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Immersion and reading comprehension: a comparison of reading from print or video game text

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Abstract

A study published in 2017 about leisure time use of average American citizens depicted the percentage of time Americans read, played video games or did other leisure activities on the computer.¹ On an average day, only 21% of respondents in 2015 would read as a pastime, a decrease from the 27% of respondents that would read for pleasure in 2005. As opposed to this, the playing of video games as a pastime increased by 38%. With the preference of time use leaning towards gaming as well as the increasing popularity of smartphones and online devices, most people tend to spend more time reading from a screen rather than from print with the average adult spending around nine hours per day reading, swiping and listening to media.² This, however, is claimed to crucially affect our level of text comprehension. Experts on study and learning claim that people remember less when reading something from a screen because of a multitude of factors. It has been argued, for instance, that texts are taken less seriously due to the loss of physical location, as explored in Jabr's article "The Reading Brain in the Digital Age: The Science of Paper versus Screens", which will be researched in more detail further on in this thesis, and that the loss of physical characteristics, such as pages put up barriers for comprehension and for memorization.³ Reading from electronic devices such as laptops or tablets can also affect the degree of concentration a reader experiences because of the constant presence of distractions.⁴ Various scholars have found that readers cannot be immersed as easily in digital texts. The notion of immersion is defined in this thesis as "the feeling of being lost in a story"; one loses track of their surroundings and devotes their full concentration of the story.

But to what degree can readers feel immersed in texts that are read in video games? Many video games contain texts as well, next to still and moving images. This thesis concentrates on text-rich video games, which are video games of any genre whose most important feature is text; although text-rich video games can be beautifully designed, the reader/player needs to read the text to proceed in the game. Playing a text-rich video game can be considered a hybrid genre, as it entails reading and playing video games simultaneously. It offers individuals the opportunity to do both at once meaning they will

¹ C. Russell, *Demographics of the U.S. : Trends and Projections*, (East Patchogue, NY: New Strategist Press, LLC, 2017) p. 479.

² K. Sheikh, 'Most Adults Spend More Time on Their Digital Devices Than They Think' <<https://www.scientificamerican.com/article/most-adults-spend-more-time-on-their-digital-devices-than-they-think/>>, (8 May, 2018).

³ F. Jabr, 'The reading brain in the digital age: The science of paper versus screens', <<http://www.scientificamerican.com/article/reading-paper-screens>>, (8 May, 2018).

⁴ H. Griffey, 'The lost art of concentration: being distracted in a digital world', <<https://www.theguardian.com/lifeandstyle/2018/oct/14/the-lost-art-of-concentration-being-distracted-in-a-digital-world>>, (11 July, 2019).

not have to choose one of the activities over the other. When considering immersion in text-rich games, Madigan believes that one of the central characteristics of an immersive game is “a strong and interesting narrative, plot, or story”. This statement, as well as research into text rich video games by Catherine Beavis, have spurred my interest in this subject.

This thesis will consist of two parts. One part describes the theory behind text rich games. Among other information, this theoretical section will include a clear definition and delineation of the term ‘text rich games’. Furthermore, this part of this thesis will touch upon theories of navigability, reading comprehension, immersion, narrative, and medium to determine whether reading video game text is feasible, desirable and similar to reading from print.

The second part discusses research into reading culture and immersion, based on a case study which compares experiences of a printed version of *The Shamutanti Hills* by Steve Jackson and the video game adaptation of the same book. The concepts that have been researched in the theoretical section will be put to the test in this section of the thesis. The main aim of the case study is to examine whether the act of reading a text in video game format can genuinely be seen as (deep) reading. Alternatively, should this solely be considered playing a video game?

The hypothesis is that the degree of immersion in the text of the video game will be similar to the text of the gamebook, this due to the similarity in non-linear form of the video game and the gamebook. A gamebook is a genre of printed book that combines elements of traditional text with elements of games in which readers choose their own stories; by flipping through the pages and following clues in the numbered paragraphs, readers find out what their choices entail. Since the game primarily works with clicks and reading, the distractions are expected to be minimal. Considering reading comprehension, the hypothesis is that participants should read about the same amount of text with similar results for reading comprehension, due to the non-conventional format of the texts, and the visual cues both texts provide.

Introduction

In the current digital age, in which 53% of the world population are daily internet users, reading often occurs from a screen.⁵ People read news articles, social media posts and books from their smartphones and e-readers on their commute to and from work and continue reading from a screen once at work. On average, American adults spend approximately nine hours and 22 minutes per day looking at screens (television, computer, tablet, and smartphone).⁶ The content that is being shown on their screens is not mainly textual: we are predominantly confronted with audiovisual content, although this can be paired with text (think of subtitles in movies and tv-shows).

The act of reading for pleasure from a physical or electronic medium has decreased, due to the rise of the popularity of technologies such as television and video games.⁷⁸ Knulst and Kraaykamp attribute the decline in reading to the rise of television and the lack of time in daily life: “Reading takes time. Not only do people need sufficient leisure time for reading, but they must also have the opportunity to concentrate on reading for a considerable period of time.”⁹ During their precious leisure time, the majority of people prefer to be entertained in a more passive manner, for instance by watching television, as opposed to the active act of reading. This does not mean that people have stopped reading altogether, but generally when people read, they tend to read from a screen. Whether we read subtitles in films or on television or texts on social media platforms, the device we use is a digital device. The texts that are read for leisure from a screen often have a few characteristics in common: the texts are short and they are often accompanied by visuals.

This being said, many experts declare that reading digital texts on a screen can have negative effects on reading comprehension, memorization of text, navigation, and mental efforts.¹⁰ For instance, the physicality of printed books offers readers points of orientation with which readers can navigate through texts and remember content by the feel of the spot they read it: a ‘coherent mental map of the

⁵ We Are Social, ‘Digital in 2018: World’s Internet Users Pass the 4 Billion Mark’ <<https://wearesocial.com/us/blog/2018/01/global-digital-report-2018>> , (8 May, 2018).

⁶ K. Sheikh, ‘Most Adults Spend More Time on Their Digital Devices Than They Think’ <<https://www.scientificamerican.com/article/most-adults-spend-more-time-on-their-digital-devices-than-they-think/>>, (8 May, 2018).

⁷ W. Knulst and G. Kraaykamp, ‘Trends in leisure reading: Forty years of research on reading in the Netherlands’, *Poetics*, 1998.

⁸ C. Russell, *Demographics of the U.S. : Trends and Projections*, (East Patchogue, NY: New Strategist Press, LLC, 2017) p. 479.

⁹ W. Knulst, G. Kraaykamp 1998, p. 32.

¹⁰ F. Jabr, ‘The reading brain in the digital age: The science of paper versus screens’, <<http://www.scientificamerican.com/article/reading-paper-screens>>, (8 May, 2018).

text’ as Jabr calls it.¹¹ Without physical orientation, readers lack the mental map they are provided with when reading a text: the landscapes of text pass them by without them knowing where it will end.¹² This effect can be observed most clearly when digital texts lack pictures or other indications that can be used as markers in the text: the reader does not know where or when the text will end or where they are positioned in the text.

Currently, some websites and e-books try to solve a part of the navigability problem of reading text from a screen by adding a progress bar or an approximation on reading time, but this does not always result in a better reading experience, and the additions can even be seen as distracting.¹³ Another solution for the navigability problem with reading from screens is changing the manner in which the text is presented. Looking at an ebook, the name betrays its heritage and the notion that it is modeled after books. The content and the format are based on their print predecessor and have been unquestioningly adapted to the new medium; e-books design their pages to look like paper and the digital display of e-books on a device is often a bookshelf or a magazine rack. Pages in ebooks can be swiped left and right to replicate flipping pages in a book. All these elements in e-books are designed after the printed book, but lack the physical aspects of books that arguably are crucial for a sound reading experience.

Contemporary companies and publishers are currently searching for new ways to renounce the format that is based on the printed book and present texts differently and more appropriately for digital media and screens. Multi-media publisher Atavist is one of these companies, having introduced Atavist Books in March of 2014.¹⁴ In an interview with *Publisher’s Weekly*, Frances Coady, former publisher for Picador stated: “We have to stop treating digital as the bastard offspring of print. Digital is its own format and should have its own resources and its own uses and purpose.”¹⁵ Together with the other creators of Atavist Books, Barry Diller, a media mogul, and Scott Rudin, a filmmaker, she strove to publish “highly innovative enhanced full-length literary e-books”, but the company was forced to shut in October of 2014 after discovering the market was not ready for digitally enhanced full-length literary

¹¹ *Ibid.*

¹² *Ibid.*

¹³ N. Bashaw, ‘Progress bars while reading — yay or nay?’, *Medium*, 15 May, 2015
<<https://medium.com/@nbashaw/progress-bars-while-reading-yay-or-nay-a31cae61ab28>>, (14 May, 2018).

