & Parikka 2011, 13). Therefore, amidst the variety of approaches, a clearly defined method is needed. As a result, the second intervention made in this thesis is methodologically, as I answer the sub-question: how can the assumptions surrounding serious health games be studied as discursive building blocks?

In what follows, I will propose a new media-archaeological method, drawing from the work of Erkki Huhtamo (1997; 2005; 2011), Friedrich Kittler (1990), and José van Dijck (2005). I argue the optimistic ideas surrounding serious health games can be studied through material discourse analysis that combines both discursive and non-discursive aspects of media-archaeological objects. This is needed because much of the research that focuses on studying discursive building blocks focuses on language as a discursive focal point. However, I argue that objects, just like language, can be considered discursive focal points and therefore need to be interpreted. Although Van Dijck's work is not explicitly related to the field of media archaeology, her thoughts are relevant for this approach, and her concepts can be used to explain assumptions of serious health games as recurring building blocks in medical media culture.

The chapter is structured in three sections. After introducing Erkki Huhtamo's perspective of media archaeology, I will illustrate how serious health games rhetoric can be studied as recurring building blocks, or *topoi* (2.1). Subsequently, in the next section I will introduce theories of medicine's media culture to argue how transparency is a recurring myth (2.2). This strategy allows me to situate serious health games within dominant discursive building blocks in medical culture. Lastly, in the third section I will bring together the concept of topos and the myth of transparency, proposing the method material discourse analysis as an analytical tool (2.3). In doing so, I will have shaped a complete framework and defined a specific method for analysing how the discourse of medical media technologies in the nineteenth century has informed serious health games discourse.

2.1 Archaeology of Topoi

In this part I will argue that a broader understanding of the optimistic reception of serious health games can be gained by studying ideas and assumptions as trans-

historical discursive building blocks that may reappear, connect and combine. This claim is embedded within media-archaeological theory. Although there is no general agreement about the methodology, principles, or terminology, there are some shared approaches and interests that hold the field together (Huhtamo & Parikka 2011, 2-3). One solution is to carefully select and describe my interpretation of media archaeology. Therefore, in this section I consider Erkki Huhtamo's concept of *topoi* as a media-archaeological lens to explain the *déjà-vu* moment in serious health games. As a preferred method of study, Huhtamo has used this concept for the analysis of an alternative history to games. The practical application of his work may be one reason for the popularity of using *topoi* as a concept. Although the concept is a good starting point, it needs to be refined in order to take into account material aspects of the technologies under examination. Subsequently, using this theory means examining some of the possible critiques of using this concept as a framework.

Media archaeology is a rich field that provides new tools for exploring situated histories of present-day media cultures. Emphasising that repressed, neglected and seemingly irrelevant media can present a cultural history other than the dominant discourse, media archaeologists have turned to the archives to make the complex web of discursive and material relations visible. As such, it creates new possibilities for understanding the social meaning of media technologies.

The problem, however, is that there is no clearly defined method, and archaeologists reject the notion of a discipline (Huhtamo & Parikka 2011, 3). However, shared discontent with media narratives and canons in history is perhaps the major driving force of media archaeology. In an attempt to read ideological biases of the new and better against the grain of dominant historical narrative, archaeologists have begun to construct alternative histories by 'pointing out unnoticed continuities and ruptures' (ibid.). The primary aim of study is to highlight ignored or discarded media technologies and cultures. Illuminating the past sheds light on the cultural logic that wanders across time and space. Continuities in media history often knit together in a network of clichés and commonplaces (Huhtamo 2011, 25). These ideas, fantasies and media forms are mediated by discursive *topoi* that transcend cultural traditions.

A *topos* (plural *topoi*) is a theme, or a cliché even, and can be traced back to classical antiquity and philosophers such as Quintilianus (V,10,20) for whom *topos* were "storehouses of trains of thought" (*argumentorum sedes*) (Huhtamo 2011, 29). In other words, a formula systematically organised to serve a practical purpose, for instance that of public speeches. The approach is influenced by the work of German scholar Ernst Robert Curtius, who studied literary *topos* in Western European culture, and studies discursive building blocks as clichés, or commonplaces. Commonplaces are ideas, assumptions or phrases normalised within a specific rhetoric (ibid. 30). One example of a *topos* within our digital culture is the trashcan icon on a desktop, which is so institutionalised as a metaphor, that the underlying processes are hidden for the user.⁶

Topoi are specific discursive building blocks that oscillate between disciplines and traditions, and 'can be considered as formulas, ranging from stylistic to allegorical, that make up the "building blocks" of cultural traditions' (Huhtamo 1997, n.p.) They can lay dormant for a while, only to resurface again, and vanish later. Conversely, *topoi* can be seen as thematic moulds for experience, but as they travel between different cultural modes of existence, they change shape. Thus, on the one hand they can appear and disappear, but on the other they can also create new *topoi*.

Important to note is that *topoi* have a certain attraction; otherwise they would not (re)appear again and again. Their attraction is also the reason why different cultural (or

medical!) industries use topoi and exploit them. While 'topoi can be mistaken for factual statements' (Huhtamo 2011, 30), they are actually ideas that spread between persons and cultural traditions, much like a meme. They are transferable through writing, images, gestures and rituals.

Thus far, there are three things that are relevant when studying the assumptions surrounding serious health games as topoi. First, topoi are commonplaces that come across as common knowledge. Specific technological assumptions about the experience of virtual reality in serious health games, such as immersion and simulation, are associated with better vision and curing. Second, topoi have a certain attraction. As I argued, virtual reality is part of the attraction of serious health games. Lastly, topoi are formulas that can be seen as a mould for experience within a specific context. In the next section (2.2) I will explain how the assumptions surrounding serious health games can be considered to be part of a longstanding the myth of transparency in medical culture.

These analytical guidelines enable me to investigate the earlier described *déjà-vu* that is present in the rhetoric of progress. Although I addressed the problematic nature of a chronological account of media history in section 1.1, I have not provided the reader with an alternative viewpoint. Instead of investigating the linear progress of media development, a media-archaeological approach focuses on the cyclical. For Huhtamo, topoi are cyclical and travel in time. This approach critiques a linear narrative of time and its connotation of progress. There is a difference between a linear narrative of history and Huhtamo's interpretation of cyclical time. In 'progressive accounts of development, media are invariably characterised as having ontological states,' whereas media considered in cyclical time are considered to be 'procedurally induced unstable phenomena' (De Vries 2012, 19). This consideration is based on the work of Foucault I discussed in the first chapter.

Paradoxically, there also is a form of linearity present in cyclical notions of time. 'There are linear aspects to be found in cyclical time as processes can temporarily go "up" or "down", but the process eventually ends at the beginning' (De Vries 2012, 36). This emphasis on origin can be problematic, since it implies that there is a certain structure and chronology a work. As Wolfgang Ernst notes, 'the claim to perform media-archaeological analysis itself sometimes slips back into telling media stories' (2011, 240).

Indeed, the tendency to interpret topoi and connect them in history falls into the danger of narrative structures that media archaeology tries to critique. One explanation for this is Huhtamo's focus on cultural representations, where the machinic and material seem to be buried somewhere underneath his argument. However, this is part of a larger debate in media archaeology, where there are cultural representations on one side, and machinic temporalities on the other. The danger in considering cyclical accounts of history herein is to homogenise discourse, without taking into account its specific media specificity.

More importantly, a strong focus on the cultural background does not take into account the material aspects of media (Ernst 2011, 240). Although Huhtamo's analysis of topoi may prove to be a good starting point for investigation, it needs to take into account the material and immaterial aspects that make media analysis more specific. Otherwise, it may leave a blind spot for the interpretation of the device itself. Rather than following the discursive mode of analysis suggested by Huhtamo, I argue the material of media also has the ability to speak and be analysed.

Although Friedrich Kittler would not call himself a media archaeologist, he is considered to be one of the most influential theorists in media archaeology (Parikka 2012, 6). Kittler's approach to studying media history can be characterised as techno-materialist, and in works such as *Discourse networks 1800/1900* (1990) he illustrates how (media) technologies afford specific forms of perception and social relations. Whereas Huhtamo analyses language as discursive building blocks, Kittler argues technology can also be read as discourse for its material inscription, hence the term "discourse networks" (Kittler 1990, xii). Scholars Geoffrey Winthrop-Young and Michael Wutz elaborate on the term and state that it attempts to link technological, physical, discursive and social systems, aiming to provide some insight into the episteme of power and knowledge (1999, xxiii). In this sense, the material affordances of a technology can also be read as discursive building blocks, that have inscribed a specific perspective on the user. Therefore, I propose Huhtamo's study needs to be adapted to take into account material aspects of media as proposed by Kittler. In the third section of this chapter, I will highlight how a combination of Kittler and Huhtamo's perspectives on media archaeology results in three discursive building blocks with which to analyse the claims and assumptions proposed in chapter one.

In sum, there are several useful insights that help to understand how the positive ideas surrounding serious health games are discursive building blocks within medical culture. Topoi are recurring discursive building blocks, which travel between traditions and disciplines. Although they are trans-historical, these topoi have a certain technological and aesthetic attraction. As a result, topoi are used in different industries as a unique selling point. Whereas progressive rhetoric favours a linear account of time, where one development follows after another, cyclical time presupposes that ideas about technological development travel back and forth through time. While these elements are a good starting point, the notion of topoi studies is problematic, because it would mean this study only focuses on the discursive aspects of serious games ideology. Instead, I proposed a combination of Huhtamo and Kittler's viewpoints. In the next section, I elaborate on how - when treating material aspects of a game as an archive - a very interesting perspective towards serious health games emerges.

2.2 Transparent Bodies as Topoi

Thus far, the discussion has been about progressive assumptions in serious health games and how to study them. In the previous section I highlighted how topos study as a concept is useful for this analysis, but needs to illustrate the importance of material practice. In this section I consider simulation as an archival source to trace the importance of visualisation in medical culture. This analytical move enables me to understand optimistic ideas and assumptions of serious health games rhetoric within a myth-oriented domain of medical instruments. After discussing theories on medicine's visual culture, I argue the optimistic rhetoric of serious health games can be understood as part of the myth of transparency, in which visualising bodies and illnesses is a central trope. Since this myth is embedded within visual culture, it focuses mostly on visual representation. Therefore, I introduce theory on media archaeology to take discursive and material aspects of medical media into consideration.

Returning to the critique that topos study focuses on discursive aspects, I propose to make two material incisions. The first will be discussed in this section and concerns situating serious health games as an instrument of medicine's visual culture. The second concerns the material layer in my methodological approach and will be illustrated in the next section (2.3). As I mentioned earlier, an important focal point of media

archaeology is to revisit the archives. While there are many different ideas on what constitutes an archive, I argue that the medium itself can also be considered an archive. Focusing on the material aspect of media, archaeologists such as Wolfgang Ernst allow us to 'rethink the machine as the archive' (Parikka 2012, 87). In other words, taking processes and materials seriously and trace their material origins. This will provide an intriguing specific understanding of the optimistic rhetoric of health games.⁷ As we've seen in the previous chapter, the technical affordance of games to simulate the body is considered to be a technological space of disruption that marked the beginning of a new distinct phase. If we return to the possibility of virtual reality in serious health games to simulate and visualise the body, then we are led to other visual instruments used in medical culture to visualise abstract or invisible processes of corporeality.

In fact, tracing the idea of visualising bodies in medical culture resonates to an earlier space of disruption in medical culture, namely the modernisation of medicine in the nineteenth century. In this time, medicine turned to the use of technologies to visualise bodily processes rendered invisible for the naked eye. In medical culture, important appropriations and innovations were made at that time. The endoscope, x-ray, stethoscope, microscope and many other instruments were used at that time.

To be more specific, the modernisation in medicine created a shift in the cultural model of medical practice. In *The Birth of the Clinic* Foucault (1973) describes the emergence of clinical medical research. Foucault observes how late eighteenth century anatomical practices of penetrating the skin and dissecting bodies overwrote the discourse of pathology and corporeality. In his analysis, the author focuses on scientific practice, discursive constructions on perspective, and the practice of looking at the body. Foucault notes how anatomical practices have opened up a different penetrative mode of observing the body:

[T]he precise, but immeasurable gesture that opens up the plenitude of concrete things, combined with the delicate network of their properties to the gaze, has produced a more scientific objectivity for us than the instrumental arbitrations of quantity. Medical rationality lunges into the marvelous [sic] density of perception, offering the grain of things as the first face of truth, with their colours, their spots, their hardness, their adherence. (1973, xiii)

There are several important elements to highlight here. First, as bodily processes were studied for adherence and material qualities, scientists became aware that the body could be controlled, and causal relations between disease and health were made. Second, besides the importance of medical instruments, Foucault explains how clinical research observes the body in function, material, shapes and affordances. Whereas medical instruments illuminated and rendered the body visible, the body was reduced to a measurable object. The medical gaze penetrates the body and makes it stand out against the backdrop of objectivity. 'The gaze is no longer reductive, it is, rather, that which establishes the individual in his irreducible quality. And thus it becomes possible to organize a rational language around it' (ibid. xiv). Language surrounding the body was reorganised into an empirical order. Lastly, Foucault suggests that this gaze is the product of an emerging anatomical-clinical method, where medical instruments provide the necessary transparency of the body to observe its dissected processes.

To break this down, modernisation in the late nineteenth century changed the practice of medicine. Empirical experimentation became part of the process of treatment and visualisation technologies were instrumentalised in practical medical culture. These instruments have helped create knowledge and representations of the body in health and illness. Important to notice is that mechanical developments in cinema and photography

have helped shape the idea that bodies could be measured and read. The ability to visualise and capture the body was a fascination for medical experts, but also created the myth that technology could render the body transparent.

Accordingly, in an attempt to understand the cultural history of the relationship between health and media, some scholars have turned to questions concerning the relationship between the body and media (Stafford 1991; Cartwright 1995; Van Dijck 2005). This field concerns itself with the visual representations of medical culture.

One particular relevant example is José van Dijck's book *The Transparent Body* (2005), in which the author views the interrelated development of medical devices and corporeal fantasies in media culture. In the book, Van Dijck carefully examines how different visualising techniques and cultural fantasies have aided in creating a myth that medical visualisations relieve the body from pain and disease. This myth is sustained by the idea that 'the body is made transparent by medical instruments' (Van Dijck 2005, 99). The myth of transparency resonates with the simulating practice of serious health games, which also renders the body transparent by using programming processes.

Moreover, Van Dijck follows different medical visual instruments and retraces how they occur in different media narratives. For her, the underlying assumptions of this myth are the topoi that seeing is curing and the topoi that peering into the body is an innocent activity (2005, 7). For instance, x-ray is an "enchanted eye" of art and science, and constituted an important disruption in the development of looking inside the body (Van Dijck 2005, 99). In this respect the myth of transparency is visible in medical technologies and representations which find their way into medical culture. Despite criticism on Van Dijck's historical approach, I argue that the myth of transparency resonates with the progressive rhetoric of serious games.⁸ Van Dijck's work builds on other visual culture literature that investigates the relationship between the act of looking, medical culture and visual representations.

Media scholar Lisa Cartwright, who has done similar research on the role of visual technology and medical culture, has influenced Van Dijck's work. Cartwright performs an in-depth historical analysis of cinematic and pre-cinematic vision in medical culture. Focusing on the moving image, for Cartwright, the areas between modern science and media culture intersect and create medical conventions of visibility, which are embedded in techniques of knowledge and power (1995 xi-v). In the next section, I will portray how analysing the material practice of institutionalising vision will visualise some of these techniques. The myth of transparency is connected to the act of looking inside the body, and visualising the invisible.

These perspectives on medicine's visual culture offer an alternative way to think about the relationship between present-day media technologies and visual representations. Yet, from the perspective of media archaeology, this perspective is limited because it focuses too much on the (moving) image and not enough on material and ludic characteristics. Although Van Dijck and Cartwright focus on representational practices and medical instruments, and this is a good starting point, in order to answer the main question posed in this thesis, we need to start from the medium specificity of games as ludic machines. In the next section, I want to investigate to what extent these optical instruments are sites for entertaining practices and ludic activities.