¹⁴ M. Coffey, ‘One Year Later, Coady’s Atavist Books Set to Launch’ *Publisher’s Weekly*
<<https://www.publishersweekly.com/pw/by-topic/industry-news/publisher-news/article/59418-one-year-later-coady-s-atavist-books-set-to-launch.html>>, (14 May, 2018).

¹⁵ *Ibid.*

books; the reason for this shut-down was the dependence on printed components.¹⁶ The enhancements in Activist Books fiction books are of an audio-visual nature, adding sound and imagery to the literary texts, as well as interactive functionalities in the form of, for example, clickable links.¹⁷

Presently, other companies are developing other ways to enhance books such as adding lights to printed books and making readers wear gear that will simulate shivers, heat changes, and influence heart rate; all for a greater sense of connection with the protagonist and a higher degree of immersion.¹⁸

Whilst the market of digitally enhanced books is still in its infancy, a different, closely related market is on the rise. Worldwide, 2,5 billion people played video games in 2016, about one-third of the world population in that year.¹⁹ The video game sector is one of the most rapidly expanding cultural and economic industries.²⁰ According to Janet Murray, the greatest creative efforts in digital narratives have so far been in the area of computer games.²¹ Where reading for leisure declined with 6% between 2005 and 2015 and reading time is down to 19 minutes per day on an average day, the population that plays video games on an average day increased by 38%.

Although reading and playing video games may seem like very dissimilar activities, many video games contain some sort of text: from short letters you can read in-game to full-text stories. Analyzing the recent developments in interactive or enhanced stories, the similarities become more apparent. Two examples of blending books and video games are Books and Magic's *The Little Mermaid*, in which readers can unlock little games by scanning certain items in the printed book and the multimedia options in reading (and solving) *Cathy's Book*.^{22,23} Looking from the developer's point of view the manufacturing of video game versions of books, one can think of games such as *Medieval Fantasy RPG*

¹⁶ Publisher's Weekly, 'Atavist Books to Close', <<https://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/64463-atavist-books-to-close.html>>, (14 May, 2018).

¹⁷ C. Reid, 'Rudin, Diller, Coady partner for Brightline, Multiplatform Book Publisher' <<https://www.publishersweekly.com/pw/by-topic/industry-news/publisher-news/article/54018-rudin-diller-coady-partner-for-brightline-multiplatform-book-publisher.html>>, (21 June, 2018).

¹⁸ Sci Fab: Science Fiction-Inspired Prototyping, 'Sensory Fiction' <<http://scifi2scifab.media.mit.edu/2013/12/19/sensory-fiction/>>, (21 June, 2018).

¹⁹ Statista, 'Number of video gamers worldwide in 2016, by region (in millions)' <<https://www.statista.com/statistics/293304/number-video-gamers/>>, (14 May, 2018).

²⁰ D. Buckingham, 'Studying Computer Games', in D. Carr: 'Computer Games: Text, Narrative and Play' (Cambridge: Polity Press, 2006), p. 1.

²¹ J. H. Murray, 'Hamlet on the Holodeck' (Cambridge, MA: MIT Press, 1998) p. 53.

²² Books and Magic, 'The Little Mermaid' <<http://booksandmagic.com/>>, (21 June, 2018).

²³ C. Reid, "Enriched E-Books: Multimedia, Mystery, and 'Cathy's Book'", <<https://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/43030-enriched-e-books-multimedia-mystery-and-cathy-s-book.html>>, (21 June, 2018).

by developer Delight Games which presents itself as “creator of interactive fiction for smartphones and tablets”.²⁴ But can video-games with text provide equal degrees of immersion as printed text can?

This will be one of the main focal points of this thesis; by conducting immersion research with a group of participants, I want to discover if immersion in video-game text is similar to immersion in a printed text. In this research, immersion is defined as the feeling of ‘lost in a book’, as described by many experts on the subject.²⁵ Immersion in reading from a printed text can be characterized by the ability to visualize the images described in the story as well as forgetting your surroundings in the real world. Although this is primarily the same for immersion in video games, immersion is often enhanced (as stated earlier) with audio-visual and even sensory elements to increase the degree of immersion.

Besides the concept of immersion, reading comprehension will also be researched. Reading comprehension, defined as ‘an active, meaning-making process’, is often researched in terms of texts with a learning goal, and are often conducted with studying in mind.²⁶ The incentive for the research that this thesis depicts, is the interest in reading texts for leisure rather than for study. Whereas most studies in reading comprehension focus on reading comprehension for learning, this thesis focuses on reading comprehension and immersion into texts that are read for fun. As depicted previously, more and more people are reading from a screen, and are playing more video games; it is, therefore, important to research the effects reading leisure texts from a screen have on a reader. By conducting this research, I hope to provide insight into immersion and reading comprehension from two alternative media; the gamebook and the video game.

The concept of immersion will be discussed in chapter one, as well as concepts such as navigability, narrative, and medium.

In chapter two: The Methodology of the Research, the methodology for the immersion and reading comprehension research will be explained. The research consists of two sections; a part of the research that analyzes immersion in the gamebook text and the video game text and a part that analyzes reading comprehension in both texts. To obtain these results, participants read the gamebook text for 30 minutes and played the video game for the same amount of time. Afterwards, the participants filled out a questionnaire. This chapter will also explain the methodology for data acquisition and data entry and give a short introduction to the *Fighting Fantasy* series and the

²⁴ Delight Games, “Home” <<http://www.delightgamesllc.com>>, (27 June, 2018).

²⁵ A. Mangen and A. van der Weel (2015) ‘Why don’t we read hypertext novels?’ *Convergence*, 23:2 (2015), p.6.

²⁶ L.M. Singer and P. A. Alexander, ‘Reading Across Mediums: Effects of Reading Digital and Print Texts on Comprehension and Calibration’, *The Journal of Experimental Education*, 85:1 (2017), p. 156.

gamebook *Sorcery! The Shamuntanti Hills*. The limitations of the research will also be discussed in this chapter. Chapter three will present the research results of the immersion and reading comprehension research. These results will be discussed in chapter four, which will elaborate on remarkable findings and errors as well. In the discussion, the limitations that were presented in chapter two will be tested. Finally, after discussing the research results and the decisions that preceded the research, the thesis will be concluded, and a summary of findings and future recommendations for further research for this subject will be presented.

Chapter 1: Related literature and theoretical focus

In this chapter the main concepts used in this thesis are discussed. These concepts are navigability, immersion, narrative and reading comprehension. For each concepts, the relevant research will be discussed.

1.1 Navigability

The term 'Navigability' has a nautical origin. In this context, it is used to refer to the degree in which a vessel can be used to steer and lead. In this thesis, the vessel is concerned with how readers can move across the text. The medium can be a physical book, an e-reader or even a website on a computer, as long as its task is to convey text to a reader.

In the introduction, I have already mentioned Jabr and his research on the differences between reading from a paper source and reading from a digital source. In this research, he says that people make a 'mental representation of text in which meaning is anchored to structure' whilst reading from paper.²⁷ This mental representation can consist of multiple factors to anchor meaning and words into a recognizable and memorable structure. One factor may be the recognition of outstanding words or phrases, that may function similarly to an outstanding and recognizable building in the mental map of your surroundings.²⁸

Another factor of this mental map can be the weight of the book in your hands: when you have just started reading, the left side of the book will be lighter in weight than the right side. Nearing the end, the right side should be significantly lighter than the left side. In standard books published in the West, the weight of the physical books creates a subconscious mental map that helps the reader

²⁷ F. Jabr, 'The reading brain in the digital age: The science of paper versus screens', <<http://www.scientificamerican.com/article/reading-paper-screens>>, (8 May, 2018).

²⁸ *Ibid.*

remember the location of a certain passage; even as an unconscious act, readers can often use it to pinpoint the location of the passage on the printed page with some degree of precision. Jabr's theory of the mental map in reading is based on the theories of 'surface form' and 'structure map' coined by Payne and Reader in their research of structure maps in online texts.²⁹ The theory of structure form refers to the 'encoding of the physical and linguistic structure of the text itself' while the structure map is the mental mapping between the physical structure and the content.³⁰ Although these theories do not ensure text comprehension (as the reader may not have a large vocabulary or knowledge of the subject, coined by Payne and Reader as 'situation model'), the mental mapping of a text provides navigability, and the lack of such maps prove problematic for online- and hypertexts.

As mentioned in the introduction, authors such as Jabr suggest that reading from a screen is said to cause a plethora of problems and strains to the reader of which one stands out the most: disorientation. In a hypertext, readers lack the mental mapping: the lack of the weight of the book or the visual aspect of when the book ends, make the texts feel as if they are never-ending. This feeling increases when hyperlinks are added to the text; not only lacking the way to the end, the reader also loses sight of what has already been read.

To mitigate the problem of disorientation, most websites and articles use a scrollbar; a bar that is usually located to the right or top of the screen that shows the reader their location in the text. This way, the reader knows how much has already been read and how much still needs to be read. Another way of solving the problem is to add approximate reading time estimations; an article is preceded by an estimation so the reader knows how long it will take to read this article before they even begin. Although this is a general estimation and does not take into consideration personal reading speed or knowledge on the subject, it still provides guidance. Another reading aid is the use of headings to indicate chapters and generally give structure to texts that lack natural structure.³¹ Cuddihy and Spyridakis discuss the 'additional cognitive demands' that reading from hypertexts pose for readers: 'Unlike reading a printed text where the ordering of pages suggests a preferred path for low knowledge readers, websites provide multiple paths to content'.³² To clarify, the multiple paths posed in a hyperlink

²⁹ S.J. Payne and W. R. Reader, 'Constructing structure maps of multiple on-line texts', *International Journal of Human-Computer Studies*, 64:5 (2006), p. 461.

³⁰ S.J. Payne and W. R. Reader, p. 462.

³¹ S. A. Sullivan and S. Puntambekar, 'Learning with digital texts: Exploring the impact of prior domain knowledge and reading comprehension ability on navigation and learning outcomes' *Computers in Human behavior*, 50 (2015), p. 300.

³² E. Cuddihy and J.H. Spyridakis, 'The effect of visual design and placement of intra-article navigation schemes on reading comprehension and website user perceptions' *Computers in Human behavior*, 28-4 (2012), p. 1402.

text pose difficulties of navigation for (low knowledge) readers as opposed to the easy navigation in a printed text because of its inherent structure of numbered pages. Nonetheless, Cuddihy and Spyridakis conclude their research by stating that visual and graphic elements in hypertext can provide the guidance readers need. They further state that 'a distinct and coherent table of contents appears to improve reading comprehension when the device is presented as a primary navigation device and is located where it can attract readers' attention.'³³ These visual and graphic elements, as well as interactive overviews and pragmatic layouts, improve reading comprehension, in both printed texts and digital texts, by offering readers a new dimension of information and drawing readers' attention to this new dimension.

This suggests that not only the addition of visual and graphic elements, such as pictures, layout, and visual cues are necessary to increase reading comprehension and decrease the degree of cognitive demand, but the elements must also attract the reader's attention. This sentiment is shared by Gabriele Berghammer of *The Text Clinic*, a company that focuses on depicting scientific and medical texts in a visually pleasing way, who states that: 'Good design helps arouse interest, singles a text out from many others that compete with it for our attention, and can make a message memorable.'³⁴ In this article, Berghammer also suggests the difference good design and visuals can make when reading for pleasure and reading for business: "in the case of reading for pleasure, good design will add yet another dimension to our reading experience [...] in the case of reading for business, it has the potential to turn the chore into enjoyment."³⁵ Recently, this has become evident in game-based learning, or gamification, research in schools; with study materials being packaged as video games, students are more inclined to do their homework and maybe even enjoy it and forget that they are actually working. This trend of gamification of schoolwork depicts a different form of visual enhancement than the aforementioned example. The visual enhancements in digital schoolbooks express themselves in the form of typographical embellishments, intertext links or explanatory videos and pictures. Nonetheless, both types of visual cues and enhancements are important for general navigation in digital texts.

To summarize this paragraph, navigability in texts is an important aspect of text memorization and comprehension. Readers create mental maps when reading texts; these maps help the reader recognize structures in the text. In printed texts, this mental mapping can be enhanced with the physical

³³ E. Cuddihy and J.H. Spyridakis, (2012), p. 1407.

³⁴ G. Berghammer & A. Holmqvist, 'Pleasing the reader by pleasing the eye—part 1. the role of format and design in readability' *Medical Writing*, 21 - 3 (2012) p. 211.

³⁵ *Ibid.*

aspects of the book; by feeling the weight in the book shift, the reader can determine where the passage is in the text, and can often find the same passage quickly by remembering the physical feel and location. In hypertexts or digital texts, there is no physical aspect of the text; readers move through the text by scrolling or clicking, with no physical guidelines. To overcome this problem with navigation in hypertexts and digital texts, scrollbars and reading time estimations can be added, as well as overviews or sitemaps. By utilizing these tools, digital texts can become more navigable, increasing recognition and memorization of texts.

1.2 Immersion

This leads us to the second aspect of reading this thesis will discuss, namely immersion. In this thesis, immersion, also called ‘flow’³⁶ is defined as ‘giving complete attention’ and the phenomenon is often referred to as ‘feeling lost in a book’.³⁷

The degree of immersion that one may experience whilst reading is closely related to a range of different circumstantial and cognitive variables, such as navigation, as I have explained in the previous paragraph. To reach a higher degree of immersion, the reader must be able to concentrate on the text for a longer period of time, must be genuinely interested in the text and feel motivated to read it due to design and visual elements and must have an adequate vocabulary. Besides the aforementioned variables, the degree of immersion also relates to the manner in which the reader decides to read the text; when ‘skimming’ the text, one often feels less immersed than when reading the text thoroughly. The reader who skims through the text is less concentrated on the text and reads discontinuously, it is called ‘shallow’ reading. In contrast to this, when a reader is concentrated on the text for a long period of time and reads the text thoroughly the act of reading is called ‘deep’ reading.³⁸

While the previous paragraph discussed variables that can influence the degree of immersion, this chapter will look into the characteristics of immersion itself. As mentioned before, the definition of *immersion* in this thesis is giving complete attention and is often referred to as the feeling of being lost in a story. Anne Mangen of the University of Stavanger argues there are two distinct kinds of immersion, and thus two kinds of feeling lost in a story: that of technologically enhanced immersion and that of

³⁶ J. Nakamura and M. Csikszentmihalyi, ‘Flow Theory and Research’ in S. J. Lopez & C. R. Snyder (eds.) *The Oxford Handbook of Positive Psychology* (Oxford: Oxford University Press, 2018), p. 2.

³⁷ A. Mangen and A. van der Weel (2015) ‘Why don’t we read hypertext novels?’ *Convergence*, 23:2 (2015) p.6.

³⁸ T. Hillesund, ‘Digital reading spaces: How expert readers handle books, the Web and electronic paper, *First Monday*, 15-4 (2010) <https://firstmonday.org/article/view/2762/2504>.

cognitive immersion.³⁹ The first type, that of technologically enhanced immersion is the immersion that is experienced when “technological features and material devices sustain the feeling of being immersed”.⁴⁰ The second type is the type that is grounded in the cognitive ability to create a fictional world by imagining or fantasizing it on the basis of the provided text, which Mangen defines as *phenomenological immersion*. Traditionally, phenomenological immersion is experienced when reading a book without pictures; the reader is tasked with imagining what the story may look like. This is an unconscious act for most people, made easier by meeting the variables mentioned in the previous paragraph. Technologically enhanced immersion can be anything from visual or audio enhancements to books that are read while wearing a harness that simulates shivers or an increased heart rate.⁴¹ Both types of immersion will be researched in this thesis, as respondents will read a printed text as well as the video-game translation of this book and report the degree of immersion they experienced during both readings.

The interactive role that the reader must assume to read and flip through pages has introduced the term reader/player emphasizing the hybrid mechanisms used to read a gamebook text.⁴² The term reader/player refers to the roles the reader must simultaneously adopt: that of the reader and that of the player. Both roles entail different actions that must be performed by the user: the reader role entails the reader/player must be able to understand and process the written words.⁴³ The player role entails that the reader/player must understand these same elements, but also understand them in combination with audio and visual cues as well as the limits the medium poses.

As stated earlier, gamebook texts and similar texts that require the reader/player to think and make story changing choices can be categorized as active acts of reading. Espen Aarseth coined the term ‘ergodic literature’ to describe texts that need to be ‘worked’ through to be understood; the reader/player must assume an active role to proceed with the story.⁴⁴ Although this may seem like the

³⁹ A. Mangen, ‘Hypertext fiction reading: haptics and immersion’, *Journal of Research in Reading*, 31-4 (2008), pp. 406.

⁴⁰ A. Mangen, ‘Hypertext fiction reading: haptics and immersion’, *Journal of Research in Reading*, 31-4 (2008), pp. 406.

⁴¹ A. Souppouris, ‘Sensory Fiction is a prototype that lets you feel a book's emotions’, <<https://www.theverge.com/2014/2/2/5370844/sensory-fiction-mit-media-lab-immersive-storytelling-concept>>, 28 November 2018).

⁴² F. Meifert-Menhard, *Playing the Text, Performing the Future: Future Narratives in Print and Digiture* (Berlin: De Gruyter; 2013) pp. 8.

⁴³ A. Carter, ‘What is the role of the reader on a text?’, <<http://arts.brighton.ac.uk/re/literature/brightonline/issue-number-two/what-is-the-role-of-the-reader-on-a-text>>, (5 July, 2018).