The works of David Parisi (2013) and Simone Natale (2011) provide ways to resolve the issue of exploring the relationship between the ludic and medical instruments. David Parisi (2013, n.p.) analyses assumptions made about present-day haptic machines such as the *PainStation* (2001) and charts the 'changing status assigned to sensations of electric shock' by analysing different machines throughout history that employ electricity as a game mechanic. He broadens his scope and traces game cultures

such as arcade halls, but also how electric shock machines were used in medical culture. Furthermore, as a method, Parisi adapts Huhtamo's topos study, focusing on the materiality of electricity in human/machine interaction by analysing how electricity was mobilised in different social and cultural contexts. In a very implicit manner, I believe Parisi's approach embodies Kittler's theory of discourse networks, since he follows the material affordance of electricity in his excavation of the electrotactile machines. The methodological lesson to be learned from Parisi is how to work with the concept of topos study from a material perspective by following specific material game characteristics. Such an analysis oscillates between ludic and medical use of specific characteristics.

Subsequently, Natale's media-archaeological approach proceeds beyond the task of tracing the history between medical and media culture, and places medical instruments *within* media history. In 'The invisible made visible' (2011) Natale questions the relationship between optical devices, entertaining practices, visual media and technology in general (2011, 346), and, following in Tom Gunning's footsteps, argues there is a primal fascination for displaying the body through optical technologies. Analysing the x-ray as a case study, Natale argues medical instruments have 'visual power' and entertainment value for their 'technological attraction' (Natale 2011, 355). Although the author does not explicitly characterise his approach as media-archaeological, his method provides an alternative understanding of the history of x-ray technology. The lesson learned from Natale is that there is no clear ontological distinction of a technology. By revisiting the archive and focusing on a medium's early reception and use, it is possible to see how technologies such as the x-ray are sites for entertainment and visual attraction.

Whereas Parisi traces a specific game mechanic in the history of human/machine interactions, Natale's archaeological approach teaches the importance of tracing the history of institutionalised medical technologies in the stages of their early development. Both scholars offer valuable methodological insight on how to construct a media-archaeological method that takes into account discursive and non-discursive elements of serious health games.

On the whole, another crucial step is taken for the media-archaeological analysis in part two. In this section, I illustrate how modernisation of medicine can be traced back to the nineteenth century, a period marked for its history of mechanical spectacles (Natale 2011, 345). Furthermore, simulations' material affordance of visualising corporeal processes discursively ties serious health games to medical instruments. The optimistic rhetoric of progress in medicine's visual culture is the myth of transparency, a concept defined by José van Dijck. I argue that this myth serves as a topos, under which I can analyse the optical instruments in the analysis. However, as I have illustrated, this investigation needs to take into account the medium specificity of serious health games as ludic devices. Now that the analytical concepts have been defined, I will proceed by combining these insights by defining the method with which my media-archaeological analysis can be performed.

2.3 Method of Material Discourse Analysis

We now have all the ingredients with which we can dissect the media-archaeological objects in the next chapter. All that is needed now is the protocol, or method of inquiry. In the previous parts I argued that the assumptions surrounding serious health games should be studied as recurring building blocks, or topoi. Through the concept of topoi, I am able to investigate how these blocks travel between discourses and traditions. In addition, I argued that the material affordance of serious health games to visualise

corporeal virtual reality discursively ties the focus of my analysis to optical devices that render invisible bodies visible, an element which is present in the myth of transparency. My proposition is to investigate the myth of transparency as a recurring topos.

The insights gained from the previous sections and the method I will define in this section provides us with an answer to the second sub-question: how can the assumptions surrounding serious health games be studied as discursive building blocks? To answer this question I position myself in the field of media archaeology by elaborating on my theoretical and archaeological propositions. With the conceptualisation of topos study and the lens of transparency in mind, I can now situate serious health games within the analytical method I propose, subsequently providing the stepping stone towards an alternative understanding of their ideological rhetoric. Lacking an existing name, I propose to call this method material discourse analysis. This brings me to the second valuable addition in this research, a media-archaeological method to analyse both discursive (semiotic) and non-discursive (material) aspects of objects. Therefore, in what follows is an illustration of three interrelated layers of analysis, which I base on building tasks proposed by James Paul Gee. Adapting these building blocks, I construct specific questions and foci needed in order to study the myth of transparency as a topos.

The first layer of analysis focuses on the language-in-use to describe the use of the archaeological objects, and how they are framed in its early use. Following Huhtamo's logic that we can read game machines as part of the broader human/machine relationship, the second layer of analysis investigates ludic activities of optical technologies. The last layer of analysis focuses on the material aspects of the media-archaeological objects in order to discover how the technology inscribes a specific perspective on the body. Thus, how optical devices are institutionalised in medical culture and how attention towards transparent vision is inscribed. These building tasks provide an outlook on how language and devices are interrelated and accomplish a discourse with values, beliefs and ideas and material reality, which informed by the trans-historical theme of transparency. In turn, these building tasks form the theoretical inquiry needed to perform a media-archaeological analysis.

Whereas in the first chapter I have described the "traditional" historical narrative of serious games, my analysis aims to provide what Brennen calls a cultural history, which is conceptualised as media archaeology. So instead of presenting facts, '[a] consideration of media will address the development of specific technologies as well as viewing them as social practices and cultural forms' (Brennen 2011, 96). To be able to study the way topoi have been materially and linguistically constructed, I must elaborate on how I will incorporate a material discursive analysis of historical topoi in a useful manner.

In the previous section, I argued that simulations' material affordance of visualising corporeal processes discursively ties health games to medical instruments. The overarching topos or theme with which I examine the media-archaeological objects in the next section is the myth of transparency. As I have illustrated in section 2.1, these topoi are cyclical, trans-historical and emerge in different forms. However, the main objective is to highlight how the myth of transparency is present in other optical technologies, what its continuities and its discontinuities are in serious health games rhetoric.

Values, ideas and beliefs are part of a historically contingent discourse. As is clear by now, meaning is built through language, and topoi operate in the same manner. Topoi as discursive constructions of language and technologies travel between contexts.

Considered as discursive building blocks, they build a specific world through their language. An extra layer I have added to the study of topoi is the material interaction in the practice of vision. These interrelated perspectives can be used to study how the myth of transparency is used to build a specific "reality" about the body. In turn, it provides alternative understanding of serious health games discourse, since it analyses how the language, images and devices are used to create a specific vision on the body. However, important to note is that cyclical account of time does not only focus on continuities, but also on discontinuities.

A media-archaeological approach is shaping specific historical windows for possible directions for development and paradigm shifts. As archaeologist Siegfried Zielinski (2006, 31-2) notes, it involves a heightened alertness to ideas, concepts and specific events, and may include taking discursive leaps from one field into another. Taking optical devices as a starting point, I examine how the technology and the language used to describe them inform and are informed by each other. These building blocks are used to inquire how the social-cultural meaning of ideals in serious health games are informed by the language, values, emotions, beliefs, things, actions, people and places where the optical device is imagined and used. Therefore, in chapter five, I am able to reflect on specific continuities or discontinuities surrounding the rhetoric of technological progress.

The first building block of a material-discourse analysis is the *semiotic* aspect of analysis, where I focus on different utterances that form a system of knowledge (Gee 2011, 82) and operation of making bodies visible. Analysing these languages-in-use will show me how the optical technologies in the stage of invention were described and received. In this block I want to investigate the claim that optimistic beliefs surrounding technologies share specific values and beliefs, which in turn will inform the ideas surrounding serious health games. '[L]anguage simultaneously *reflects* reality ("the way things are") and *constructs* (construes) it to be a certain way' (Gee 2001, 82). The language, or images used, the way it is written or captured, represents a specific sign system, and includes specific ideology on what the technology is.

In the first chapter, I have already illustrated how metaphors represent specific ideas, values and beliefs. In this research, I want to take the analysis of metaphors to the next level, by situating the meaning of simulating bodies for treatment in a historical context. In their well-known book *Metaphors We Live By* (1980), authors George Lakoff and Mark Johnson argue that language functions in conceptual metaphors, where a word refers to a concept, which can be analysed as patterns corresponding in different semantic domains. The authors argue that myths can be seen as extended metaphors that provide ways of comprehending experiences within a situated cultural setting (1980, 186-188). The myth of transparency, therefore, is a collection of metaphors that represent ideas and beliefs about optical technologies. Zooming into specific metaphors used to describe the act of making bodies visible will enable me to highlight how these metaphors are sites for imagination and fantasy. Therefore, here I will focus on the communicative systems (images & languages), and how these can be read as metaphors that describe the use of optical technology privilege or disprivilege other sign systems and ways of knowing.

After describing the early reception of the archaeological objects, what signification is used to describe them, and how this connects to the myth of transparency, I want to argue how these imaginations are a site for entertainment. Therefore, the second building block is the *activity* aspect, the way in which specific instruments are used (Gee 2001, 82). The specific activities in which participants are engaged, and in turn, make up a sequence of action. Excavating written accounts of

experiences, my primary goal is to uncover the ludic human/machine interactions. Driving this building block is the question in what way medical instruments were a source for entertainment and ludic pleasure. Scholars such as Kittler and Foucault focus on suffering subjects such as criminals, women, madmen. '[T]he sufferance of the body, its essential pathos, becomes a privileged locus for the analysis of discourse networks in terms of both their systematic character and their effectivity' (Kittler 1990, xv). Nowadays, pathos is strongly related to suffering and disease. Pathology - *pathos* and *logia*, meaning "an account of" - is used for studying diseases in the broad sense. Pathogens, *pathos* and *genes* which means "producer of," is used to describe diseases that bring suffering and pain to the body. However, the word pathos does not necessarily relate to pain and suffering alone, rather to sensation as well as experience. Thus, in this thesis I plead to stretch this definition of pathos to providing pleasure, and thus relieving pain. Since serious health games can be seen as somewhere in between a medium for pleasure and an instrument for medical care, my archaeological analysis focuses on this specific analytical plane.

Analysing different ludic activities of the media-archaeological objects will make visible how serious health games are informed by historical ludic practices, and how elements of the myth of transparency travel between different contexts, but re-emerge again and again. Therefore, this building block focuses specifically on the relation between the ludic use and the language used to describe this activity. This will allow me to illustrate the traveling nature of the transparency metaphor, and how its imaginative properties are a site for pleasure and treatment.

The last layer of this method focuses on non-discursive aspects of technology. Technology is a system of inscription, so the study of topoi needs to take into account how a specific account of the corporeal is inscribed in medical culture. As media archaeologist Friedrich Kittler argues, (media) technologies afford specific forms of perception and social relations. 'The object of study is not what is said or written but the fact— the brute and often brutal fact— that it is said, that this and not rather something else is inscribed' (Kittler 1990 xii). Thus, the social relationships and the process of describing how to look at the body put a certain vision in place within medical culture.

Thus, the last section focuses on how medical instruments are embedded within the practice of treatment, and how vision is incorporated. This material approach is conceptualised by Christina Grasseni (2004, 1) as "skilled vision" and analyses the subjective process of incorporating technological vision within medical culture. This is actualised in analysing the material practice and disruptions in optical perspective. Grasseni - in line with Kittler - is interested in how technology creates disruptions within specific contexts, which is found in the way the use of the optical device is instrumentalised in medical culture. Here I will answer the question what perspective on the body is created and how the myth of transparency is used to advocate the use of the technology. The aim is to show optical devices are embedded within the process of treatment. After describing how these three building blocks co-constitute the myth of transparency, I am able to reflect on how the myth of transparency is a collection of metaphors, ideas and beliefs that has informed the rhetoric of serious health games.

Before I commence with the analysis, I want to highlight the analytical "cuts" I have made which might limit the analysis. The first archaeological move I make is to point attention to technologies that are considered as common medical technologies today, but where ludic devices in medicine in the early twentieth century. Instead of focussing on a plenitude of devices, I choose to focus on two technologies, which I will analyse in more depth with the material-discursive elements mentioned in this section.

Because of their status in medical culture today, my case studies are the x-ray device and the microscope.

The second analytical cut is to focus on the technology's early reception and use in three contexts: its invention, its ludic use, and its institutionalisation in medical culture. These will serve as analytical points of entry my analysis. Mapping how ideas, values, beliefs concerning transparency emerge, change, or disappear over time, I am able to illustrate how particular rhetoric of newness and transparent vision are sites for imagination, instrumentalisation and pleasure. Resonating Huhtamo's approach, I reconnect present-day ideas about serious health games with the past (2011, 38).

The last analytical cut I will make concerns the entry point of my analysis. While I have some directions as to where to start, a media-archaeological analysis has no specific beginning or end. Indeed, this means that my archaeological excavation has to start 'somewhere in the middle' (Parikka 2012, 5).

In brief, in this section I have proposed a novel method of media-archaeological analysis that considers both discursive (language) and non-discursive (material) aspects of media as vital in the analysis. After combining Kittler's techno-materialist perspective with Huhtamo's concept of topos study, I discerned three discursive building blocks. First, the semiotic aspect, which analyses the language-in-use and what metaphors are used in discourse. Second, the activity aspect, which analyses how ludic practices of medical media are described. Third, the material aspect, which analyses how material affordances inscribe specific vision and perspective on the corporeal.

To summarise the most important findings of this chapter I return to the second sub-question of this research: how can the assumptions surrounding serious health games be studied as discursive building blocks? I have argued how topoi can be studied in the form of a material discourse analysis, a version of discourse I have adapted to take the non-discursive aspects of topoi into consideration. In the first section I portrayed how progressive assumptions found in serious health games can be studied as topoi, which recur throughout history. Cyclical time presupposes that ideas about technological development travel throughout history. The study concerning the concept of topos proved to be useful, but not complete.

To make the study of topos more specific, I argued in the second section how the optimistic rhetoric of serious games and the affordance of simulation to render bodies visible can be understood as part of the myth of transparency. The myth of transparency can be traced back to the nineteenth century and the advent of optical technologies. While visual culture literature has extensively analysed the role of vision in medical culture, the ludic use of optical devices is under theorised. Therefore, I proposed to inquire the ludic use of medical instruments. Answering how its ludic use relates to the myth of transparency will allow me to re-examine the history of serious games in the context of healthcare.

In the last section (2.3), I combined theories from section 2.1 and 2.2 to create a method, which I have defined as material discourse analysis. The three building blocks I have chosen to focus on are: the semiotic aspect, which will show specific metaphors used to describe visualising travel between discourses; second, how these optical devices are sites for imagination and entertainment, which is seen in the ludic use of these technologies, and the material practice of institutionalising the device in medical culture, which will highlight how the myth of transparency is used as a theme.