⁴⁴ E. J. Aarseth, *Cybertext – Perspectives on Ergodic Literature*. (Baltimore/London: The Johns Hopkins University Press, 1997), p. 1.

medium and the story are exerting power over the reader/player, this is not the case; after all, the reader/player can always put the text away. On the contrary, the way the gamebook is written gives the reader/player an active role as well as agency: each choice and every turn of the page affects the story they read. This approach to agency in the gamebook and in choose-your-own-adventure stories is shared by Stacey Mason, who adds that the feeling of agency is increased by the embodiment of the character in the book.⁴⁵ This increased feeling of agency in choosing your own adventure and gamebook stories may be caused not only by the active choices that need to be made but also the manner of addressing the reader/player. Gamebooks are often written addressing the reader with 'you'; the reader reads the text as if it is a retelling of events that happened to them, with each segment of text informing the reader of the consequences of their previous choices. By addressing the reader in the second person, the writer is *breaking the fourth wall*, as the phenomenon is often called in cinema, and in doing that, establishes agency for the reader. This phenomenon of creating a participatory environment - as the phenomenon is called in Janet Murray's *Hamlet on the Holodeck* - is present in printed fiction as well.⁴⁶ In the case of creating agency through using vocative case, this thesis argues that the stronger feeling of agency ensures a higher degree of immersion.

But using vocative case and technological enhancements alone do not cause the feelings of immersion or agency. Murray argues that:

the more realized the immersive environment, the more active we want to be in it. When the things we do bring tangible results, we experience the second characteristic delight of electronic environments - the sense of agency.⁴⁷

This statement indicates that a well-developed environment is also crucial to create feelings of immersion. By seeing the way our actions have consequences for the story, we feel agency. To create a well-developed immersive environment, Murray argues that a few checks need to be ticked; the reader/player needs to be motivated by a goal, the narrative needs to be detailed and speak to the imaginative ability of the reader/player, and the boundaries between the imaginary world and the real

⁴⁵ S. Mason 'On Games and Links: Extending the Vocabulary of Agency and Immersion in Interactive Narratives' in: Koenitz H., Sezen T.I., Ferri G., Haahr M., Sezen D., Çatak G. (eds) *Interactive Storytelling. ICIDS 2013. Lecture Notes in Computer Science*, vol 8230 (2013), p. 28.

⁴⁶ J.H. Murray, *Hamlet on the Holodeck: The Future of Narrative Cyberspace*, (Cambridge MA: The MIT Press, 2016), p. 138.

⁴⁷ *Ibid*, p. 159.

world need to be clearly defined.⁴⁸ Especially with potentially distracting participatory texts, it is important to comply with the aforementioned criteria, because these criteria are necessary to keep the *liminal trance*, or a concentrated immersive state, conserved.⁴⁹ By providing reader/players with a goal, reader/players are more invested in the story. Another way of doing this is by offering reader/players details to keep track of; Murray gives examples of authors who use this technique, including Tolkien and Faulkner.⁵⁰ This technique of offering details to keep track of not only keeps the reader/player active by remembering details that may be important later in the story, but the details also provide background information to create understanding. The final aspect Murray mentions is that of clearly defined boundaries. Murray argues that, in order to conserve the liminal trance, the boundaries between fiction and real-life must be established. Murray opts for looking at the boundaries as a visit of sorts; when you turn on your computer and open the game or when you open the gamebook, you commence your visit.⁵¹ In screen-based environments, the screen functions as a fourth wall and the mouse functions as a threshold object that provides access.⁵² In print, the physical book functions as the fourth wall, with the flipping of pages as the threshold object. The necessity of an action (clicking nodes or flipping pages) to proceed in the story adds to the feeling of immersion; as Murray states:

This correspondence, when actual movement through real space brings corresponding movement in the fantasy world, is an important part of the fascination of simple joystick-controlled video games. [...] This constant activity means that even if you move through the space without fighting, the world is still dramatically present; this is not a passive game board but a live-action stage.⁵³

Although Murray mentions joystick-controlled video games, the same can be said for video games that are controlled by mouse-clicks; in both instances, physical movements have consequences in the fantasy world.

To summarize this paragraph, there are a multitude of methods of creating immersive environments. The methods mentioned in this thesis are; use of vocative case, use of technological enhancements, motivation by in-text goals, detailed texts, and clearly distinguished boundaries between

⁴⁸ *Ibid*, p. 155.

⁴⁹ *Ibid*, p. 126.

⁵⁰ *Ibid*, p. 137.

⁵¹ *Ibid*, p. 134.

⁵² *Ibid*.

⁵³ *Ibid*. 134.

the real world and the fantasy world. By applying one or more of these methods, texts can become more immersive for reader/players, and often create a feeling of agency. To create agency, the text must provide goals for the reader/player and demand an active stance from the reader/player.

1.3 Narrative

The third theme this thesis will discuss is that of narrative. The subject has been touched upon previously, but this paragraph is dedicated to narratives of gamebooks, also known as choose-your-own-adventure stories. The general definition of narrative is: “fictive construction, a representation”, and is a concept can be applied to both oral and written stories.⁵⁴ In this thesis, the emphasis will lie on written stories, and within the written stories there will be a distinction between printed gamebook text and digital text.

In many digital games and gamebooks, the story is told with nodes. Nodes are the connecting points in a story, often offering multiple choices to the reader/player. This segmentation of smaller sections of a text is in line with Barthes’ concept of ‘lexia’.⁵⁵ These lexia can be understood separately, but are all part of the master text, the full-text story. For instance, a node in the gamebook that the case study in this thesis is based on, “*Sorcery! The Shamutanti Hills*” can be visiting a shopkeeper. The shopkeeper refers to different items the reader can buy, each item connected to a new path with a new outcome. The use of nodes, that, once combined, give meaning to the narrative is specific to the *future narrative* type of narrative. Bode defines this type of narrative as one that:

does not only thematize openness, indeterminacy, virtuality, and the idea that every ‘now’ contains a multitude of possible continuations [...] but actually stages the fact that the future is a space of yet unrealized potentiality – and by allowing the reader/player to enter situations that fork into different branches and to actually experience that ‘what happens next’ may well depend upon us, upon our decisions, our actions, our values, and motivations.⁵⁶

This demonstrates the possibility of different narratives existing parallelly within one reading is a possibility. This coincides with the structure of many gamebooks; although there are multiple routes to take, some leading to dead ends, there are multiple paths leading to a successful completion of the text.

In addition to the aforementioned forms of narrative, another form of narrative is crucial for the

⁵⁴ G. Farner, *Literary Fiction : The Ways We Read Narrative Literature* (New York: Bloomsbury Academic & Professional, 2014), p. 6.

⁵⁵ R. Barthes, *S/V.* (New York: Blackwell Publishing, 1974). p.13.

⁵⁶ S. Domsch, *Storyplaying – Agency and Narrative in Video Games* (Berlin: De Gruyter, 2013) p 1.

research in this thesis, namely the *ludonarrative*, or the play narrative. This form of narrative has sparked debate in the literary studies with one side of experts, including Murray, arguing that video game texts can be considered texts and thus narrative, and other experts, including Aarseth, arguing that video game texts must be seen as a game.⁵⁷ The ludonarrative resonance is a convergence of traditional narrative and gameplay and combines characteristics of both. Performing an action that is specific for the gaming genre, such as fighting with a monster, should, in terms of ludonarrative, have an effect on the narrative itself – as well as spark an emotional response from the reader/player. Considering the discussion in the literary world about ludonarrative texts, Mattie Brice argues that

Ludology and narratology aren't mutually exclusive studies. In fact, their combined perspectives will improve how video games influence players. Both are formally concerned with how the player interacts with the game and receives the intended experience of the developers.⁵⁸

By looking at narrative in terms of both structure and emotional response, video game texts can achieve resonance ludonarrative and, in turn, create a greater degree of immersion for the reader/player. For example, by performing a specific action, such as clicking the mouse or turning a page, the reader/player becomes immersed by seeing the consequences unfold. When the action does not have the expected outcome, for instance, the reader/player clicked, but nothing happened, the reader/player loses their immersed feeling, their liminal trance.

In summary, narrative is generally seen as a fictive construction to tell a story. In the gamebook genre, narrative structures are often achieved with a system of nodes; the reader/player moves through the text by consecutively choosing paths that are attached to nodes. Because the consequences of the chosen paths are never known beforehand, the reader/player chooses blindly, which is a characteristic of future narrative. Furthermore, future narrative also argues that experiencing the consequence affects further choices; it affects the way the reader/player reads and chooses. Another narrative form that has been discussed in this thesis is the ludonarrative. The ludonarrative is a convergence of play and narrative; when the structure of the game, the context, and the emotional response cross, then this is called ludonarrative resonance.

⁵⁷ O. Pérez-Latorre, M. Olivia & R. Besalú, 'Videogame analysis: a social-semiotic approach' in *Social Semiotics*, 27:5 (2017), p.587.

⁵⁸ M. Brice 'Narrative Is a Game Mechanic' < <http://www.mattiebrice.com/narrative-is-a-game-mechanic/>>, (17 July, 2019).

1.4 Reading Comprehension

The final concept I will address is that of reading comprehension. The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation defines reading comprehension as “the intellectual, socioculturally embedded process of making meaning from printed texts”.⁵⁹ These meanings involve three important factors: the texts, the reader and the context.⁶⁰ In the introduction, it is mentioned that a group of experts believe that reading from screens has negative effects on reading comprehension.

Two experts who have conducted reading comprehension research into these negative effects are Anne Mangen of the University of Stavanger and Hanho Jeong of The Chongshin University. Mangen conducted reading comprehension research with 72 tenth grade children in Norway.⁶¹ She split the participants into two groups and had one group read the texts digitally and the other group on paper. The results indicated “that reading linear narrative and expository texts on a computer screen lead to poorer reading comprehension than reading the same text on paper”.⁶² The research Jeong conducted was similar to that of Mangen, albeit conducted with younger children. Jeong introduces the term P-book, paper book, as opposed to the e-book, electronic book, in the research.⁶³ The conclusion of the research is that the children ‘did not show positive behavioral intentions toward e-books.’⁶⁴ Jeong explains that this can be ascribed to the students feeling tired while reading from a screen, screen size and clarity of the screen.⁶⁵ Feeling tired, or even bored withheld the children from comprehending the text in the way they should. Jeong attributes this to the limits of the medium set, rather than the presentation of text on a screen. In the article’s conclusion, Jeong pleads for designers of e-books to consider strain that size and screen pose for eyes.⁶⁶

Although there is something to be said for the risks reading from screen pose for reading comprehension, other experts believe that reading from a screen does not necessarily pose a threat to reading comprehension. For instance, Grimshaw, Dungworth, and McKnight deem that additional

⁵⁹ D. J. Arya and J. Yu, ‘Reading comprehension’ in *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation* (Thousand Oaks, California, United States of America: SAGE Publications, Inc, 2018), p. 1383.

⁶⁰ *Ibid.*

⁶¹ A. Mangen, B.R. Walgermo and K. Bronnack, ‘Reading linear texts on paper versus computer screen: Effects on reading comprehension’ in *International Journal of Educational Research*, 58 (2013), p. 61.

⁶² *Ibid.* P. 67.

⁶³ H. Jeong, ‘A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception’ *The Electronic Library*, 30-3 (2012), p. 390.

⁶⁴ *Ibid.*, p. 404.

⁶⁵ *Ibid.*

⁶⁶ *Ibid.*

features such as (audio)-visual effects support the text.⁶⁷ Ball and Hourcade agree, and add that when comprehension is assessed and the research takes the length of texts, content, age, and subject into account ‘performances on screen can become just as good as those on paper’.⁶⁸ In their research, Ball and Hourcade conducted two experiments to prove that reading from a screen is not inferior to reading from paper. Their first experiment was with three groups of 12 people in different age groups. The first group was children between 11 and 14 years old; the second group was the younger adults of between 18 and 27 years old; the final group is the older adults between 60 and 78 years old. The participants were to read a text and answering a quiz about this text. Their results showed that the younger children needed more time to read the texts, but all groups scored similarly on the reading comprehension.⁶⁹

Their second experiment focused on younger adults and older adults. Each group had 24 participants with a total of 48 participants. The differences in reading speed between print and screen were minimal: reading from a computer was 144 seconds and from print was 150 seconds.⁷⁰ There was no difference between younger adults and older adults. In terms of reading comprehension, older adults showed better results than younger adults. Ball and Hourcade conclude their research by saying that (older) adults that did not grow up with the technology the younger generations have (and are still doing), are still able to learn to use these technologies, even if they have more difficulties than the younger generations.⁷¹

To summarize, reading comprehension is the ability to make meaning out of texts by understanding context. In terms of reading comprehension assessment from a digital text, many experts argue that reading comprehension scores from digital texts are lower than the same tests from printed texts. This, however, cannot always be ascribed to the inherently digital nature of the texts, but may also lie in the quality of the medium, as the research by Jeong demonstrates.

1.5 Summary

Considering navigability, a physical characteristics and mental mapping of a book are important tools for navigability in reading from a physical book: the shift of weight of the book while progressing through the story help readers sense where they are in a book and also helps retrace their steps if they

⁶⁷ S. Grimshaw, N. Dungworth, and C. McKnight, ‘Electronic books: Children's reading and Comprehension’ *British Journal Of Educational Technology*, 38(4) (2007), p. 584.

⁶⁸ R. Ball and J. P. Hourcade, ‘Rethinking Reading for Age From Paper and Computers’, *International Journal of Human-Computer Interaction*, 27-11 (2011), p. 1067 – 1068.

⁶⁹ *Ibid*, p. 1074 -1075.

⁷⁰ *Ibid*, p. 1077.

⁷¹ *Ibid*, p. 1080.

are searching for a specific passage. These characteristics are lost in texts that are read from a screen; the physical characteristics of the screen do not change whilst reading, there is no feeling of the weight of the screen shifting whilst progressing through the story. To help navigability in texts read from screen, visual embellishments are used as waypoints in the story, not unlike in printed books. These embellishments, ranging from pictures, layout choices and scrollbars help the reader navigate the text.

In the paragraph discussing immersion, the term liminal trance, meaning a state of concentrated immersion, has been mentioned. Current studies discuss liminal trance in terms of traditional, linear books in which the movement through the text is generally achieved by flipping one page at a time, in the same direction. In the gamebook *Sorcery! The Shamutanti Hills* and other books in this genre, the reader is sent to passages back and forth in the book, completely diverging from the linear reading method. Because of this, the phenomenon of liminal trance is especially interesting to explore further; are reader/players still able to reach this degree of concentration with the non-linear reading or clicking? Another point of interest considering immersion are the methods for creating an immersive environment, as coined by Murray. The methods are motivation by in-text goals, detailed texts, and clearly distinguished boundaries between the real world and the fantasy world. In this thesis, the degree of usage of these methods will be tested for further analyses.

When looking at the theory for narrative, it is clear that the gamebook structure of the *Fighting Fantasy* series works with nodes, as discussed in the theoretical paragraph. The nodes represent choices the participants make and lead to new nodes, with new consequences. The working of these nodes and their effect on reading comprehension and immersion will be researched in this thesis. Another form of narrative, namely ludonarrative, will be researched in this thesis. By looking at the in-text reactions, this thesis will be able to determine whether or not *Sorcery! The Shamutanti Hills* can be considered ludonarrative resonant.

The common stance on reading comprehension in reading from a screen or reading from a printed text is that reading from print leads to better comprehension and memory of the text. This stance will be challenged in this thesis; because the digital text is a non-linear video game text – in which the text will be accompanied by audio and visual enhancements – it is expected to produce similar results to the printed gamebook text.

Chapter 2: Methodology of the case study

This chapter will describe the methodology for the reading comprehension and immersion research as well as the methodology for data-entry in depth. Firstly, I will describe the case study in terms of the main concepts discussed in chapter one. Secondly, different methodologies for this type of research will be discussed. Thirdly, the selected methodology for the reading comprehension and immersion research will be presented. Finally, the limitations of this method will be addressed.

Considering navigability in texts, this thesis will explore the navigability of a gamebook and a video game translation of said gamebook. Since both types of text are non-traditional in their respective media, it is expected that the traditional tools for navigability are less effective; the weight and physicality of the book, for example, does not mean much in terms of reading a gamebook due to the non-linear structure of gamebooks. On the other hand, the visual enhancement of the video game text with a map on which the reader/player's character is dragged can provide more grip on the text than scrollbars or reading time estimations.

In the case study this thesis researches, the book, and the video-game text are both texts of fiction, and the specific type of text is a gamebook ; a type of text that has entertainment as the main goal and characterizes itself by having a non-linear storyline. Another distinct characteristic of this genre of the text is the fact that gamebooks compel the reader to assume an active role by making readers choose their own paths in the text. In print versions of gamebooks, this is done by flipping through the pages of the book, each page offering a few different paths leading to either successful completion or failure to complete the mission, often leading to in-text death. In many video-game translations of gamebooks, the reader must click on their choice to activate their path and follow-up choices. The paths in gamebooks, both printed and digital, work through nodes, or hubs. Each path is connected to a node, where the reader needs to choose another path. The books in this genre are often written in a system to guide readers to the end of the story, be it by many different paths. This type of gamebook navigation is called convergent; convergent gamebooks split up into different storylines and paths, to converge together at the end. This means that readers can always end up with successful completion of the story, even if they read about very different events on the way. In convergent gamebooks, there are often 'key' nodes one must choose to survive. The paths converge to these key nodes and then split until they come back together at another key node. This differs from the second most common type of linearity in gamebooks, namely divergent gamebooks. Divergent gamebooks also split up into different storylines and paths, but do not necessarily converge at the end of the story. This means that if a reader chooses the 'wrong' path at the beginning of the story or at a key node, he will

most certainly fail the storyline, and the in-text character will die. Because of the possibility of in-text death, readers feel a high degree of immersion: everyone wants to finish the story. The specific gamebook series researched in this thesis is the *Fighting Fantasy* series, created in the 1980's by Steve Jackson, game designer and Ian Livingstone, fantasy author. The series defined a new genre, the gamebook, that fit in the already existing genre of choose-your-own-adventure books and added tabletop board game elements, such as dice rolls and character sheets to create the gamebook genre.