Part II

Diffracting Patterns

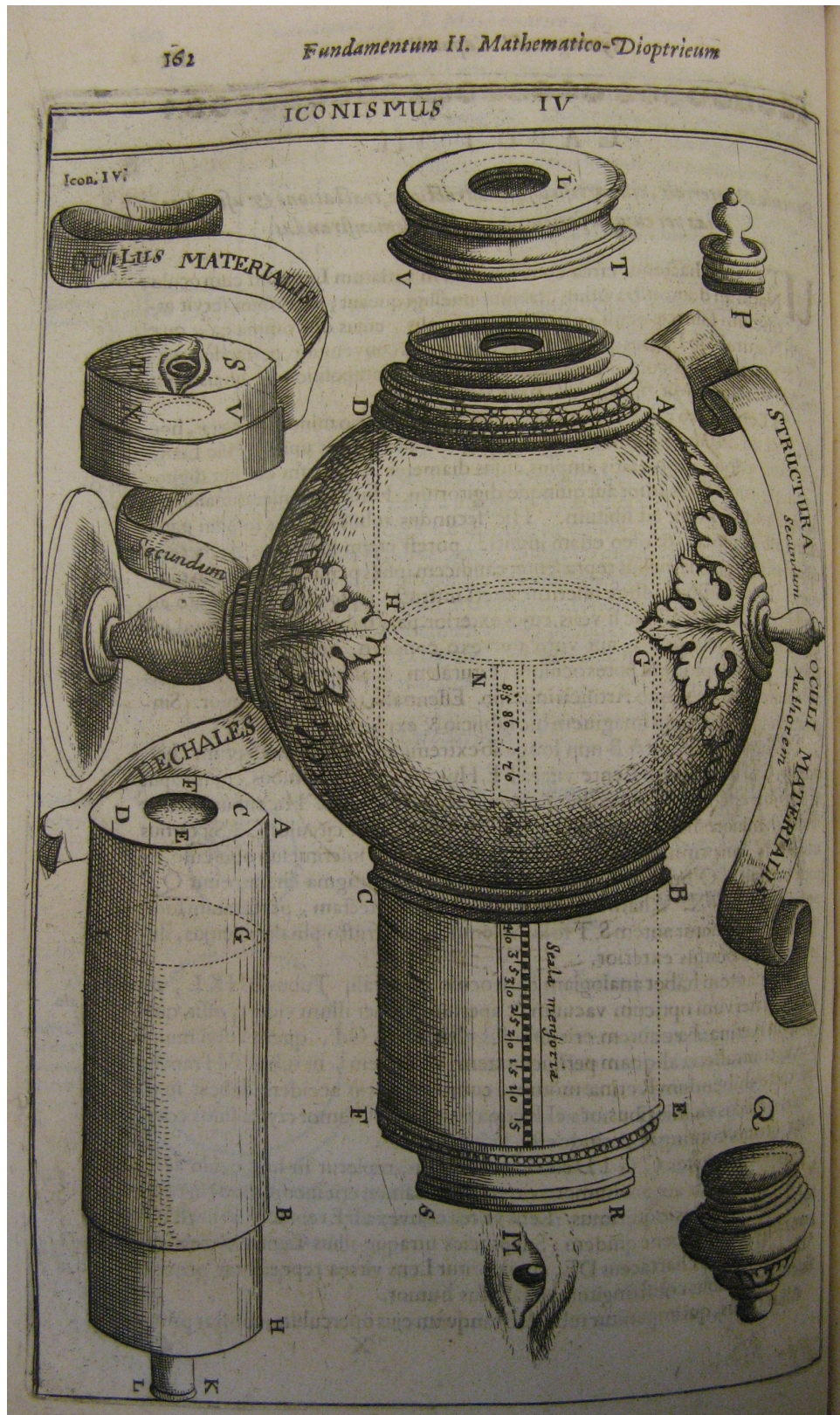


Illustration 2 "Mechanical Eye" by Johannes Zahn (1685)

Whereas in the previous part I made important interferences on a theoretical and methodological level, this section is dedicated to the last valuable addition I intend to make, namely understanding how distinctive assumptions, ideas and expectations about medical instruments are part of deeply ingrained myths about corporeal transparency, which are still relevant in today's discourse on serious health games. In chapter one I have argued that serious health game ideology is about the following assumptions:

1. Serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties;
2. Playing serious health games will make the player forget his pain;
3. Serious health games are simulations of real world phenomena;
4. Playing games about the body creates a deeper understanding of the body.

These ideas are rested within a narrative of progress that favours chronological development. However, I argue the social meaning of these assumptions can be understood as part the trans-historical myth of transparency, visible in optical instruments used for medical purposes. Therefore, I am able to extend the media-archaeological investigation of this analysis into the x-ray device and the microscope.

While technological progress in medicine pervades all aspects of medical culture, I claim they are most readily observable in visual instruments. At end of the nineteenth century, the invention of the x-ray device and the application of the microscope were two innovations in optical instruments that sparked conversation and wonder in medical culture and the public.

The purpose of this section is to understand the ideas about serious games as a pattern that emerges within medical cultures striving for knowledge. I have also illustrated how adapting José van Dijck's myth of transparent bodies proves to be a good starting point for the analysis of this pattern. Now that I have mapped my method and theoretical framework considering assumptions about serious health games ideas as discursive building blocks, I aim to answer the last two sub-questions posed at the beginning of this thesis: in what way are these building blocks visible in other medical instruments, and what are the continuities and discontinuities between these building blocks and serious health games discourse?

The former question will be answered in chapter three and four, which are structured in a similar manner. I commence by highlighting how both the microscope and x-ray respectively were received in their early days by analysing authoritative voices that played a role in the invention of these devices. Then I will analyse how the metaphors used in this rhetoric connect to the myth of transparency, which creates a certain perspective of the technology and what it represents. Then, after establishing metaphors, values and beliefs of the x-ray and microscope, I proceed to analyse how these optical devices are used as a site for entertainment. By highlighting the pleasure in reading the body, I aim to argue how optical devices that render bodies visible have a deeply ingrained connection to pleasure and play.

Then, in the last chapter I return to the latter sub-question, and analyse how the continuities and discontinuities of novelty in different optical devices illustrates specific patterns about the pleasure of making invisible bodies visible. Subsequently, I conclude this thesis by returning to the assumptions about serious health games and answer the main question posed in the beginning of this thesis: to what extent are the historical discourses of the x-ray, microscope, and serious health games determined by the rhetoric of progress?

3 Visualising the Microcosmic

Just as the telescope reveals the infinity of the great world above and around us, so does the microscope reveal the infinity of the little world around, about, and within us.

Edward Byrn, *The Progress of Invention in the Nineteenth Century*, 1900

The present chapter zooms in on the early reception and use of the microscope in order to comprehend how and where idealised beliefs and ideas about rendering bodies visible find their roots. I will do so by systematically discussing the myth of transparency and several themes covered in the last chapters - technological progress, the ludic use of optical devices, and the instrumentalisation of the microscope - through the building blocks proposed in the last chapter. In doing so, I illustrate possible connections or disruptions in the early reception, apprehension and justification of visualising technologies, which is the first step towards formulating an answer to the main question of this thesis.

In the first section (3.1) I return to the myth of transparency, and illustrate how the desire for sharper vision has driven the evolution of optical devices such as the microscope, and continue with presenting some of the important metaphors used to describe what is visualised with the x-ray and microscope. Then, I proceed to the second section (3.2), where I typify the bright side of pathos by illustrating how visualising the invisible is a powerful metaphor and an attraction for ludic activities and games. Lastly, in the last section (3.3) I will focus on the dark side of pathos, and argue how the myth of transparency is used to justify medical corporeal vision and the utopian idea that vision will end suffering. At the end of this chapter, I return to the third sub-question posed in this thesis. Seeing some beginning patterns emerging, I will continue to explore these themes in chapter four.

3.1 Magnifying a New World

This first section elaborates on the microscope's early conceptualisation. The first building block of this analysis concerns how the language-in-use forms specific relations to the eye. Just as I have done in the analysis of the rhetoric about serious games, it is fruitful to analyse how this technology is valued over other technologies, and why, and which metaphors are used to describe it. First, I will elaborate on the metaphor of the "mechanical eye", and how it is introduced in microscope rhetoric as an extension of the senses. Then, I will situate the imagined use and within the context of the myth of transparency, which will show how the early imaginations of the "mechanical eye" to visualise the unseen world is a powerful site for imagination.

In their early days, the microscope and the telescope were considered to be mechanical eyes, making the invisible visible. As is seen in the elaborate illustration made by Johannes Zahn (2), the telescope and microscope were considered to be extensions of the human eye, visualising the infinitely big, and the infinitely small. The exact origins of the microscope are unclear, but it originated sometime in the seventeenth century, with the invention of Galileo's single microscope, and the improvements that were made on it by Antoni van Leeuwenhoek and Robert Hooke. In those days, the inventor of the microscope was also frequently the user.

Antoni van Leeuwenhoek (1632-1723) was an avid lens maker and observer. His specific type of single microscope was simple, but at the time it was one of the

strongest lenses, as some of his lenses magnified the subject up to 480x. Van Leeuwenhoek was obsessed with making the hidden world of the miniscule visible, and was passionate about his work. Writing to the Royal Society in London, he became a prestigious member in this important scientific network. In his many letters to the secretary of the Royal Society, Van Leeuwenhoek describes the world which he sees when peering down the lens. One example describes what he saw when dissecting the testicle of a hare '*een ongeloofelijke menigte van Dierkens met staarten*', an unbelievable crowd of Animals with tails (1679, 6). In his description Van Leeuwenhoek speaks of his animals with a tone of innocence. The microscope makes a new world visible. As Van Leeuwenhoek describes the experience of looking down his microscope, he explains how Sir Robert Hook himself gazed at the Animals with wonder: '*ende de Dierkens siende, met verwondering deselfde aanschouwde*' (ibid. 13). Making the invisible world visible was an optical spectacle, but there was an actual science behind it, for the microscope 'was an epistemological and educational tool for revolution' (Stafford 1991, 356).

The microscope did not only change perspective: it was meant to change scientific values to deconstruct false, muddled and reversible appearances of artistic representations. Despite Van Leeuwenhoek's imaginative descriptions of wonder, the striking aspect of his research was his mathematical approach of calculating and measuring what he saw. What sets Van Leeuwenhoek's method apart from other sightings is that he used basic calculus such as measuring the length of his "little Animals" or counting the numbers of sightings.

The mechanical eye metaphor in the context of its inventors was made to distance the scientist's senses from the observation. In *Micrographia*, inventor Robert Hooke (1665) elaborates on the way the microscope is an 'assistance of the eye', for the 'Endeavours of Skilful men' to 'advance the operations' of experimentation by removing the senses from observation (Hooke, preface, n.p). He continues and states: '[a]nd as *Glasses* have highly promoted our *seeing*, so 'tis not improbable, but that there may be found many *Mechanical Inventions* to improve our other Senses, of *hearing, smelling, tasting, touching* [authors emphasis]' (ibid.). In his process, Hooke implores to systematically record and archive objective descriptions. The method to objectively accomplish this is to use instruments:

The next care to be taken, in respect of the Senses, is a supplying of their infirmities with Instruments, and, as it were, the adding of *artificial Organs* to the *natural*; this in one of them has been of late years accomplisht [sic] with prodigious benefit to all sorts of useful knowledge, by the invention of *Optical Glasses* [authors emphasis]. (Ibid.)

In this elaborate quote, the language used to describe the microscope's usefulness is the preference of mechanical instruments over subjective experimentation as registered through the clouded vision of the natural eye, hence the dichotomy between "artificial organs" and the "natural". Hooke claims that the instrument, because of its mechanical nature, is an objective device, which the user can use to supplement the senses. In other words; to add a rational layer over the senses. Hooke discredits science done with the naked eye, because it is led by the emotional senses. The myth of transparency manifests itself in the disappearance of the subject, where transparency is achieved by using instruments such as the microscope.

Additionally, the mechanical eye is compared to the telescope to make a new space visible. For the telescope, there is nothing too distant, and for the microscope,

'there is nothing so *small*, as to escape our inquiry; hence there is a new visible World *discovered to the understanding* [Authors emphasis]' (ibid.). Interesting is the relation of the device to make a new world visible, which cannot be seen with the eye. As we will see later on in this chapter, the possibility of making an invisible world visible is a powerful idea that ignites the imagination for playful and game activities.

Striking is the intense desire for knowledge and (rational) understanding, especially 'new things,' in 'every little particle of its matter,' in order to ultimately 'reckon up in the whole *Universe* itself' (ibid.). This desire for ultimate knowledge manifests itself in a different type of transparency, namely the disappearance of the subject. This quest for knowledge was considered a noble quest, since the rational subject was not concerned with pleasures of the flesh, but with the mind (Stafford 1991, 178-180). To be led by the senses was to be led by passion, which distracted the mind.

Making the invisible visible was on the one hand a visual spectacle, but on the other hand a rational scientific experiment, where scholars such as Van Leeuwenhoek and Hooke spent their days cataloguing their findings, and placing them in categories of species in atlases. This revolution, however, was not happening at that time: in the early days of the microscope it was not an accepted tool for medical research. One explanation for the lack of medical research might be the inconsistent quality of the observations. Microscopes were not without flaws. The lenses were not always perfectly sharpened, or had scratches or bubbles on them. Besides the different quality lenses, light proved to be a disrupting factor as well. A distortion called chromatic aberration happened because different wavelengths of light diffracted through glass at different angles (Jardine 2008). Visible in the historical descriptions of the development of the microscope is the quest for greater magnifying lenses and better visibility through the development of compound microscopes.

Indeed, the rhetoric of the microscope by its inventors demonstrates that its invention gave rise to the *possibility* of objective observations because the user could distance *himself* from the event - hence the conceptualisation of the user as observer - and from his senses.⁹ Here is where we can identify the idea that (optical) technologies make it possible to see new things, and create new knowledge. This compelling idea that "seeing is knowing" is part of the representational function of the technology.

Furthermore, we see a paradoxical relationship between the desire for rational observation, and the pleasure derived in experiencing novel vision, which is visible in the act of seeing - think of Van Leeuwenhoek's little animals - and the pleasure in new knowledge - think of the new things Hooke describes. The topos of transparency is present in making the invisible world visible, and in combination with this act of visualisation microscopes are described as "artificial Organs" and "Optical Glasses". The topos of the invisible made visible oscillates between the rational (serious) and the pleasurable. Here, the early signs of a pattern that the usage of technologies that render the body visible oscillate between serious and fun start to emerge, suggesting an oxymoronic nature of the rhetoric surrounding this technology. I will investigate this further in the next section.

To sum up, in exploring the early invention of the microscope with the first building block of the analysis, the myth of transparency materialises as the desire for the subject to disappear and to make the invisible world visible. The mechanical eye fulfils the need for scientists to remove distractions from pure observation. Paradoxically, the bodily sensation of pleasure cannot be repressed, as the enjoyment of seeing little animals is part of the topos of making the invisible visible.

3.2 Pleasure in Peeping

In the previous part I illustrated how the microscope's early inventors conceptualise the microscope as a mechanical eye, intended to put an objective mediation in between the scientist and the object. Despite this argument, the pleasure in discovering a hidden microcosm cannot be hidden from rhetoric. While the microscope's original intended use was for scientific purposes, the affordance to magnify and visualise a hidden world was a popular form of entertainment.



Illustration 3 Pocket microscope Wells et al. 1886

Following the assumption that games are novel in healthcare for their entertainment value, this section aims to elaborate on the discursive relationship between the optical technology and its ludic use. Therefore, I focus on the second building block of this material discourse analysis, namely the relation between ludic experiences and the language used to describe these activities. The aim for this section is to illustrate the inherent relationship between visualising bodies and ludic practices, and taking the first step towards rethinking the origins of serious health games. In analysing different practices in educational and non-educational contexts, a pattern of amazement and wonder starts to emerge.

3.2.1 Amazement and Wonder in Parlours and Public

Analysing the discursive relationship between the myth of transparency and ludic practices in the nineteenth century, we see how the act of making the invisible visible is a powerful imaginative topos. In analysing newspapers and literature on the use of the microscope, we see how the mechanical microscope emerges as a source for entertainment. Following Huhtamo's logic that we can read game machines as part of the broader human/machine relationship, the second layer of analysis investigates ludic activities of optical technologies.

Although the use of the microscope was intended to dismantle artistic illusions on the invisible microcosm, paradoxically the instrument proved to be an enchanting instrument for high society. Albeit the medical use of the microscope was limited, the microscope was an instrument used for visual and intellectual play. The visual spectacle of making the invisible world of little animals visible was a source of entertainment and amusement for the upper class up until the nineteenth century (Lentz 2013, 6). In his book *Oculus Artificialis*, Johannes Zahn (1685) provides early examples of the ludic appropriations of the microscope - one example is illustrated at the beginning of part two - which he describes extensively in beautifully drawn illustrations. The mechanical eye was used in private showings, but reproducible photographic images extended microscopic exhibition from the parlour to public venues (Godbey 2005, 277). In its early days, the medium's potential to visualise small objects was a visual attraction. Seeing the hidden world clearly amazed the crowd, and was a source for entertainment. This ability to see the natural world from another perspective drew crowds. For

instance, in a newspaper, the Dutch *Zoo Natura Artis Magistra* - now known as Artis - in Amsterdam advertised a show with the microscope, and uses terms such as *verwonderlijk* (amazement) *vreemdsoortige dieren* (strange-looking animals) to describe what *voor het oog bemerkbaar gemaakt worden* (becomes visible for the eye) (*Algemeen Handelsblad* 1841). These early accounts of microscopic images resonate with early cinematic projection practices such as the magic lantern.¹⁰

The *Magic Lantern Journal* (1875) published a transcript of the use of a magic lantern for educational purposes. In this example, the professor is displaying a living plate of eels:

I will try one other specimen - (a fresh plate of eels, leaping with galvanic starts and jerks, whereat [sic] - Oo! Ah! Ee! There he goes! Aee, see! There he goes! Tee-hee (The big one shakes himself), laugh; (little one darts across), Ah, the poor little thing! see him; it is frightened. (Quoted in Godbey 2005)

Although the exhibition of specimens is used in an educational context, it is obvious that the act of seeing the unexpected movements of the living animals under the microscope is a source of pleasure. The oohs and ahs which describe the act of looking clearly echo with the pleasure seeing something strange or unusual. Again, in this example amazement and wonder about the unseen world resonates. To make the invisible visible is a powerful imaginative practice. As if the world is shrouded with another layer that explores everyday objects under a different light.

The technology's attraction to show a real world that the eye alone could not see was an enchantment that drew visitors to world exhibitions. The strength of a microscope is mentioned as property to lure visitors to exhibitions. In advertisements selling the microscope, it is sold as '*De Wonder-Microscoop*' (Miracle Microscope), able to visualise '*de kleinste stofdelen en voor de oogen onzichtbare dieren*' (the smallest dust particles and animals invisible for the eyes' (*De Tijd*, 1895). Its ability to show an unseen world was a technological attraction.

At the world exhibition in Paris held in 1900, the turn of the century was a reason to reflect on mankind's greatest technological achievements. In a newspaper article circulating around the Paris exhibition, the importance of the microscope was discussed. The cultural reception of the microscope as a technological attraction can partly be explained by its relevance in Louis Pasteur's work on the bacteria, which is related to legitimising the optical device as a relevant and vital part within experimentation and analysis. Before we proceed with discussing how the technology was legitimised as a technology aiding in man's greatest achievements in 3.3, I want to first zoom into the ludic practices and activities surrounding the optical device. The rhetoric surrounding the public use of the technology materialises the deeply engrained feeling of experiencing a different perspective.

3.2.2 Microscopes in Games and Play

Besides the public exhibitions in educational and non-educational contexts, ludic practices with the microscope emerged. The interest in the microscope as a ludic device can be seen in the several publications on microscopes in the late nineteenth century, which show how to make one using paper, which is a pinhole microscope, but also describe different microscopes that were used by the avant-garde. The book *Through a Microscope* (1886) describes the common practice of using a microscope as an instrument for the curious. In order to explain the workings of the microscope to a wider

audience, the metaphor of the mechanical eye returns: 'the eye is an optical instrument' and to 'increase its capacity for seeing small things we add to it other optical contrivances' (Wells, Treat & Sargent 1886, 14). Also visible is the pleasure derived from seeing the unseen world: '[t]he microscope reveals so many strange odd-looking water creatures and plants that we can easily imagine ourselves transported to some new world' (ibid. 18).

This activity was restricted to the high society, who could afford the time to walk around the city and to purchase pocket microscopes. Gentlemen of the upper class had the possibility to stroll 'along the banks of the Wissahickon, in Philadelphia's beautiful park, and stopping now and then to examine some little flower or insect with pocket lenses' (Wells, Treat & Sargent 1886, 14). In the authors' description of using the microscope, it becomes clear that the practice of using a microscope was a visual spectacle: 'They had never dreamed of such a sight, and their wonder and amazement were as great as if they suddenly beheld a new world' (ibid. 15). For these activities, special pocket microscopes were developed. As is seen in illustration three, the nature of the activity changed the shape of the microscope. As people became more mobile, the microscope became smaller, which enabled the user to take the microscope with him.

In a similar manner, organised tours started to emerge, and fairs advertised with their microscopes. The pleasure of seeing bodies with the mechanical eye was a source for profit. Analysing the advertisements of Dutch newspapers in the late nineteenth century, a popular activity for the general public was to inspect everyday urban life with the microscope (*Utrechtsche Stads-Courant* 1841a;). In the newspaper, advertisements are made for group walks in the city, where the tour guide facilitates a microscope, with which the participants can explore the city. In another example, fairs toured cities such as Amsterdam, The Hague, or Utrecht, advertising shows for the microscope. Ranging between 25 and 70 cents per guided tour, users would stroll around the cities of cities such as Amsterdam or Utrecht in order immerse themselves in this new world (*Utrechtsche Stads-Courant* 1841b). Quite literally, the quotes described here remind us of the immersive pleasure of exploring a new world, another reality created by the mediation of technology. Just like with the magic lantern shows, an expert, or at least the owner of the venue, narrated these guided tours and fairs.

The strain of modernisation overloaded the senses, and in an attempt to seek relief from the strain of factory work, people turned to machines to seek relief. Whereas microscopes used to be in the hands of scientists and the wealthy, in the arcade-era, anyone could own the gaze for a short moment. These new machines were adorning the scenery of a variety of public places: amusement parks, railway stations, street corners, bars and trade fairs. Particularly since the 1880s many different machines were developed: vending machines, strength testers, fortune-telling machines and optical illusions (Huhtamo 2005, 6-7).

Meanwhile, with the emergence of modern capitalism, the social, urban and industrial fields were saturated with sensory input. As Jonathan Crary aptly argues, the endless stream of products, information, and sources of stimulation pushed attention and distraction to new limits and thresholds (2000, 14). Ironically, in order to relieve their senses, the middle class turned to ludic machines to escape from mechanised everyday life.

Although arcades emerged in the 1880s, the 1930s were considered to be the golden age of penny arcades. These spaces for leisure and provided a place for employed and unemployed men to try their hand at a slot machine (Huhtamo 2005, 14). Between World War One and World War Two, the financial situation of many households was not well. In an article "Penny Still Reigns As Arcade's King" a journalist is optimistic about the game machine: '[i]nflation has shrunk the dollar, but the penny is still king in the Arcades' (Knuff 1954, 1). The emergence of arcades around the turn of the twentieth century removed scientific inspection from the machine and internalised a product of sexualised entertainment, changing the context from peering down a microscope to peeping with the microscope.

Specifically, machines like *Nudist Colony* (1936), promised players a peep-show. 'Nudist Colony - They are at work. They are at play. They are alive!' (Bryan Bryant's Automatic Works, 1936). The player's coin operated a switch, which activated an electrical light. The player could then peer down into the lens and see a colony of living ants moving around. The wordplay was essential for its success, aiming at gullible viewers who would pay money to see this optical trick. The act of looking down a microscope changes from peering to peeping. In another article, the ludic practice of looking is compared to "virtuous eyes" (*The Billboard* 1957). Disguised as an exotic experience, these machines created an immersive experience to make users forget their sorrows for a short while.

In addition, *The Billboard*, a weekly entertainment magazine issued in the United States, makes several references to the game *Nudist Colony*. In the descriptions, the arcade game is sold as a profitable and fascinating machine:

EXHIBIT'S NUDIST COLONY is the greatest single attraction of the past ten years. People are drawn like to a magnet. An entire colony of live ants living in a glass house. The colony is a complete ant city. in it are the streets canals, storehouses, cemeteries, and nurseries of the ants [sic]. Fascinating and profitable. With a minimum of care the ants will live for years. (*The Billboard* 1957, 13)

Although the machine is sold as a peeping show, what is considered fascinating in this quote is not the virtuous act of peeping, but rather the unfolding of a complete micro-world. The metaphor of a city is used to make the process understandable for the



Illustration 4 Nudist Colony (Bryan Bryant 1936)

general public. In this "city" everything is present what is needed to make a reasonable life for the ants. They are born, and they can shop, stroll, and die in this small world. The viewer is immersed in a complete and new world. Important to notice is that the emergence of arcade machines removed the narrator from the human/machine interaction. Instead, the viewer needed to imagine a narrative unto what was seen under the microscope, which would explain why the ant colony is referred to as a city.

Concluding, the microscope's ability to zoom into the world invisible for the naked eye through the use of a magnifying lens was both a technological and visual attraction. As an arcade game, the pleasure of viewing is sold as a peep-show, but as I argued, analysing the language used to describe these ludic practices - such as the city-metaphor - indicates that viewers were immersed in another realm. Furthermore, the use of superlatives such as amazing and wonderful to describe the technology almost gives it magical powers. Besides the visual pleasure of seeing the unseen, the technology itself was an attraction. Shown at world exhibitions, the public spectacle of progress is described in terms of magnifying power and sharper vision. In the first section I illustrated how the myth of transparency is related to rendering the user transparent. In a similar manner, we start to see that transparency in ludic context is also related to controlling vision.

3.3 Scopic Regimes

In the previous part I highlighted how seeing with the microscope was considered to visualise a new world. I now want to follow up on the imagined scientific vision in 3.1, and zoom into technologically constituted scientific sight. Therefore, I delineate how this shift in spatial perspective legitimised the use of optical instruments in medical culture. Here I pick up the myth of transparency to illustrate how the scientific community revolted against ludic use of the microscope. The question I aim to answer is what perspective on the body is created, and how the myth of transparency is used to advocate the use of the technology. In order to achieve this goal, I turn to the third building block of my analysis, which focuses on the material practice of embedding (microscopic) perspective within medical culture. After discussing resistance of ludic use of the microscope, I turn to the technology's attraction of objective, second sight, and how this has been instrumentalised in medical culture. Visualising this process will show how the material practice of the microscope institutionalised observing with instruments.

In the second half of the nineteenth century 'human and animal organisms had been thoroughly investigated under the microscope and hooked up to machines and instruments' (Zielinski 2006, 206). When scientists like Robert Koch localised the specific *baccilii* that caused Tuberculosis, it changed the nature of diagnosis and treatment.

The microscope and the study of bacteriology, however, have revealed to us the presence of minute living organisms or germs, which are everywhere around us, infesting the air, the earth, the water, our food, our bodies, and all organic matter in countless millions. These infinitely small beings multiply with a rapidity and fecundity that bewilders the imagination. (Byrne 1900, 207)

Noticeable is the change in language, where "little animals" change into "infesting germs," which marks the identification of a harmful type of being: bacteria. This new

structure of clinical medicine created a new grammar and style of diagnosis in the form of diagnosing through language and images.

Meanwhile, zooming in on the material affordance of the microscope, lenses opened up the possibility of studying cause and effect on a micro-scale. As we have seen, scholars such as Hook or Van Leeuwenhoek tried to distance themselves by extending the senses into mathematics and artificial organs. In academic society, the ludic use of the microscope was frowned upon. In the proceedings of a lecture delivered by John Mayall for the Journal of The Society of the Arts, the early use of the microscope is discussed, as the author refers back to the early use of the microscope as a form of entertainment: 'from the number of instruments in this inferior class figured by Zahn, I think we may infer that the microscope was rapidly becoming vulgarised' (1886, 1019). Instead of using microscopic images to dazzle and amaze the general public, scientists aimed to use the instrument to measure, categorise and explain these novel

bodies. What was seen under the microscope was considered as real, which was conceptualised as instrumental realism. Instrumental realism, according to philosopher Don Ihde, is a product that originated in the early days of the microscope, but found its acceptance in modernity: '[w]hat could be seen through the lensing systems was taken as real, in part because it retained its analog qualities to unmediated vision' (2002, 46). Therefore, it can be argued that transformation of vision has been more about technologies or instruments of vision.

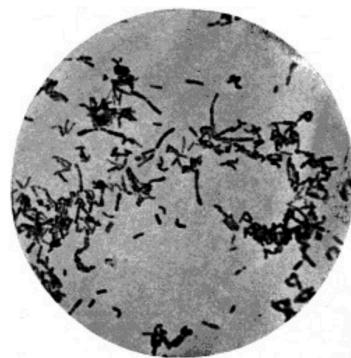
Accordingly, microscopic images in the late nineteenth and the early twentieth century were employed in scientific practice to render bodies transparent. Magnification, as a powerful tool to bring small objects to a closer proximity to human measurements, shifted the perspective of vision. The thing under investigation could be enlarged and brought closer to the researcher. Ironically, in bringing the object closer to the subject, the body of the patient disappears.

An illustration of how microscopic vision rendered the body transparent is seen in medical textbooks that advocated the use of microscopes in diagnosis and treatment. A popular textbook used in medical education, *Clinical Diagnosis* (Emerson 1908), aimed specifically at diagnosing diseases using the microscope. In order to magnify bodies, they had to be abstracted.

Better sight was achieved by sampling body parts that were small enough or transparent enough to be examined under the microscope. The microscope is used to relieve the body from the pain and suffering of diseases caused by bacteria and pathology as the



BACILLUS OF TUBERCULOSIS IN SPUTUM.



BACILLUS OF DIPHTHERIA (KLEBS-LOEFFLER).

Illustration 5 Micrographs of Bacteria (Byrne 1900)

study of diseases that cause suffering made its way into the textbooks. Making the invisible visible became a vital part in the process of treatment.

Returning to the question what pathos is inscribed on the body; when looking under the microscope, the patient's body disappears as the object under the microscope is considered a "specimen," and graded for its visibility. In *Clinical Methods*, bodies are conceptualised in their affordance for transparency: fluids such as blood, urine, sputum or stomach content are good since they can be examined under the microscope (ibid. viii). Other pieces of the body such as crusts, flesh or skin are less interesting, because they are more opaque and are less visible.

Additionally, the disembodied specimen is compared between the "normal" and "pathological" (ibid.) As a result, the body is characterised in measurable sizes and graded for its potency to be examined. The idea that bodies can be read is strengthened by the scientific use of the microscope.

In fact, the technological mediation by the microscope removed the physical examination of the patient by the doctor. Instead, the patient could be examined without being physically in the room, since samples could be taken by someone else. This process meant that a person's living material could be transported and seen as a living entity in another space. In a sense, this resonates with the corporeal presence of the patient, who does not have to be present in the flesh in order to be diagnosed. I argue this creates a sense of *corporeal objectivity*; the idea that bodies can be quantified in measurable objective terms.

Furthermore, the idea of medical instruments showing true nature as it was seen through the lens was strengthened by photography. Before photography, images needed to be drawn by hand. In the book *Photo-Micrography* the usefulness of the combination between microscopy and photography is explained:

All microscopists are aware of the fickleness with which objects display their structure, markings easily perceived at one time may baffle all attempts to resolve them at another, and perhaps when seen are beyond our power to delineate, I have before me at present, some drawings which must have taken the artist a week to finish, and even then, shew [sic] the existence in his mind of preconceived notions of their structure. (Malley 1885, 1)

Two observations are relevant: firstly, microscopy is positioned as an unstable subjective practice, with several steps of translation where the image is altered. Small changes in light, lens or the glass plate change the results, which makes it difficult for medical culture to reproduce the image.

Secondly, the process of representing microscopic images with illustrations is considered to be a tedious and subjective practice. The representations made by an artist's hand are considered to be clouded with preconceived notions, in other words, the aesthetic and ideas of the artist, which take a long time to produce. In contrast, photo-micrography is introduced as a means to capture and reproduce images with the microscope. The advent of photography and its 'mechanical system for reproduction' stirred the imagination:

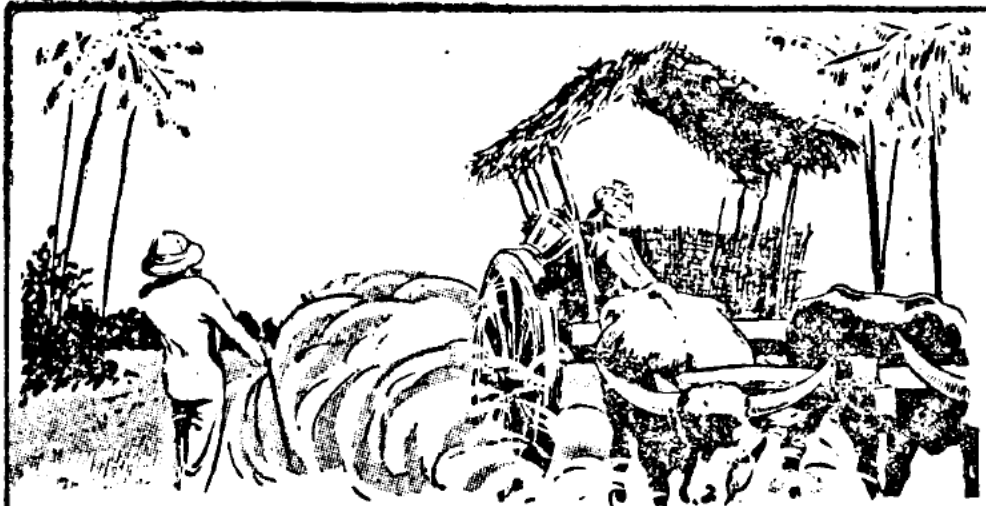
Photography not only obviates the necessity of future trouble and perhaps failure in the display of these markings, but in a period varying from a few seconds to as many minutes, imprints the latent image on a sensitive surface, which after development, can be multiplied a thousand fold, and give to the world results, indisputably proving the

truth of some favourite theory, or showing the existence of some doubtful structure.
(Malley 1885, 1-2)

In effect, the pattern of a continuous struggle for better vision and objective visualisation emerges. If the microscope is the mechanical eye, then photography can be considered to be the mechanical memory of vision. The ability for the photo to be reproduced inexpensively without changing its image is seen as the quest for ultimate truth.