Considering reading comprehension research, there is already a lot of background literature about research methods. According to Pearson and Cervetti, reading comprehension is the result of three interconnected factors, namely the text, the reader and the context.⁷² They argue that these three factors were important in reading comprehension assessments in the past 50 years.⁷³ Reading comprehension is a central skill that is necessary for individuals to know and master, which is the reason this skill is often taught at a young age. Because of its importance and the fact that reading comprehension is taught from a young age, many experts have researched the topic, ranging from education experts and pedagogy experts to literary studies and language studies experts. One method of testing reading comprehension is a timed multiple-choice test, which is often conducted with groups of school children at a time.⁷⁴ Although this method is widely used, it also has its limitations within the framework of this study; as opposed to traditional reading comprehension assessments where it is clear what passages will be read and should be tested, in this study it was not clear which passages would be read by whom beforehand. Therefore, it was nearly impossible to ask the right questions about the right passages for each participant. This method of assessing reading comprehension would not be possible.

A second research method for this type of research is a modern reading comprehension assessment method called *scenario-based assessment*. Scenario-based assessment methods are adapted to modern reading by incorporating changes due to reading from a digital device and caused by modern-day comprehension studies.⁷⁵ Another characteristic of scenario-based assessment methods is that they are flexible; a readers' comprehension can be tested in different ways than just multiple-

⁷² P. D. Pearson and G. Cervetti 'Fifty years of reading comprehension theory and practice' in P.D. Pearson & E.H. Hiebert (eds.) *Research-based practices for Common Core literacy* (Teachers College Press, 2015) p. 1.

⁷³ *Ibid*, p. 1.

⁷⁴ N. H. Clemens, et al. "Interpreting Secondary Students' Performance on a Timed, Multiple-Choice Reading Comprehension Assessment: The Prevalence and Impact of Non-Attempted Items.", *Journal of Psychoeducational Assessment*, 33:2 (2015), p. 154.

⁷⁵ J. Sabatini, T. O'Reilly, J. Weeks and Z. Wang 'Engineering a Twenty-First Century Reading Comprehension Assessment System Utilizing Scenario-Based Assessment Techniques' in *International Journal of Testing* (2019), p.2.

choice, or an open question summary; Sabatini's study also provides readers with the option to complete a graphic organizer or mood map, or identify keywords.⁷⁶ Although this method would have worked better in the research conducted and described in this thesis, it would not solve the problem of coherently depicting all of the possible choices leading to different narratives, as well as the possibility of many different forms of data collection, making it more difficult to distinguish the information. This method may also complicate the research for participants that had not expected the modern research method. For this reason, an alternative research method has been chosen for this research, that will be discussed below.

In the experiment conducted for this study, twenty-two participants were asked read 30 minutes of the gamebook *Sorcery! The Shamuntanti Hills* and played 30 minutes of the corresponding 2013 video game *Sorcery! The Shamuntanti Hills* developed by Inkle. *Sorcery! The Shamuntanti Hills* is a gamebook written by Steve Jackson in 1983. As explained earlier, a gamebook is a book in which the reader participates by making choices within the text, flip to the chosen option and read the outcome. This gamebook, part of the *Fighting Fantasy* book series, describes a fantasy world that is on the verge of being taken over by evil beings. To prevent this, the main character (the participant) must recover the Crown of Kings - a powerful magical artifact. By reading the text and making the best choices, the reader can recover the Crown of Kings and defeat evil. The book was adapted as a video game by the narrative game company, Inkle. The company, based in Cambridge, United Kingdom focuses on narrative video games, and has created its own open-source markup language called Ink, in which they wrote *Sorcery!*⁷⁷ To conduct this case study, both sources - the gamebook, and the video game - were used to compare reading comprehension and reading speed from print and screen. In this study, none of the participants had previous knowledge of the book and the video game *Sorcery! The Shamuntanti Hills*.

During the reading element of the research, participants wrote down the paths they took in the books and wrote on their character sheet. During the video game element of the research, the participants played the game by dragging their character across the map with their cursor and clicked on the choices provided.

To be able to compare the printed text and the video-game text, adaptations have been made to the rules of the printed text. In the physical book, readers were not allowed to consult the spellbook during the adventure. The spellbook is a dictionary consisting of dictionary entries made out of three-letter spells and their descriptions. In this experiment, the participants of this research were allowed to

⁷⁶ *Ibid*, p. 10.

⁷⁷ Inkle Studios, Ink "<https://www.inklestudios.com/ink/>", (3rd June 2019).

consult the spellbook, since this option is also allowed in the video game version. Another adaptation is that the participants were not obliged to choose between warrior or wizard adventurer whilst reading the book, because this option is not given in the video game either. Participants played with a hybrid version of adventurer (based on the video-game) for the gamebook. For reasons of comparability, I have also striven to make the conditions in which the participants experience the book and the game as similarly as possible, by conducting the research in similar places, under similar circumstances and with the same software and auxiliary support documents. These support documents consist of the path sheet, the character sheet, and the questionnaire. The questionnaire consisted of three elements, one element with questions about general information about the participant, one element with reading comprehension and degree of immersion after reading from print and a final element regarding reading comprehension and degree of immersion after reading from the video-game text.

Participants

This paragraph will portray the participants of the research. There were 22 participants (N=22) for the research into reading comprehension and immersion. The amount of participants was determined by following norms for social studies qualitative research of between 5 and 50 participants, as well as striving to create a more diverse participant group. The group of participants consisted of university students and family members. Of the participants nine were male and thirteen were female. Most participants were between 20 – 30 years old with a few outliers of > 30 years old. The pie chart below depicts the native languages of the participants. The largest group considers Dutch their native language. The participants had Caucasian backgrounds and middle to high education levels; all participants had at least completed a form of higher vocational education.

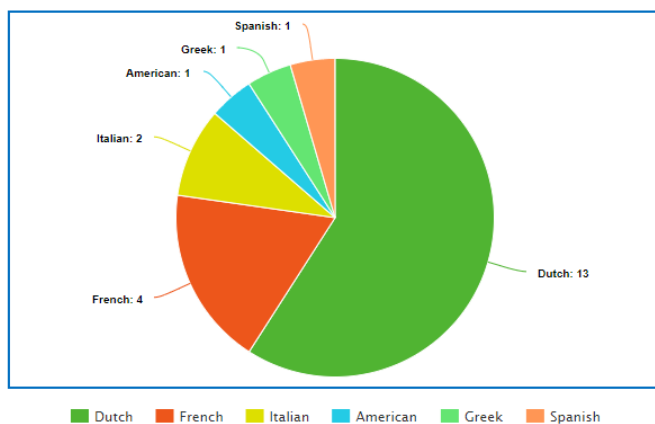


Figure 1: Native language of participants

Participants were also asked to give an estimation of the time they spend reading long text and/or playing video games per week in hours. The bar chart below shows the results of these questions. The Y-axis shows the hours, the x-axis show the time spent reading (blue) and playing video games (orange) per participant.

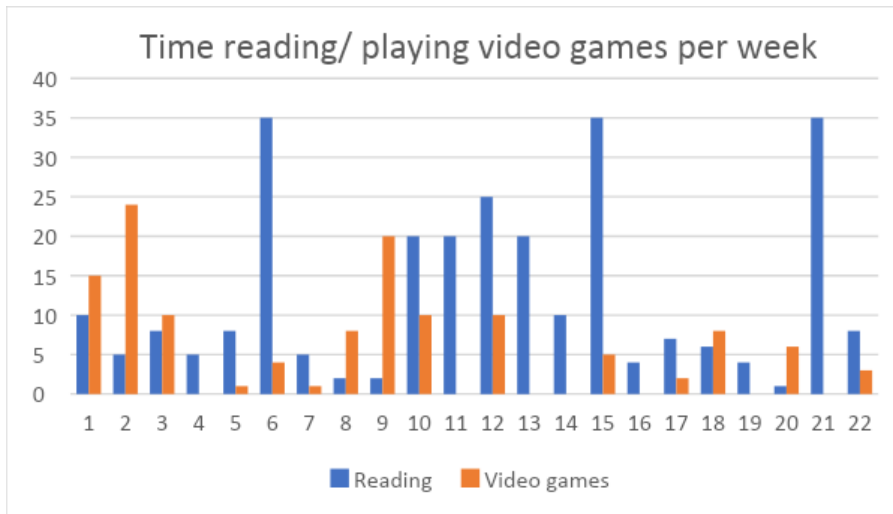


Figure 2: Time reading/ playing video games per week in hours

From the chart, it is apparent is that the participants usually choose one or the other as their main time pastime; although most participants spend time doing both activities. The time spent on reading and on video games is never equal, however. The difference is most apparent for participants 6, 15 and 21, who all read around 35 hours a week, and spend significantly less time playing video games if at all.

The participants have been classified in different reading degrees and video gaming degrees. There are four degrees in each activity: 0 hours per week is non-gamer/non-reader, 1 – 10 hours per week is basic, 11-20 hours per week is intermediate, 20+ hours is avid. For example, participant 6 is an avid reader (35 hours per week) and a basic gamer (<5 hours per week. The numbers of the participants are listed within their classification according to their questionnaire and are divided as follows:

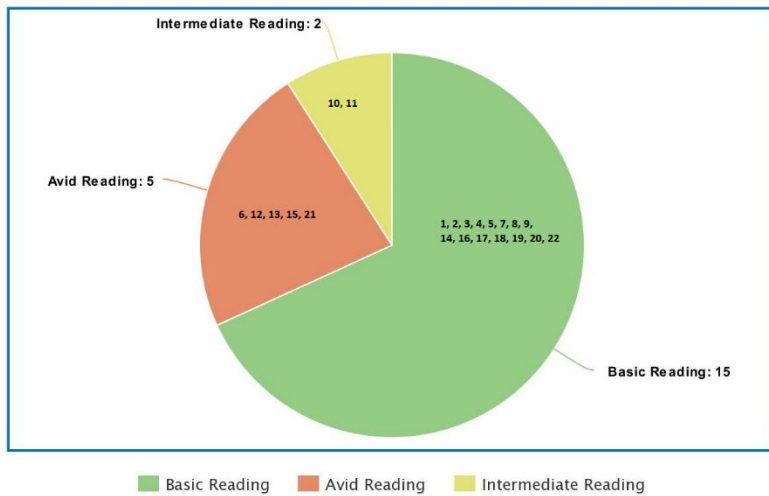


Figure 3: Classification reading

This chart shows that the largest part of the group is classified as having a ‘basic reading’ degree. Five participants read more than 20 hours per week and only two participants read between 11 – 20 hours per week. In this, reading was defined as long-form reading from a physical book or from a screen.

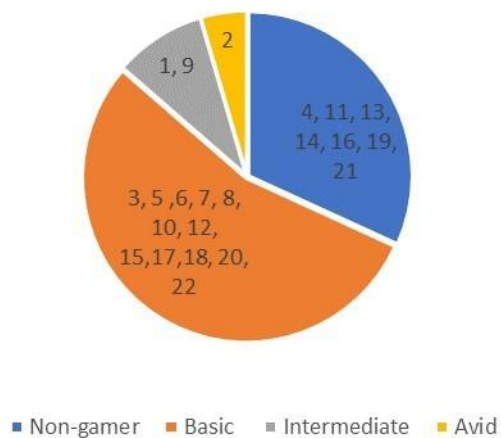


Figure 4: Classification of video gaming profile

Looking at the chart for the classifications for video gaming, only one participant (Participant 2) plays video games for 20+ hours per week. The largest group (19 participants) spend between 0 – 10 hours per week playing video games. The participants have a slight inclination to reading more than playing video games.

Material and procedure

All participants were provided with the following to conduct the research:

- Pen
- Adventure sheet
- Path sheet
- Questionnaire
- Laptop/computer with *Sorcery!* Installed on it
- A version of *Sorcery! The Shamutanti Hills* (either the 1983 version or the 2018 version)

Considering the two editions of *The Shamutanti Hills*, the text and the division into passages are the same. The largest difference is that the 1983 version depicts a map of the *Shamutanti Hills* and the 2018 version does not. Another difference is that the spellbook is at the beginning of the book in the 1983 version and at the end of the book in the 2018 version. Participants were required to use their own headphones, or borrow a pair during the video gameplay.

During and after the research, the following materials were utilized:

- Screencast-o-Matic: recording and video editing software tool
- Videoindexer.ai: a video transcribing tool that uses OCR and AI to recognize characters and fill in words.

The research was conducted as follows:

1. Participants would be seated in a quiet area/room in one of the three designated locations: Secluded room in the Leiden University Humanities faculty, Press Room or private residence.
2. Participants would get an explanation and receive the pen, adventure sheet, and questionnaire.
3. Participants would be allowed approximately 10 minutes to read the rules in the printed version of the book
4. After reading the instructions in the book, participants would start reading the book whilst recording stats, gold, and prayers on their adventure sheet, as well as writing down each path they take. The stats they would record were their stamina (determines how many and how impactful their attacks were) and luck (luck can be used to change the outcome of a battle). Gold and prayers were tools to buy items or otherwise aid the participants in their journey.

5. After 30 minutes, the participants were asked to fill out the section of the questionnaire that is about the printed book. Participants get a maximum of 10 minutes for this.
6. Once the questionnaire is filled out, the participant sat down in front of the Laptop / Computer to start the game.
7. Participants played the video game and did not need to fill in an adventure sheet, the video software filmed the playthrough.
8. After 30 minutes, the participants were asked to fill out the questionnaire part about the video game.
9. If not completed beforehand, the participant was asked to fill out their general information and they were informed that the (anonymized) data would be used in a strictly scientific sphere.

Limitations

Limitations of this research are as follows:

Location and ambiance:

The areas in which the research was conducted were as silent as possible, but since most of them were public spaces, there was no guarantee for quietness. This may have affected the degree of concentration the participant felt, especially during the reading element of the research, which required concentration, and during which participants were not allowed to use headphones, as this may influence their reading.

Limited knowledge of the game:

In some cases, participants started off with problems discovering the controls for the video game. These were not given in any tutorial or mentioned in an introduction, so some of the participants had difficulty discovering the correct way to play the game at the start. When this happened, I was able to help the participants and added extra time to their playtime.

Concentration and wanting to read

As mentioned in chapter 2, one must be able to concentrate on a text and also be intrigued by the text. The current research results are based on a single event in which the participants read 30 minutes from a physical book and played/read 30 minutes of the video game text. The fact that the research is based on a single event must be taken into consideration; it is possible that participants did not feel like reading or were not intrigued by the text. These possibilities could have had negative effects on the

word count and reading comprehension of these participants. By adding a question in the questionnaire asking participants to indicate their current degree of wanting to read, this could have been taken into account. This, however, is prone to dishonest answers; often participants want to provide the answer they expect the researcher to want to hear.

A better way of taking this problem into consideration is to have had multiple sessions with the same participants reading/playing the same texts (but letting them choose different paths) and see if the word count and reading comprehension was better, worse or the same. This, however, may still lead to negative results: participants can become bored by reading the same/similar texts.

Similarity of texts

As mentioned briefly in the last limitation, the similarity of the physical gamebook text and the text in the video game could have influenced the experience and speed of reading during the second read-through. Having already familiarized themselves with the characters, setting and atmosphere during the first read-through, may have affected the second read-through, in turn affecting the results of the reading comprehension and reading speed research.

The methodology of data analysis

In this paragraph, I will describe the methodology for data acquisition and data entry for the immersion and reading comprehension research. The paragraph will be split in data acquisition and data entry for reading from print and for reading from a screen. I will start by explaining the data acquisition and entry for reading from print.

In the previous paragraph, I have explained how participants conducted the element of the research that focuses on reading from printed text, namely reading the text, writing down their paths on the path sheet and stats on their adventure sheet. The adventure sheets were left out of the research and were only used for the gameplay of the book. The data that was used for the research were the paths noted on the path sheet. The paths on the path sheet were used to find the corresponding book entries in a machine-readable version of *The Shamutanti Hills*. The entries were copied onto an empty Word file, creating a full-text, readable rendering of their adventure as it was read by the participant. After doing so, the Word files were checked and the word count was calculated for each participant.

Considering the data acquisition and data entry for the reading from a screen element of the immersion and reading comprehension research, the methodology was not as straightforward. After the participant had read/played the video game text, the video of the gameplay was stored locally on a laptop or PC. The video then had to be uploaded into Videointerpreter.ai, the online video transcriber that

worked with artificial intelligence and Optical Character Recognition (OCR) to determine the words. After Videoindexer.ai was finished transcribing the video, the transcription and the video footage were used to create the database of paths. The database of paths consists of almost 1000 paths that the participants had taken during their on-screen adventure. Each path has a number, a reference, and the text. The number was written down on a Word file per participant. The texts that were read by the participants were all transcribed and their path numbers had been documented. The numbers were replaced with the corresponding text. This resulted in a Word file with the full-text that the participant had read during the game. The file could then be used to determine the word count and the passages the participant had read, identically to the method used to determine word count and passages read for the reading from print research.