Notwithstanding, mechanical objectivity served as a perfect canvas for rational scientific research. Micrographs and the practice of microscopy were embedded in medical culture. Instead of the practice of dissection, the living could be studied to sample the body. Highly similar to the studies of the movement of the human body, medical researchers started studying the movement of these bacteria. 'Ever more sophisticated "experimental systems" proliferated to observe, measure, and classify all phenomena and processes of living organisms' (Zielinski 2006, 206). For instance, Illustration five shows micrographic images of tuberculosis and diphtheria. The human body was studied for its regularities and abnormalities, and as bacteria were further divided into species, names were given them to distinguish the different forms.

The institutionalisation of microscopy and photo-micrography was considered to be an objective and real conceptualisation of the corporeal. This is visible in the rising popularity of the use of photo-micrography in advertisements. In this Dutch advertisement for mint candy, microscopic images are used as "proof" that the tablets have effect.¹¹ Illustration six shows the image of sputum with bacilli and Figure B shows an image of sputum after taking a Formamint tablet. Two things are of interest here. First, the advertisement uses a medical expert, Dr. G.E.A. Broese van Groenou, to create the illusion that an actual experiment was conducted here: a rational study of cause and effect is suggested here, where the effect before and after taking a tablet is measured. The images of the microscope are used here to create the illusion of objectivity and claim to visualise the truth. As science historians Lorraine Daston and Peter Galison advocate, mechanical objectivity in itself is a myth, because it cannot exist without subjectivity. 'Objectivity is not synonymous with truth or certainty, precision or accuracy. [...] [A]n objective image is not always an accurate one, even in the view of its proponents' (Daston & Galison 2007, 372). In this rhetoric, the desire to avoid sickness is sold by the myth that truth photo-microscopy captures the real unmediated truth.



Stof bedreigt Uw gezondheid

Reeds een enkele gram stof bevat millioenen gevaarlijke bacteriën die, met dit stof ingeademd, zeer gemakkelijk in mond en keel doordringen.

Bedenk dat deze bacteriën de verspreiders zijn van gevaarlijke ziekten, zooals griep, diphtheritis, influenza, enz. Eenmaal doorgedrongen in mond en keelholte, vermeerderen zij zich snel, en vormen een voortdurende bedreiging van Uw gezondheid.

Formamint vernietigt de bacteriën in mond en keel en beschermt U tegen besmettingsgevaar. Dr. G. E. A. Broese van Groenou, te Haarlem, schrijft dan ook:

„Ik ken geen practischer en doelmatiger middel ter ontsmetting van mond en keel dan Formamint.”

Houd in droogte en stof Uw mond zuiver en frisch en voorkom besmettingsgevaar met

FORMAMINT

De keel-ontsmettende tabletten

Verkrijgbaar in alle Apotheken en Toko's



Fig. A Fig. B

De werking van Formamint op de bacilli der lucht, gezien door microscoop! Figuur A toont een glaasje met bacillen, zooals ze in lucht en stof voorkomen, vóórontsmetting. Figuur B hetzelfde glaasje na ontsmetting met Formamint.

On the whole, returning to the myth of transparency and the question posed in this section; what perspective on the body is created, and how does the myth of transparency resonate in the use of technology? The ability of the microscopic lens to magnify the unseen reconceptualised the experience of space. The small world unseen could be transformed to be the same size as the seen world or larger, but a careful selection process evaluated which parts of the body could be examined and which not. In respect, transparency was valued as better in contrast to opaque materials. Thus, the body was measured in terms of its ability to be transparent.

In scientific context, the myth of transparency is strongly related to instrumental realism; the idea that observation with the mechanical instrument captured the real. I want to point out one interesting generalization that emerges from this examination of the microscopic instrumentalisation: the better the image, and the more information derived from the image, then the better the chance of diagnosing or treating the patient. The microscope in combination with photo-micrography is advocated as the technology in order to receive that enhanced vision.

In summarising the most important conclusions of this chapter, there are several patterns and topoi emerging. First, the ludic affordance of the optical technology was not considered to be a valuable property for healthcare, since the ludic use of the microscope was considered "vulgar" in the scientific community.

Second, the topos to make the invisible visible is a powerful in the sense that it ignites the imagination and is the basis of many ludic activities. The intense pleasure derived from seeing the unseen cannot be denied, and in fact, the use of microscopic technology in penny arcades is a form of relief from the struggle of everyday life.

Third, this observation leads to the conclusion that the microscope as optical technology provides an immersive experience, in its ability to materialise an alternative reality that was a source of pleasure and captivated the public. In serious health games, immersion is considered to be one of the games main characteristics. The user experiences a sense of "being there," fully immersed in another world. The intrinsic desire to explore new worlds provides fertile soil for the idea that playing games creates a deeper understanding of bodies.

Fourth, another important emerging pattern is the idea that mechanical objectivity captures reality. Despite the fact that simulation is not the same as representation - as I will highlight in chapter five - the ideology that seeing creates knowledge does seem to be present in serious health games rhetoric (3).

Lastly, a pattern of technological progress emerges in the quest for sharper vision through technological advancement. Performance is measured in the way the image can be reproduced objectively. There is a generalisation present that strives for ultimate vision, which will lead to more knowledge, and presumably will lead to healthier bodies. The social meaning in this context is the desire to find out how diseases such as Diphtheria or Tuberculosis can be eradicated. In this quest, the mechanical eye turned downwards and inwards, changing perspective of space. In parallel, the advent of another technology in the late nineteenth century changed perspective again, as the x-ray enabled the penetration of seemingly opaque objects. Therefore, to illustrate another shift in perspective, I will proceed to the next chapter and perform the material discourse analysis in a similar manner.

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A MONTHLY
DEVOTED
TO THE
PRACTICAL
APPLICATION
OF THE
NEW SCIENCE
AND TO THE
PHYSICAL
IMPROVEMENT
OF MAN.

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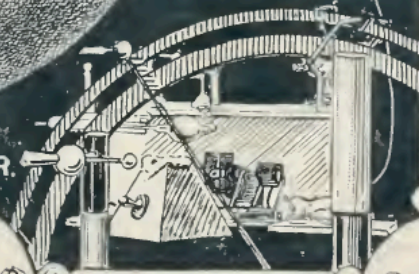


Illustration 7 Cover of the Monthly X-ray Journal (1900)

4 Making the invisible visible

Insights that had formerly been gained only through the bloody process of dissecting dead bodies were now presented in transparent black-and-white images of living bodies. Inner organs were also visible to the eye; on these images, only golden wedding-rings resisted the newfound force for rendering bodies transparent.

Siegfried Zielinski, *Deep Time of the Media* 2006

So far in this analysis I argued that several topoi are emerging under the umbrella of transparency. The topos of making the invisible visible is paradoxical, since it has the double meaning of the rational mind and pleasures of the flesh. Despite the extensive efforts of medical culture to advocate the use of optical devices in the spirit of science, the pleasure of the new world visible to the eye was a source for amazement and entertainment. The optimistic reception of the compound microscope as one of the greatest inventions of the nineteenth century reveals the underlying hope for a better future, one where illnesses such as Tuberculosis are a thing of the past.

There are several patterns emerging that relate serious health games to medical instruments, for instance the rhetoric of progress and better vision, which is driven by the desire to free the body from suffering and illness. It cannot be denied that the assignment of social meaning to technological progress is the source of many great improvements in eradicating disease. The positive impact of these technologies in the discovery of illnesses notwithstanding, the question is raised to what extent the evolutionary reception of serious health games is a continuity of a recurring exploration of new worlds, enabled by different visualising technologies. This chapter is about exploring the x-ray and revisiting the earlier mentioned topoi and the myth of transparent vision in light of their technological promise to relieve the body from suffering; or in the words of media archaeologist Imar de Vries: 'myths work because they conceal the failures, the social struggles, and the unreachability of a sublime state; they are extremely adept at setting agendas and letting people forget that they are repeating themselves in proclaiming the gospel of the new' (2012, 92).

First, since the myth of transparency is proposed to be a guiding principle, I consider in section 4.1 how the description of the metaphors used to describe x-ray technology represent a specific sign system. After contrasting Wilhelm Roentgen's realist approach towards x-rays with the imaginative topos of visualising the invisible, I move forward in section 4.2 to highlight some of the ludic practices that emerged in the early use of the technology. Next, in the final section (4.3) I present how the material affordance of the x-ray to penetrate bodies shifts perspective inside the body as a new space. Similar to the previous chapter, these sections will be discussed through the building blocks of material discourse analysis.

4.1 Mysterious Rays

In this part I focus on the x-ray's early conceptualisation and invention. Returning to the first building block of the material discourse analysis, I demarcate how the language in use forms specific relations between metaphors of the eye and the senses. In the last chapter we have seen that the myth of transparency is the scientific desire to render the scientist invisible, and that the shift toward optical technologies that bring small objects

close changed the nature of medical research. Photo-micrographs were used to "prove" the existence of harmful bacteria that could not be perceived by the naked eye. At the other side of the spectrum there are x-ray images. To what extent are these ideas present around x-ray technology? First, I will elaborate on the metaphor of the "enchanted eye," and how the technology is presumed an extension of the senses. Then, I will situate the use of this metaphor within the myth of transparency, where I revisit the topos of making the invisible visible.

A DISCHARGE from a large induction coil is passed through a Hittorf's vacuum tube, or through a well-exhausted Crookes' or Lenard's tube. The tube is surrounded by a fairly close-fitting shield of black paper; it is then possible to see, in a completely darkened room, that paper covered on one side with barium platinocyanide lights up with brilliant fluorescence when brought into the neighbourhood of the tube, whether the painted side or the other be turned towards the tube. The fluorescence is still visible at two metres distance. It is easy to show that the origin of the fluorescence lies within the vacuum tube. (Roentgen 1886, 227)

In these opening words of Roentgen's 1886 article "On a New Kind of Rays," the allusion to the myth of transparency is made by opposing "complete darkness" with "brilliant light." The x-ray brings light to darkness by rendering opaque bodies transparent. Although these words seem neutral at first, considering that they were published in the journal *Science* at that time, the superlatives indicate the surprise and satisfaction of the discovery. At the time, Wilhelm Roentgen was studying electric discharges within rarefied gasses, when he noticed how the electrical discharge made with the Crooker's tube created an imprint on fluorescent paper. His attempt to hide his excitement is visible in his cool description of materials and processes.

Likewise, bodies are dehumanised and characterised in material properties, as Roentgen explains the variety of his experiments with materials: aluminium, water, flesh and wood. Bodies are dehumanised and brought back to specific properties, for instance density, or permeability:

From these values it is clear that in no case can we obtain the transparency of a body from the product of its density and thickness. The transparency increases much more rapidly than the product decreases. (Ibid. 228)

Noticeably, transparency is considered in a more literal sense, differently than it does in the microscope. Whereas transparency in the microscope is considered in fluid, or in thickness, transparency in x-ray technology has to do with heaviness, the density of a material. As a result, the idea that bodies could be penetrated and rendered transparent emerged.

In his article, Roentgen explains his justification of identifying this force of mystery as rays:

The justification of the term "rays," applied to the phenomena, lies partly in the regular shadow pictures produced by the interposition of a more or less permeable body between the source and a photographic plate or fluorescent screen. (Ibid. 230)

Not surprisingly, the photographic plate gained the status of experimental proof, another example of mechanical objectivity. The rays were an undiscovered identity before their effects were laid bare in the shape of the photograph. Instruments such as photography

and the x-ray are a favourable system of communication that is favoured above human experience. As a result, the myth of transparency in scientific observation aims to distance the scientist as a subject from the experiment, a strong idea that emerged in the analysis of the microscope in the previous chapter.

Meanwhile, the topos to make the invisible visible gained a mystical status. Roentgen conceptualised radiation as 'the x-rays (as I will call the rays for the sake of brevity)' (ibid. 228). A recurring pattern is the conceptualisation of optical technologies as extensions of the senses, as the mysterious x-rays are extensions of the eye. When Roentgen published his article in 1895, the source of the rays as radiation was not yet defined. However, the value of his significant discovery as a technique for producing images invisible for the naked eye was clear from the start. To grasp the meaning of the x-ray image in that time, here is a quote of the memorial speech given by Sylvanus Thompson of the British Roentgen Society (1897):

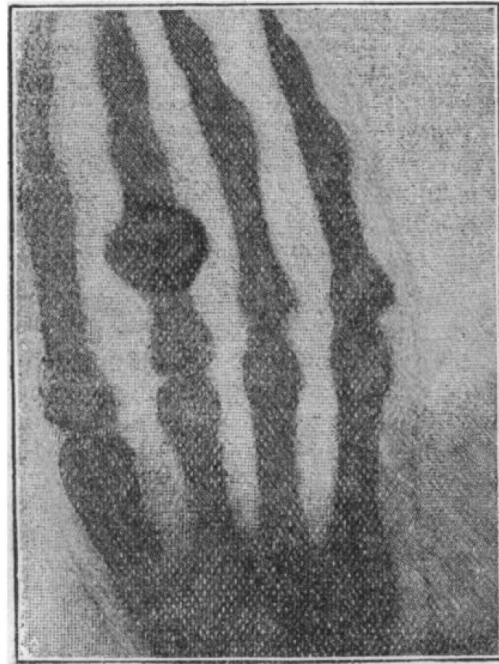


Illustration 8 Image of Bertha Roentgen's hand (Roentgen 1886)

November the eight, 1895, will ever be memorable in the history of Science. On that day a light which, so far as human observation goes, never was on land or sea, was first observed. The observer, Prof. Wilhelm Conrad Röntgen. The place, the Institute of Physics at the University of Würzburg in Bavaria. What he saw with his own eyes, a faint flickering greenish illumination upon a bit of cardboard, painted over with a fluorescent chemical preparation [...] [I]n the darkness, expressly arranged so as to allow the eye to watch for luminous phenomena, nothing visible until the hitherto unrecognized rays, emanating from the Crookes tube and penetrating the cardboard shield, fell upon the luminescent screen, thus revealing their existence and making darkness visible. [...] Strangest of all, while flesh was very transparent, bones were fairly opaque. And so the discoverer, interposing his hand between the source of the rays and his bit of luminescent cardboard, saw the bones of his living hand projected in silhouette upon the screen. The great discovery was made. (Thompson quoted in Cartwright 1995, 111)

Transparency, in this context is achieved by seen through opaque objects. As a result, in the x-ray, transparency has a more literal meaning of making opaque objects translucent. Notwithstanding, the invention of the x-ray was considered to be a major event. As we see in the quote above, x-ray vision was considered to be a paradigm shift in the way (human) bodies were seen. Terms such as "luminous phenomena" were used to highlight the great achievement made by this one man.

Again, the powerful topos of making the invisible visible re-emerges with a vengeance. As cultural historian Yuri Tsivian pointed out, 'cultural expectations aroused by the x-ray exceeded anything that could be observed in connection with other scientific discoveries of the time' (1995, 82). Indeed, there was a complete frenzy around the roentgen rays.

The metaphor of the "enchanted eye" (Van Dijck 2005) is the result of the mysterious nature of the rays. When analysing illustration seven on the previous page, the metaphor seems to fit perfectly: we see a divine angel radiating down on earth with her ephemeral rays. On the one hand, there is something supernatural about these rays. Furthermore, it is interesting to highlight how the image resonates

After subjecting his own hand to the screen, Roentgen subjected his wife Bertha Roentgen to the x-ray device. Illustration eight is the image taken by Roentgen of his wife. This photograph was considered to be one of the earliest photographs of the human body. The reaction of Roentgen's wife shows how the experience was shocking at first:

When [Roentgen] showed the picture to her, she could hardly believe that this bony hand was her own and shuddered at the thought that she was seeing her skeleton. To Mrs. Roentgen, as to many others later, this experience gave a vague premonition of death. (Glasser quoted in Cartwright 1995, 115).

The experience of seeing your own bones for the first time must have been uncanny, since the only way to visualise the inside space of the body was to penetrate it with a knife. Despite its macabre premonition of death, the x-ray was a site for pleasure and entertainment.

In brief, in the exploration of the language-in-use to describe the x-rays, the myth of transparency is revisited in a different technological context. Consequently, because of the technology's affordance to permeate opaque objects, the x-rays are described as mysterious and mythical. Instead of a mechanical eye, the metaphor 'enchanted eye' would be better suiting to describe its status, but the underlying idea of the optical technology to extend the senses prevails. In the early use of the x-ray the topos of making the invisible is related to a macabre pleasure of seeing live bones. In the next section, I portray how this pattern is related to the desire to experience the corporeal as a new space.

4.2 Ghostly Visions

In this part I want to pursue the pleasure of visualising the invisible further, and argue there is a deeply ingrained admiration and wonder in visualising living bones. The ability of the x-rays and spectroscopy to visualise the living inner body created presence of the inner space, turning perspective inwards. Following the path of excavating the immersive experience of feeling present in a new world, I depart the second discursive building block and analyse the discursive relation between ludic activities and the language used to describe them.

Albeit in a different material context, the imaginative topos of visualising the invisible returns in the x-ray technology. As other scholars have pointed out before me, in its early days the x-ray device was a technology of attraction (Gunning 1991; Cartwright 1995; Van Dijck 2005; Natale 2011). On the one hand the technology itself was an attraction, on the other hand it was seen as a haunted medium that enabled viewers to the living as the dead. In its early days, the technology was considered to be harmful and magical, for its ability to permeate bodies without cutting them open first.

In a sense, the pleasure of experiencing x-ray technology can be compared to visiting the haunted house. Startled by the skeletons on the one hand, but experiencing a strange sense of pleasure on the other. In a sense, the x-ray device was a haunted medium. The term *haunted media* was coined by media archaeologist Jeffrey Sconce.

Although his work is focused on communication technologies such as the radio or television, I argue the concept haunted medium perfectly fits the x-ray. Referring the network of correlations between the supernatural and media technologies, Sconce argues how communication media are haunted as 'uncanny electronic agents' or considered to be a portal towards 'electronic otherworlds' (2000, 4). The ability to experience the inside of the body when it was alive, and not dissected, envisioned the body as a space transcendent of the visual world, since the x-rays penetrated the flesh and visualised what was beneath the skin.



Illustration 9 The X-ray Fiend (Smith 1897)

Just as was seen in the ludic use of the microscope, the scientific community rejected the imaginative practice of the x-ray device to communicate with the spirit world. The ability to capture the unseen was an attraction for occultists and spiritualists to try and capture the spirit world. As media historian Simone Natale argues, '[m]any spiritualists and psychical researchers immediately regarded Roentgen's discovery as an event that opened the way to a new phase in their investigations into the supernatural' (2011, 353). Since the technology's beginning, occults and spiritualists were interested in the device to see if they could communicate with the dead. More specifically, the inventor of the Crookes tube, Sir William Crookes, was said to be a spiritualist and conducted several experiments where he would invite psychic readers at his home (Medhurst 1972). Even though these experiments were described using the social language according the scientific model, his attempts to describe and communicate with the other realm were rejected.¹² Despite the effort of the scientific network to reject charlatans who made absurd claims about visualising the dead, the mysterious rays were still considered to have an ephemeral quality, shining light on a world unseen before.

Early accounts of x-ray imagination emphasised the ability of the medium to augment reality with vision that exceeded natural boundaries. As a consequence, x-ray vision created an alternative reality. Illustration nine is a still from the *X-Ray Fiend* (A.M. Smith 1897), which is set against a dark background. A long shot shows a woman with an umbrella and a well-dressed man sitting on a park bench. In the scene, the man advances the woman, who mildly resists his flirtations. The villain in the story is a fiend who has a portable x-ray camera, which he carries over his shoulder (notice the resemblance to modern video cameras). The evil character takes the "lens" off his x-ray camera, and - at this point there is a cut in the film - the man and woman become skeletons. Next, the scene is augmented with x-ray vision, which allows the fiend of the story to pierce through the exterior, and transports the viewer into an electronic elsewhere that exhibits the body through mysterious rays. Indeed, the x-ray imaginary draws the viewer's attention to the interior, where electronic presence enhances the world through images.

Truly, *The X-Ray Fiend* embodies various imaginations visible in the early years of x-ray. The first visual attraction is the macabre yearning of penetrating the body. In the film, the characters perform a sort of *Danse Macabre*, strongly related to pleasures of the devil, which are actualised in the characters exaggerated movements when

transforming into the x-ray skeletons. The second striking feature is the electronic potential of closeness to the corporeal inner world, and presence inside the body. It presumes that reality can be filtered to visualise the reality hidden underneath.

Moreover, the pleasure of experiencing the x-ray device was twofold. On the one hand, the device was a public attraction, on the other hand it was an aesthetic pleasure. The notion that visual technologies are a spectacle resonates back to the work of Tom Gunning (1991), who has studied the pre-cinematic and argues early viewing experiences of the cinema were not as much a theatrical tradition, as a fairground attraction. Gunning frames x-rays within the similar culture of attraction:

Nor should we ever forget that in the earliest years of exhibition the cinema itself was an attraction. Early cinema audiences went to exhibitions to see machines demonstrated (the newest technological wonder, following in the wake of such widely exhibited machines and marvels as X-rays or, earlier, the phonograph) rather than to view films. (Gunning 1991, 231)

The x-ray device drew much attention, as it was displayed in many exhibitions. The medium's ability to penetrate opaque objects was presented as a technological fascination, which attracted visitors of world exhibitions, fairgrounds, public conferences and magic theatres (Tsivian 1996, 89).

To illustrate, in a newspaper article in 1886, a new theatre piece by Dutch theatre maker Anton van Sprinkhuysen is announced (*Het Nieuws Van Den Dag* 1896). Not surprisingly, the piece is called '*x-stralen*' (x-rays), and is a comedy that visualises many of the caricatures on x-rays circulating at that time. The main event of the show is the actual use of the x-ray, where a lucky person in the audience is picked and is the subject of the mysterious rays (ibid.). Although this clipping was only a short announcement, the fact that this performance was done in the Tivoli, a major theatre in Rotterdam, shows the impact and popularity of seeing the x-ray device in the flesh.

Similarly, the x-ray's imaginative captivation struck the heart of many poets and writers, and the amazement and curiosity for both the technology and the aesthetic could not be hidden from sight:

LINES ON AN X-RAY PORTRAIT OF A LADY
She is so tall, so slender; and her bones—
Those frail phosphates, those carbonates of lime,—
Are well produced by cathode rays sublime,
By oscillations, amperes, and by ohms.
Her dorsal vertebrae are not concealed
By epidermis, but are well revealed.
Around her ribs, those beauteous twenty-four,
Her flesh a halo makes, misty in line,
Her noseless, eyeless face looks into mine,
And I but whisper, "Sweetheart, Je t'adore."
Her white and gleaming teeth at me do laugh.
Ah! lovely, cruel, sweet cathodograph!
(Lawrence K. Russel quoted in Lyons 1960)

This poem is a playful dance between a closeness and distance. His desire to gaze into the soul of his beloved is actualised when putting on his x-ray goggles. The cathodograph visualises the real space hidden underneath. The act of seeing is

ephemeral, as the contours of the flesh are considered to be halos. We see the entanglement between death and the pleasure of immersing one's self inside the world of his love's true inner being.

As of so far, we can conclude that the popularity of the experience emphasises the ludic use of the device. The ability to see one's own inside ignited the curiosity of many. As is visible when analysing the advertisement in illustration ten, the technology is used to draw visitors to the department store. The caption on the right, next to the woman viewing her own feet, emphasises the pleasure in seeing the invisible. The comparison is made with a stereoscope, a popular device used in the mid-nineteenth century, which used two images to create the illusion of depth in the image.

In a recent article published by *The Telegraph*, Bernard Becker (2012) thinks back of his fond memories of the Ped-O-Scope:

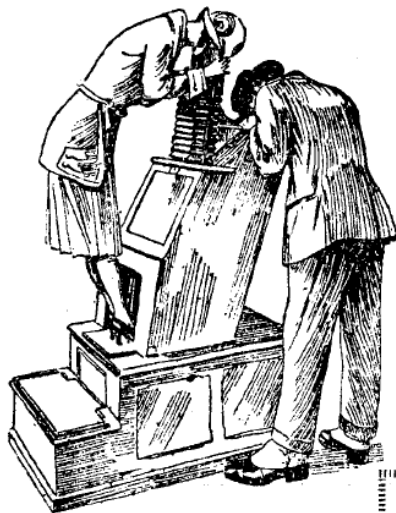
I still remember how the friendly assistant placed my newly shod feet into a slot at the bottom of this box. Peering through a hole at the top, I could see the skeleton of my feet inside the outline of the new shoes (they were brown leather, bone hard with a stitched toecap, and I didn't like them). The attendant and my mother peered through other holes, encouraging me to wriggle my toes, making sure there was ample space. [...] The mystery wooden box held an X-ray tube in a lead-shielded base, beneath the platform that customers stood on. At the push of a button, a beam travelled up through the feet; and an image of the bones within the outline of the new shoes was directed onto a fluorescent screen. [...] For children like me, bored with the dreary chore of shoe-shopping, they were as attractive and exciting as being handed a free balloon.

The device was exploited as an "extraordinary device" which the interested public could experience for free. The ludic use of the technology is visible in two ways. First, the technology's attraction to make the invisible visible is obvious. Whereas the public usually had to pay an entrance fee at world exhibitions for instance - which were only displayed in major cities in Europe such as London or Paris - the technology now was used as a "free" attraction. Of course the underlying purpose of the department store was to draw in more paying customers. In Becker's experience, he compares the experience of the device with getting a free balloon, indicating the shift in perspective, from the tedious act of shoe fitting, to the pleasurable act of gazing down the magical device.

To conclude, the technology's novelty to conceptualise the body as a new space was both a technological and aesthetic attraction. The use of language such as mysterious, ghostly, and amazing, indicate the experience was macabre, but first and foremost ludic. In a similar manner, this attraction seems to be related to novel vision afforded by different technologies. In the next section I aim to highlight how this knowledge has been normalised and made relevant in medical culture.

de Ped-O-Scope

'n Hoogst interressante uitvinding



Geen Röntgen-opname noodig! Zoals nevenstaande afbeelding toont, gaat ge eenvoudig op de tweede trede van het apparaat staan en zet Uwe voeten zo ver mogelijk in het gat. Kijk door de opening, die het best te vergelijken is met een stereoscope, en ge ziet onmiddellijk zeer duidelijk het X-stralenbeeld van Uwe voeten.

Schoenen aanpassen behoeft niet langer uitsluitend een kwestie van gevoel te zijn. Bij ons kunt ge thans Uwe schoenen passen met behulp van de laatste en nieuwste

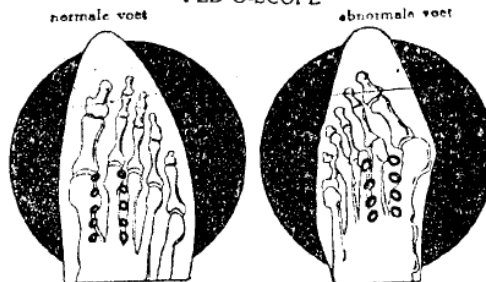
Wetenschappelijke Machine,
ZONDER EENIGE KOSTEN.

Het X-stralenbeeld van den Ped-O-Scope laat U duidelijk zien hoe Uwe voeten in de schoenen zitten.

Wij noodigen daarom belangstellenden uit, het nieuwe en buitengewone toestel in werking te komen zien.

Demonstratie kosteloos.

Het X-Stralenbeeld zoals men het ziet door den PED-O-SCOPE



Dit X-stralenbeeld van den Ped-O-Scope geeft U een in druk hoe men een normale voet zal zien in 'n goed passende schoen. Men lette vooral op de vrije ligging der voetbeenderen, zoowel ten opzichte van elkaar als wat de vorm van den schoen betreft.

Deze afbeelding geeft de treurige gevolgen weer van geregeld nauwe of te korte schoenen dragen. De misvorming v/d. voet is hier dermate dat zelfs bij goed passen de schoenen niet meer kan voorkomen worden dat ook 't model van den schoen mis-aakt wordt.

DE BIJENKORF

Amsterdam

Illustration 10 Advertisement of the Ped-O-Scope displayed at a department store (Algemeen Dagblad 1926)

4.3 X-rays for Treatment and Diagnosis

In the last part I have illustrated the technological and visual attraction of the x-ray to penetrate the body. This shift in perception of the corporeal evoked fantasies of seeing the naked self and fed the desire to visualise the dead. The macabre x-ray imaginary turns attention to the medium's most astonishing power: the illusion of instantaneous vision into the inner space of the living body. In its early days, the x-ray technology was not a medical instrument. Turning back to the last discursive building block of my analysis, in this section I aim to show how the x-ray device was instrumentalised in medical culture, where medical professionals' growing enthusiasm and need to prove the validity of the medium resulted in a variety of applications for x-ray images.

Today, the x-ray device is a common instrument used in diagnosis and treatment. Recognising the value in penetrating the body without cutting it open early on, medical specialists soon began to experiment with x-rays. In the *American X-ray Journal*, the use of the x-ray device is received as a technological novelty:

The progress made in the diagnosis and the treatment of disease has been most marked in nearly every particular. Not only have the therapeutical resources of the physician been greatly enlarged, but new possibilities in diagnosis placed at the disposal of the medical fraternity, which have, to a large extent, changed the methods not only of diagnosis, but the treatment also. Our fathers in medicine and surgery would be astonished today to see the fragments of fractured bones, before they are set and then to examine the case afterwards during repair. The means which are offered to the profession for a correct diagnosis are very ample and the X ray plays surely the predominant part in the hands of a skillful man [sic.]. (Rudis-Jicinsky 1901, 851)

As a tool for diagnosis, the x-ray device was instrumentally tied to the photograph. In fact, in the early development of the x-ray, the connection to photography was so strong that Roentgen feared it could hinder the scientific understanding of his discovery. In a letter written to a friend, Roentgen expresses his concern towards x-ray photography: 'I cannot recognize my own work. For me, photography has been a mere instrument to reach my ends, but now it is depicted as the most important thing' (Roentgen quoted in Natale 2011, 349).

In another article of *The American X-ray Journal*, the language draws attention to the medium's efficiency and efficacy in diagnosing fractures or other injuries:

Skiagraphs taken soon as possible after the accident, and again after dressing, and again when the patient is discharged from the care of the company, leaves the record complete. All the language of a sophist or the paraphrase of the skilled council can not bear down the simple argument the truth these pictures make. (N.a. 1900, 818)

Skiagraphs were an early conceptualisation of what we call the x-ray image. Skiagraph, derived from the Greek word for "shadow," represented a silhouette.

One example of the skiagraphic spectacle is found in the work by Mihran Kassabian, director of the Roentgen lab in the Philadelphia General Hospital. In his article "The Value of Stereoscopic Skiagraphy" (1904), Kassabian explains the technique he has conceptualised as "stereoskiagraphy [sic]," which consists of taking two separate skiagraphs of the same part, on two separate plates without changing the position of the plates (see illustration eleven). The trick was to displace 'position of the Crookes tube two and a half to two and three quarters inches (6 cm.), corresponding to the distance apart of the pupils of the eye' in the second skiagraph, creating depth in the



Illustration 11 Stereoscopic Skiagraph of a hand (Kassabian 1904)

image (Kassabian 1904, 6). According to the author, the stereoscopic skiagraphs can be viewed in different manners. In the more instrumental use the images can be used to study the 'mechanisms of the joints,' or when injected with opaque materials such as mercury, the arteries could be studied, but first and foremost, in surgery to localise "foreign bodies," 'giving as it does a definite view of the foreign body, enabling the surgeon to operate with certainty' (ibid. 6-9).

As scholars such as Crary (2000) and Foucault (1973) argue, the modern idea of vision is connected to developing products to create better and sharper images. Looking at the stereoscopic skiagraphs, the medical expert gets a certain x-ray vision. The stereoskiagraph is positioned as a novelty, creating better vision than a regular skiagraph.

The ordinary skiagraph does not show the variety and character of a dislocation. The stereoskiagraph [sic], however, overcomes this difficulty, producing a clear and definite view of the existing condition, so as to differentiate between an anterior and a posterior dislocation. (Ibid. 10)

Unfortunately, the stereo-skiagraph never gained much attention. Around this period there were many cases of dangerous radiation exposure or poisoning, resulting in burning wounds, or even in some cases death.¹³ However, highlighting a forgotten medium such as the stereo-skiagraph, makes visible that the rhetoric of progress in medical vision was about creating more vivid and real representations of the body.

Additionally, the second striking feature about the earlier mentioned Ped-O-Scope is something we have seen in the microscopic images as well. The x-ray images are used as objective representations between the "normal" and the "abnormal." Since the 1930s, the x-ray device has become a regular sight in hospitals and, as its value in treatment and diagnosing was established, the experimental technology became publicly known. Even though this is an instrument of attraction, and not used for scientific purposes, the device is called a "scientific machine," indicating the mechanic rationale behind the produced images. One explanation behind this rationale is that scientists were avidly promoting the scientific value of using these images in diagnosis and treatment. In this respect, transparency became a dominant trope in medical science.

On the whole, in this section we witness a return to the technological quest for better vision, visible in the micrographs and skiagraphs. Images are used as an objective instrument to capture the unseen and advocated for their sharp visibility and depth. In a medical context, images were viewed in the process of diagnosis, or to measure the

performance of treatment. In this sense, visual technologies are presented as curing technologies. Visualising bodily functions creates a language of visual symptoms of illness conceptualised as normal or abnormal, which is part of medical culture's continuous strive for more knowledge and better technologies. The x-ray renders the body transparent, and conceptualises the body as a new frontier accompanied by a specific vision and perspective.

To conclude this chapter I return to the third sub-question posed in this thesis and argue that the myth of transparency has travelled between technologies and discourses and can be seen as the first seed of emerging patterns that transcend the rhetoric of progress about the microscope.

Firstly, the dominant narrative pattern surrounding medical instruments that emerged in the nineteenth century is the oscillation between ideas of technological progress through vision and the optimistic idea that visualising bodies equals controlling bodies. Secondly, modernism actualised the idea that instruments capture reality free from subjective interference, which is conceptualised in mechanical objectivity. Transparency, in this sense, is instrumental, created to render the body of the scientist translucent, as if not even there. Third, the topos of visualising the invisible is a powerful metaphor which medical culture uses as a trope to embed technology within the process of treatment and diagnosis. The other side of this metaphor - one that the scientific community rejects - is the imaginative captivation and pleasure that users experience when using technologies that immerse in a novel world, albeit a microcosm or a corporeal cosmos. This leads to a strange paradox between bodily pleasures experienced in use, and the efforts of medical culture to distance themselves from these vulgar experiences.

Summarising the most important findings in chapter three and four brings us close to understanding how the myth of transparency subjugates several topoi that re-emerge between technologies in medical culture. Although, one more question remains to be answered, which focuses bringing together the continuities and discontinuities between these discourses. Therefore, in chapter five I will bring together the discursive patterns that have emerged in this analysis and compare them with the rhetoric of progress about serious health games.

5 Revisiting the Present

So far the discussion of the last two chapters has been about technologies of the past, where I uncovered several topoi as building blocks that re-emerge in the optimistic reception of medical media technologies. I have revealed that the x-ray and microscope's rhetoric of progress are the subject of several topoi that transcend technologies, and emerge when different technologies that shape and change perspective emerge. When analysing the modern myth of transparency present in medical media technologies it branches out into several topoi, which are: the topos of better vision through technology and the topos of visualising the invisible. Furthermore, under the umbrella of transparency, there are some visualisation topoi that are deeply ingrained in the introduction of novel technologies. First, the belief that mechanical objectivity captures corporeal reality remains a persistent ideal in medical culture, and the topos of visualising the invisible is used to promote the desire for more knowledge. Second, the intrinsic fascination and pleasure derived from exploring new corporeal perspectives. Analysing how these topoi emerge in early thoughts about the future of the x-ray and the microscope has visualised the strong hold the myth of transparency has over the imagination.

Then, what do these past discourses tell us about present-day popularity of serious health games? In the second chapter I argued that the study of topoi enables an alternative understanding of present-day media ideals. A broader historical understanding of this discourse offers insight in two ways: first, the realisation that today's rhetoric of serious games in healthcare can be explained by revisiting old ideas, dreams and expectations of medical instruments. Second, this inquiry reconceptualises the history of serious health games from a longstanding relationship between humans and optical instruments.

Therefore, in this fifth chapter, I turn to answer the final sub-question posed in this thesis: what are the continuities and discontinuities between the discursive building blocks and serious health games discourse? In order to answer this question I return to the assumptions surrounding serious health games postulated in the first part of this thesis: (1) serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties; (2) playing serious health games will make the player forget his pain; (3) serious health games are simulations of real world phenomena; (4) playing games about the body creates a deeper understanding of the body. Discussing these assumptions makes visible how specific discursive building blocks inform and co-construct present-day reality and its accompanied optimistic outlook on technological progress.

5.1 Between Vulgar and Fun

The first assumption claims that serious health games are a new instrument for their entertainment value and technical properties. As we've seen in section 1.3.1 there is a double logic present in the term serious games, as it oscillates between serious business and fun practices. It is assumed that serious health games are empowering, and the rhetoric of progress revolves around technological advancements.

In analysing the rhetoric of progress about the x-ray and microscope, a recurring pattern emerges that instruments are valued for their technological novelty of sharper and better vision. Better vision can be understood in the sense that visualising a body

creates knowledge of the body, which is achieved by a chronological quest for better technologies. The topos of technological progress through visualising bodies transcends different media forms and is part of a pattern in discourse on technology that re-emerged in the nineteenth century. This pattern is still relevant today and focuses on the oscillation between ideas of technological progress through vision and the optimistic idea that visualising bodies equals controlling bodies. If there is one thing adamantly clear after the analysis of how visualisation ideas are expressed in serious health games, it is that new optical devices are on the one hand presented as truly visualising and captivating technologies, and on the other resemble older attempts of institutionalising technology in medical culture.

In the discourse analysis surrounding the early use and reception of the microscope and the x-ray, the struggle for validation and recognition is visible. In a sense, it is ambiguous: there are inventions and discoveries that created epistemological shifts on how the body is seen, but at the time of their invention, they had to justify their presence. As voiced by William Boddy (1994, 122), in 'a model of ambiguous determination, it is important to consider the historical agency of the ephemeral, fantastic, and utopian discursive responses.' In an attempt to justify the importance of these new technologies, discourse seems to slip back into the same metaphor of visualising the invisible. Considered this way, the rhetoric of progress about serious health games is an attempt to validate its own presence, by making use of old patterns of technological innovation.

Accordingly, the topos to make the invisible visible is a powerful idea that captivated both popular and scientific imagination, in part because it was recognised as part of a century of scientific and technological discoveries: electrical light and mechanical reproduction were introduced in medical practice and gave rise to the use of cinema, photography, the x-ray device and the development of physiology, pasteurisation, and pathology. One writer voiced it as 'a splendid, brilliant campaign of brains and energy' where the Western man was 'seeing with the eye of science the possibilities of matter' (Byrn 1900, 15). In analysing the metaphors used, technology afforded a different extension of the eye.

In contrast, there is one discontinuity noticeable in comparing the discourse of the x-ray, microscope and serious health games. A discursive inversion of meaning has taken place in present-day rhetoric. As we have seen, the scientific community rejected every notion of pleasure through medical media technologies, and considered the ludic use of the x-ray and microscope vulgar activities. However, serious health games are popular *because* of their assumed ludic affordances to provide a pleasurable and immersive experience. The oscillation between serious and fun is what presumably creates the uniqueness of serious health games. It is by virtue of the ability to immerse the senses into this virtual world that deep learning is achieved. The hard cut between the pleasures of the body and ratio of the mind is severed, as both are deemed relevant in serious health games.

In short, on the one hand, rhetoric of progress surrounding medical media rehashes the topos of better vision through optical technologies. On the other hand, play and pleasure through medical media was considered to be vulgar, and not befitting the serious practices of medicine.

5.2 Games of Attraction

The second assumption I would like to address is the following: playing serious health games will make the player forget his pain. As I have highlighted in 1.3.2, immersion

into the game world is mentioned as a specific characteristic of serious health games. When zooming into human/machine interactions in a ludic context we have seen that in general, making the invisible visible creates an immersive experience where one "loses" sense of the world around him, and interacts in this mechanically or computationally mediated environment.

When we undress topos of making the invisible in these different media technologies, a strong recurring pattern is the fascination and pleasure derived from experiencing new perspectives on the world - or more specifically, the body. In microscopy, I illustrated how the act of looking in the late nineteenth century was a visual spectacle, where upper class gentlemen entertained themselves carrying around pocket microscopes. Zooming into game environments more specifically, we see that the pleasure of looking is discursively tied to modernist vision, where sensory overload in the new capitalist era gave rise to microscopic illusions in arcade halls. Considering interactivity and immersion as the essences of games would therefore be jumping the gun. Whereas the microscope has a longstanding history of ludic activities and entertainment practices visualising the infinitely small with the camera obscura, the x-ray was only first idealised in the 1895. The visual aesthetic of making opaque bodies of the flesh transparent was a visual and technological spectacle.

The fascination to be immersed inside the body, or zoom into a invisible world, is still present today, where imaginations of immersing one's self into the body are sometimes taken quite literally. Think, for instance, of the film *A Fantastic Voyage*. In this 1966 science fiction film *Fantastic Voyage* directed by Richard Fleischer a team of three men and a women embark on the mission to rescue the life of a famous scientist by shrinking to microscopic size and entering his body. After an exciting journey through the scientist's body, the team travels to the brain, where a blood clot is located. They manage to isolate it and destroy it using a laser. The group makes it out in the nick of time through a tear, before growing back to their original size. This fascination to travel inside the body is part of the topos of making the invisible visible. It is transparency taken quite literal, and whether it is the x-ray, microscope, or a serious health game, a new perspective provided by technology captivates the user. Although additional research that performs a close-reading of specific games is needed, it seems that there is a fascination with exploring the body as a new world.

One important break in the immersive experience is that this immersion was not considered to be an instrumental function of the x-ray and microscope as optical technologies. While we have seen that the early receptions of the microscope and x-ray were sites of imaginative and captivating metaphors, immersive experience was not institutionalised by medical culture. Instead, the topos of making the invisible visible pointed towards the functional use of the technology. This can be related back to the disruption discussed in 5.1, where the scientific community refrained from acknowledging ludic and entertainment practices. Although it is outside the scope of this thesis, further research could investigate where this shift in perspective has taken place.

In short, the claim that serious games are pain relievers is strongly related to the feeling of immersion. As I have argued, the advent of technologies that provide novel perspectives into other (corporeal) realms and enable seeing inside the body are sources for imagination and pleasure. Whereas the topos of making the invisible visible is related to both pleasure and knowledge, in the nineteenth century these two aspects were dichotomised and placed opposite each other. In serious health games, however,

these have converged. Although immersion was not sold as an added value in the nineteenth century, analysing its practices show that it is a discursive building block that keeps re-emerging.

5.3 Just Another Tool in the Box

While the discussion so far has been about patterns of pleasure and the oscillation between serious and fun in the rhetoric of progress surrounding serious health games, I want to focus on the deeply ingrained idea that medical technologies can capture, or visualise unmediated truth. Therefore, in the third section of this chapter I discuss the claim discussed earlier in section 1.3.3, that serious health games are simulations of real world phenomena.

The ideological topos lying underneath this assumption is the trans-historical pattern of capturing corporeal processes using medical instruments. Analysing the institutionalisation of the x-ray and microscope in medical culture, physiology and pathology created scientific understanding about how the body functions. Drawn to discover taxonomies, species, characteristics and symptoms, medical scientists set out to compare the "normal" versus the "abnormal". Through capturing images with techniques such as photo-micrography and stereo-skiagraphy instead of drawing illustrations by hand, the illusion was created that the scientist as a subject was removed from the process of interpretation. A deep-seated belief that visualisations in medicine capture the truth is the result of the idea that medical instruments can capture objective reality, which is also called mechanical objectivity (Daston & Galison 2007).

This pattern is present in the rhetoric of progress surrounding serious health games and becomes visible in the consideration of simulations to visualise corporeal processes. As I have highlighted in 1.3.3, simulations are considered to be safe environments to visualise the body. Outcomes are depicted, but not physically experienced, and a simulation has the ability to zoom into or slow time to highlight specific aspects of the body. In the main analysis, something similar is happening in the advent of the x-ray and microscope, which were both considered to be less intrusive technologies to visualise corporeal processes than, for instance, dissection. In this belief, simulations are safe representations of corporeal processes. The question that is left unanswered is to what extent simulation games can be said to have no physical repercussions, because to make this claim would be to state that digital games have no material effect on the player. This argument, albeit in different contexts, repeats the pattern that instruments are outside ourselves, distancing the subject from the object.

This deep-rooted desire for capturing corporeal reality notwithstanding, I want to highlight the break between simulations and representations, which is visible in its material affordance. The material processes used to capture these visualisations vary greatly, as skiagraphy and micro-photography are representations made with chemical processes of light reflecting on a roll of film, and simulations are programmed visualisations, made by creating images on the computer. Whereas the material affordance of these technologies materialises the perspective of looking down at the body and zooming into the body (microscope), or penetrating the body (x-ray), simulations, for their malleable affordance have the ability to create bodies, which is to say: simulations can create a reality that does not necessarily exist, or exist yet.¹⁴

In sum, a continuity found in the analysis is the underlying trans-historical illusion of capturing the truth, found in mechanical objectivity. A discontinuity is the material process of capturing versus creating. Where representations with the x-ray apparatus and photo-micrography are imprints made by chemical processes, a

simulation has no original, but rather it is created and can be re-created because of the technical affordance of computational technology.

5.4 Paradox of Making the Invisible Visible

Focusing on the topos "seeing is curing" brings us to the last assumption of serious health games rhetoric, namely the belief that playing games about the body creates a deeper understanding of the body (1.3.4). The topos is part of a tradition that places visualisation within the process of treatment, where it is expected that visualisations will lead to greater understanding of corporeal processes. Although the use of serious health games is still a novel phenomenon, a recurring pattern found in the idea of progress is visualising the body. Just as the skiagraphy or photo-micrography is embedded within treatment, the same strategy of embedding a protocol of use is embedded within serious health games rhetoric. The topos of "seeing is curing" is embedded as a static moment in time, capturing an end result. The success in the adoption of the x-ray and microscope as part of the process of treatment can be seen in the recurring use of micro-photography and skiagraphy in advertisements. A pattern of legitimation emerges, making use of similar discursive strategies to embed different perspectives of visualisation within medical culture. Although serious health games are not yet actualised, thinking about the recurring strategies of legitimising media technologies within healthcare may provide insight into the tactics which are already visible, such as the extensive research in proving the effectiveness of serious health games.

Breaking with this tradition are the disappearance of the expert in transferring knowledge and the appearance of player agency. Whereas visualisations in treatment using micro-photography and skiagraphy are mediated by a medical expert, in serious health games, the knowledge to be transferred is built into the game. Instead of visualising an image narrated by a medical expert, narration is formed through the mechanics of the game, which constitute a form of visualising corporeal reality. Procedural rhetoric assumes that desired scenarios can be built into the game's mechanics, and that the playing experience has the ability to persuade the player - to aid the player in treatment. Troubling about this is that procedural rhetoric programmed into the game does not have to be actualised. As I have illustrated in 1.3.4, a game can be played in different ways, changing the context intended by its makers.

Serious health games rhetoric optimistically embedding games in the process of treatment is problematic because it positions games as having a fixed state - just as a photograph - without taking into consideration the specific historical or personal. The idea that playing games creates knowledge is embedded within the rhetoric of progress through play, which is based on constructivist and behaviourist theories of learning. However, as I have tried to highlight in this historical material-discursive analysis: serious games in the context of healthcare operate from various cultural and material contexts which they are part of. This process becomes even more complex, considering the personal playing context of the player playing a game as a form of treatment. A critique on this simplified rhetoric of progress comes from Brian Sutton-Smith (1993, 283), who argues 'the simplistic discourse of play as progress is preventing us from a true generality and complexity of play.' Making a similar argument is Sebastian Deterding (2015, 15), who is critical on the contemporary rise of games in healthcare and argues underneath the rhetoric of progress is 'a conceptualisation of human beings as computational and *rational actors*.' A rationalisation of change implies that in the games mechanics specific "nudges" can be programmed to stimulate behaviour (ibid).

Which leads to the question to what extent cognitive changes can be computed. But I will leave answering this question to another researcher interested in continuing this study.

In short, the last claim is the belief that playing games about the body creates a deeper understanding of the body. Striking in the analysis of the x-ray and microscope is the overarching discursive tradition of embedding visualising technologies within the process of treatment, and the strategy used to legitimise the technology. This topos of "seeing is curing" is also seen in its early stages in health games rhetoric. A break with this tradition is the disappearance of the expert in transferring knowledge, and the appearance of player agency. As a result, there is a paradoxical relationship between the subjective experience of playing and the rational argument that humans can be considered as rational actors.

To conclude, in these three chapters I have conducted a comparative media analysis from a media-archaeological perspective, in order to answer the main question posed in this thesis. As a result, I have argued how trans-historical discourses of optical technologies used in healthcare are subject to similar discursive building blocks also found in today's rhetoric of optimistic assumptions surrounding games in healthcare.

On a very basic level, the myth of transparency travels between technologies and discourses, surrounding new inventions. Deeply ingrained is the desire to augment reality to visualise that which cannot be seen (or explained). Early responses to the x-ray and early thoughts on the microscope showed that transparent bodies have an immersive effect. Although some of the metaphors travel between technologies, it is the medium's specificity that provides the fertile soil on which the metaphor grows.

In the final analysis, I have highlighted that other media instruments embedded within medical culture are part of the historical and cultural contextualisation of serious health games. This broader understanding of serious games as an instrument raises several interesting observations: first, the distinct essence of games as an interactive immersive medium can be debated when considering the immersive ludic experiences of the microscope and the x-ray. Second, modern vision constantly strived for sharper images. In medical culture, the need to capture and visualise pathologies created a specific grammar on symptoms and diseases, dramatising life as foreign bodies. Indeed, simulating corporeal reality in serious health games is influenced by the idea that seeing is curing. As De Vries argues, myths undergo many transformations, but feed on the ever-present notions of "newness" (2012, 88). Taking the fantasies surrounding transparency into consideration, serious health games continue the lineage to make the invisible visible.

Conclusions

Summary

The main research question of this study was to examine to what extent the historical discourses of the x-ray, microscope, and serious health games are determined by the rhetoric of progress. By conceptualising material discourse analysis as a media-archaeological method, I was able to investigate how discursive building blocks of progress transcend different media histories, which influence each other. To elaborate this, I will shortly summarise the findings per chapter.

Part one of this thesis was structured in two chapters, where I defined the theoretical field and shaped the methodological framework needed to perform my main analysis. In the first chapter I discussed the theoretical field in media studies that concerns itself with analysing claims and assumptions made about the present-day media phenomena. Then, by analysing the history of serious games, I argued how origin stories of serious games are part of a rhetoric of progress that shapes serious games in a network of dominant scholars that frames serious games as novel, revolutionary, and successful due to technological success of the computer. This results in a linear narrative of progress, where one technological development precedes the other. However, this approach to technological progress created a *déjà-vu* moment, where I followed in the footsteps of other media historians such as Siegfried Zielinski, Erkki Huhtamo, and Carolyn Marvin and argued that this viewpoint was limited, because it ignored the cultural-historical meaning of serious games. In my next analytical move I proposed to investigate specific assumptions about serious health games, using the healthcare context as a starting point for my investigation. In discussing serious health games, I discerned four assumptions: (1) serious health games are a new instrument for healthcare professionals for their entertainment value and technological properties; (2) playing serious health games will make the player forget his pain; (3) serious health games are simulations of real world phenomena; (4) playing games about the body creates a deeper understanding of the body.

In the second chapter, I framed the assumptions surrounding serious health games as *topoi*, or discursive building blocks. The concept of *topos* study (Huhtamo 1997; 2005; 2011) is part of the broader field of media archaeology. For its practical application, *topos* study is a good starting point for analysing discursive building blocks, but as I argued, this concept is limited because it does not consider material affordances of media (Kittler 1990; Ernst 2011). As a result, I introduced a novel method of media-archaeological analysis, which I named material discourse analysis. In adapting Erkki Huhtamo's approach to *topoi* by combining it with theories of archaeology appropriated from Friedrich Kittler, this method consisted of three discursive (textual) and non-discursive (material) building blocks. The first block focused on the semiotic aspect, in order to investigate how specific metaphors can be deconstructed for their imaginative and material capabilities. The second building block focused on the activity aspect, where the objective was to highlight the discursive relationship between different *topoi*, and the way in which the medical media instruments were used for ludic purposes. Lastly, the third building block of this method was the material aspect, which focused on the material practice of looking, or "skilled vision" (Grassini 2004), and the legitimation of this perspective in medical culture.

Furthermore, I contextualised the assumptions surrounding serious health games by framing them within the myth of transparency. This myth, which I consider as a topos, is present in optical technologies and representations that find their way into healthcare. Technologies such as the x-ray and the microscope have caused important technological shifts in medical culture. Therefore, I argued to use these two technologies as a starting point for this media-archaeological analysis.

In part two of this thesis, I conducted the main analysis of material discourse analysis, structuring chapter three and four in a similar manner, by making use of the three types of building blocks. In these chapters, I analysed in what way the earlier mentioned topoi were present in the x-ray and the microscope by using the three types of building blocks proposed in the method as a structuring principle. The first building block revealed different metaphors used to describe the technologies and their use. Whereas the microscope was the mechanical eye (Hooke 1665; Zahn 1685), the x-ray was positioned as the enchanted eye (Van Dijck 2005). Also, the topos of "making the invisible visible" proved to a powerful imaginative metaphor transcending these technologies. Second, although the microscope and x-ray are common practices in medicine today, in their early days, these technologies were sites for entertainment and ludic practices, relieving the public from the strains of everyday life, proving the pleasure received by discovering new worlds using technology. The language used to describe these pleasurable activities suggests an immersive experience into a new world, once hidden from sight. Lastly, in the final section of these chapters, I analysed how transparency is legitimised within medical culture. The introduction of the x-ray and microscope has shifted perspective and altered the experience of time and space, driven by the continuous quest for better vision and knowledge, actualised in technological progress.

In the fifth and final chapter of this thesis, I examined the claims about serious health games rhetoric and the several topoi that have emerged, and discerned several continuities and discontinuities that travel throughout history between technologies in healthcare. In considering the first claim of serious health games, which argues games are a new instrument for their entertainment value and technological properties, I argued that the optimistic reception is a historical construction. Analysing the topos of better vision, I highlighted that reception is not so much technologically dependant, but part of a continuous desire for progress, embedded within a hunger for knowledge. However, one discontinuity is the double logic of serious health games to both provide knowledge and be pleasurable. In the early reception of the x-ray and microscope as medical technologies in the nineteenth century, ludic activities and entertaining practices using these technologies were considered by the scientific community to be vulgar. Secondly, the assumption that playing serious health games will make the player forget his pain is tied to the experience of immersion. This feeling is not novel however, but part of a longstanding human/machine tradition of technologies that shape or change perspective. Discovering new visions, or new worlds, has always been a powerful imaginative practice. The difference now, however, is that the pleasure of immersion is used as a promotion tool for progress, while the ratio of the mind, and pleasures of the flesh, were positioned as two distinct practices in the early use of the microscope and x-ray. Third, the assumption that serious games can represent real world phenomena is part of a deeply ingrained belief that medical technologies can capture, or visualise, unmediated truth, which transcends these different discourses of evolution. This belief is the result of the illusion that optical technologies can capture the objective reality. However,

focusing on the material affordance of simulation, the practice of capturing is disrupted, since digital simulations have the affordance to create reality without an original. Lastly, the assumption that playing games about the body creates a deeper understanding of the body is part of the paradox of making the invisible visible. Embedded within a constant struggle for improvement and greater knowledge, novel technologies are embedded using similar strategies of legitimation. The difference herein is that serious health games are not a fixed object, but constituted by the historical-cultural context of healthcare, and dependant on the subjective experience of the player. Therefore, serious health games rhetoric is trapped within a paradox where it is knowingly unable to reach the idealised idea of curing by playing. However this does not stop many practitioners, game designers, and medical experts from trying, driven by the illusion that technology can be designed to solve all obstacles in treatment that stand in the way of getting better.

General implications

On a broader level, the interventions made in this thesis have contributed to the field of media studies on a theoretical, methodological, and analytical level. The theoretical value of this research is directly linked to the purpose of this thesis, which is to highlight how media archaeology as a methodology is able to provide a specific understanding of the meaning of serious games in healthcare. Instead of following the techno-optimistic rhetoric of serious games, I chose to analyse how these claims are embedded within a historical discursive construction. Also, the earlier described method of material discourse analysis is a valuable intervention in the field of media archaeology, combining the Anglo-American school (Huhtamo) and the German school (Kittler) of media theory. Finally, the analytical value of this thesis has been to provide a different understanding of serious games and its short chronological history. Instead of framing serious games within the context of education and the computer, I argued how an archaeological investigation of ideas and ideals about serious health games contextualises the meaning of games as part of a longstanding tradition of medical media technologies.

Limitations

The limiting factor of comparing serious health games rhetoric with technological discourses of the x-ray and the microscope is the discursive leaps taken in the analysis, which have stretched comparison between games as a media form and the x-ray and microscope as optical technologies. This is raised by other critics, who voice their concern of stretching the limits of textual analysis, which is conceptualised by some as over-interpretation (Eco 1994). In defence of this method, however, extreme forms of interpretations 'have a better chance [...] of bringing to light connections or implications not previously noticed or reflected on than if they strive to remain "sound" or moderate' (Culler 1994, 110). As a result, I was able to highlight deeply ingrained ideas surrounding different medical media.

In addition, for this project I have compared the discourses of the microscope and x-ray with serious health games discourse. This decision was based on Siegfried Zielinski's principle that discursive building blocks are trans-historical. Recognising that these large discursive gaps are problematic, further research could compare the disadvantages and advantages of such an approach. This brings me to the final section of this research, where I pose more concrete suggestions for further research.

Further Research

Despite the value of this thesis, there were some moments where I wished I had the opportunity to analyse media-archaeological objects in more detail. For instance, objects like the Ped-O-Scope are embedded within their own historical development, which I was unable to follow up on. Also, a close reading of *Re-Mission* or *Nano-Bot's Revenge* would excavate more about dominant ideas present in the games narrative. Therefore, further research into the historical context of serious health games could investigate the political and ideological framing of specific games by performing a critical discourse analysis.

Moreover, in the last chapter I briefly highlighted that the rhetoric of progress positions humans as rational actors, which can be programmed to stimulate cognitive or behavioural changes. Programmed in a game are specific entry points, or nudges, that steer the user towards desirable behaviour. While serious health games are one example, other applications using gamification principles also make use of these nudges. Further research is needed into the question if and to what extent it is possible to program game mechanics designed to evoke behavioural change.

Concluding, in the rhetoric of serious health games much effort is invested in studying the effectiveness of these games, and we seem to have arrived at a point where games are being incorporated in the treatment of illnesses and disorders. While so much research is invested in legitimising serious health games and answering the question "how are games effective," too little research is invested in the question "why are we driven to instrumentalise games." This has been a critical and specific investigation into the question why this is so, emphasising how history tells us that the rhetoric of progress is part of a complex discursive construction of reappearing patterns that influence how we receive and make sense of new technologies.

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Endnotes

¹ For instance, yearly conferences such as the Games for Health conference (<http://gamesforhealth.org/>), Games for Health Europe conference (<http://www.gamesforhealtheuropa.org/>), and Games for Change festival (<http://www.gamesforchange.org/>). Also, periodical journals surrounding serious games, e.g. the Games for Health Journal (Publisher: Mary Ann Liebert, Inc.), International Journal of Serious Games (Publisher: Serious Games Society), International Journal of Game-Based Learning (Publisher: IGI Global), and Simulation & Gaming Journal (Publisher: SAGE Publishing). Lastly, a number of serious game institutes: Serious Games Association (<http://www.seriousgamesassociation.com/>), Games and Learning Alliance (<http://www.galanoe.eu/>), and the Serious Games Society (<http://www.seriousgamesociety.org/>).

² In this thesis, I differentiate between method and methodology. Whereas a method is the specific tool to analyse and answer a research question, methodology is a consideration of the concepts and theoretical field that underlie the method used in research, such as this thesis. In other words, I frame media archaeology as a methodology, i.e. the overarching field with theoretical principles that guide my method. My method is the specific tool with which I analyse my research objects. For more information on this distinction, I refer you this website: http://www.humanities.manchester.ac.uk/studyskills/assessment_evaluation/dissertations/methodology.html

³ A dystopian view on playing games is for instance the belief that playing violent games stimulates violent behavior. See for instance the articles "Does Video Game Addiction Exist" (2005) by Mark Griffiths and Mark N.O. Davies and "Violent Video Games" (2005) by Jeffrey Goldstein.

⁴ One example in defining serious games are shifts between names: edutainment, serious games, applied games, digital game-based learning, learning games. See for instance chapter 8 of *Understanding Video Games* (Egenfeldt-Nielsen et al. 2013).

⁵ In his chapter 'Evaluating the Potential of Serious Games', Marco Ennemoser (2009, 353) writes about the problematic nature of measuring the effectiveness of serious games: 'players interact with the game in different ways, depending on numerous variables like motivation, prior knowledge, or preferences for particular contents and sequences'.

⁶ In *Transcoding the Digital*, Marianne van den Boomen (2014) has argued how icons such as the desktop, mail, or trashcan are metaphors present in everyday digital culture and hide the operating processes behind it. Although she does not explicitly state this, I argue the metaphors she describes can be considered as commonplaces.

⁷ This idea resonates with Actor-Network-Theory (Latour 2005) and the method of following the connections, and actors who carry meaning.

⁸ Nonetheless, some scholars have critiqued Van Dijck's analysis for misrepresenting 'the Western ideal of fully transparent and knowable bodies' (Van Dijck, 2005 6), an idea Van Dijck appropriates from cultural historian Bettyann Holtzmann-Kevles. Science historian Michael Sappol is critical about the work of Van Dijck's analysis of the x-ray, since it refers to 'vaguely determinant epistemological orders' (2007, 487). For instance, Van Dijck asserts that the meaning and value of x-ray as a new technology was 'not exclusively medical but had a much wider resonance, as the culture at large tried to make sense of its mysterious transparent qualities, adjusting the spectator's gaze to a changing scopic regime prompted by new representational technologies' (2005, 84). In this chapter she does not provide an adequate explanation of this scopic regime, for instance by mentioning its characteristics and limitations.

⁹ In this section I intentionally gender this rhetoric, because of the trope of the white-male scientist that has dominated the scientific discourse of innovations.

¹⁰ The Magic Lantern is an early projector, which displayed images using sheets of glass. It was a common education and entertainment tool.

¹¹ This advertisement was placed in a colonial newspaper *Bataviaasch Nieuwsblad*. The newspaper was published in the Dutch-Indian settlement of Batavia (now known as Jakarta).

¹² For further reading on this topic, I recommend the book *Crookes and the Spirit World* (1972) written by R.G. Methurst. This book is a collection of Crookes's articles and letter conversations, and shows in detail how Crookes as a renowned scholar was rejected by the scientific community for his "far fetched" ideology.

¹³ In a chapter called 'Martyrs to the x-ray' Cartwright (1995) elaborates on the pathos of the technicians bodies as they were often victim of repeated radiation exposure. Although this is further research into how the way x-rays were institutionalised as a form of treatment, this lies beyond the scope of this research.

¹⁴ This is what Jean Baudrillard (1993) conceptualises as a simulacrum. A simulacrum is not a copy or representation of real, but created without an original, a simulation of something non-existent. Thus, the simulacrum creates its own reality, which is hyperreal. For more information on this Baudrillard's concept of hyperreal, I found this website very useful: http://web.stanford.edu/class/history34q/readings/Baudrillard/Baudrillard_Simulacra.html.