Limitations to data acquisition and data entry

The research methodology had a major limitation: the transcribing software. The nature of the videos of gameplay posed a problem for transcribing: only having written text, with said text appearing and disappearing at different intervals made it difficult to find software that would be able to transcribe the text well enough to use as a foundation for the full-text rendering. The transcribing software used to acquire the video game text was Videoindexer.ai, a recent (May 2018) online tool developed by Microsoft. Although the tool was able to recognize most words, some fantasy words (such as region names such as Analand, Baklands, etc.) were replaced by similar-looking words; the software would wrongly recognize letters and make new words. A common mistake the software made was changing Baklands into 'Badlands' or 'Bad iands'. Another limitation this transcribing tool had, was the repetition: because the video game text moved upwards with each new choice, it often stayed on screen for a longer period of time, especially with participants that took their time reading. This resulted in the text being repeated at different stages in the transcription, often cutting sentences in half. The correction of these limitations was time-consuming.

Chapter 3: Research Results

In this chapter, I will discuss the research results. The research model that has been described in chapter two was executed between the 20th and 30th of April, 2018. In this time, 22 people participated in the

research by reading 30 minutes of gamebook text and 30 minutes of the video game version of the same book. Unfortunately, the data of four participants could not be researched due to corrupted video files (three participants) and a partially filled out path sheet (one participant). The following table will depict the remaining participants and their classifications:

Participant	Sex	Age	Native language	Education	Class reading	Class video games
1	Male	27	Dutch	Master	basic	intermediate
2	Male	24	Dutch	Bachelor	basic	avid
3	Female	23	Dutch	Bachelor	basic	basic
4	Female	25	Greek	Master	basic	basic
5	Female	24	Dutch	Master	basic	basic
6	Female	25	Spanish	Master	avid	basic
7	Female	50	American	Higher Vocational Education	basic	basic
8	Male	27	Dutch	Bachelor	basic	basic
9	Female	25	Dutch	Master	basic	intermediate
10	Female	28	Italian	Master	intermediate	basic
11	Female	26	Dutch	Master	intermediate	basic
13	Female	24	Dutch	Bachelor	avid	basic
15	Female	22	Italian	Master	avid	basic
16	Female	21	French	Master	basic	basic
17	Male	21	French	Master	basic	basic
18	Male	22	French	Master	basic	basic
19	Male	58	Dutch	Bachelor	basic	basic
20	Male	30	Dutch	Higher Vocational Education	basic	basic

Table 1: table of definitive participants with data

The concepts that were investigated with this research were: navigability, immersion and reading comprehension & speed. The first theory I want to test according to the research is navigability.

3.1 Navigability in The Shamutanti Hills

As explained in Chapter 1, navigability is the ability to be able to navigate through a text. Texts can become more navigable when containing elements such as overviews, consistent layouts or visual cues. Considering this, linear texts have a clear route: ascending pages should be read in numerical order. With non-linear texts, such as the gamebook *Sorcery: The Shamutanti Hills*, there are multiple paths and the 'successful' route is not clear from the beginning.

In the physical book, all readers start at the same spot in the book but are quickly able to choose alternative paths by following directions to a different text entry. Figure 5 below depicts a page from *Sorcery: The Shamutanti Hills* in which the entry numbers are printed in bold (green), the page numbers refer to the entries on the page (red) and the follow-up entries are mentioned in the current entries (blue).

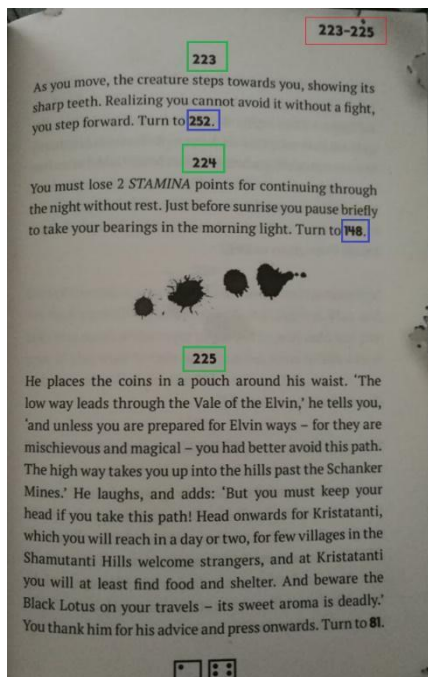


Figure 5: Navigation in the physical book

In the video game version of *The Shamutanti Hills* readers also choose alternative paths after the beginning at the same point. Because the execution of this version is more similar to a video game, the readers are not confronted with flipping pages, but have the choices presented to them in the form of flags when on the map (figure 6) or page excerpts when in the middle of an encounter (figure 7), which they have to click on. There is minimal scrolling in the video game played on PC.



Figure 6: Flags as choices

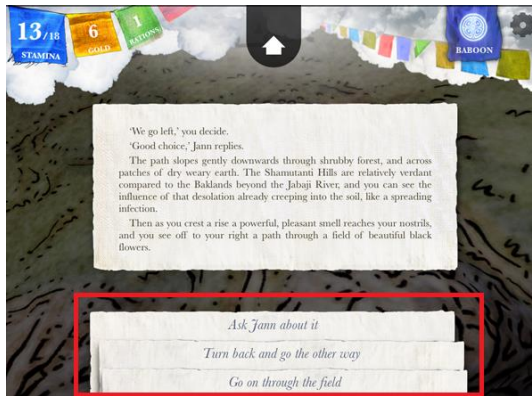


Figure 7: Page excerpts as choices

In terms of navigability, the participants had no trouble with the way this worked in the physical gamebook. A few participants had difficulties with the movement of the character in the video game at the beginning, which decreased the sense of navigability. The problem that arose was that the reader knew *where* the text was but was not able to reach it. In these cases, the participant either asked for help or solved it on their own. Considering none of the participants had read a gamebook or played the video game *The Shamutanti Hills* before, the navigability of the non-linear texts is to be considered comprehensible and not confusing for users.

Whereas reading from print requires mental mapping of the text, the video game text may have provided more grip on the text than the printed text; the choices are shown on an actual map. The location of the reader/player is pinpointed on the map, showing the exact spot of the reader on the ingame map. This may provide people that only play the game with the advantage of being able to estimate when they would reach the top of the map, which signifies the end of *The Shamutanti Hills*. This, however, may be more difficult than it seems, due to the fact that the text is not linear, and texts in different nodes are also not always the same length. The physical text provides less grip for the reader: the version of the book that was published in 1983 provides a map of the entire story (with the Shamutanti hills as a small, non-detailed area) and the new version of the book provides no map at all. Readers have no idea when the story is finished, and how far they are in the story. In terms of navigability in *The Shamutanti Hills*, reading from a screen and the support the ingame map provides, may make the experience of reading from screen more pleasurable and less demanding for the reader. This, however, was not one of the questions explicitly posed.

3.2 Immersion in The Shamutanti Hills

Immersion in the text is an important part of the research. Immersion, as explained in chapter 1, is defined in this thesis as the feeling of losing oneself in a text. After reading the texts, the participants

were asked whether or not they felt immersed in the text or not. First, I will discuss the degree of immersion after reading the physical text of *The Shamutanti Hills*.

The majority (N=13) of participants had felt immersed in the story whilst reading from the book. The pie-chart below depicts the division of participants and the feeling of immersion.

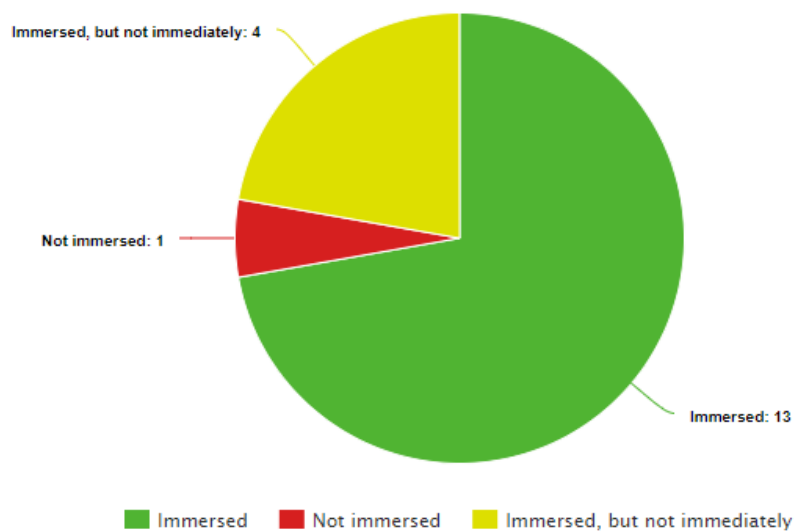


Figure 8: Immersion in the printed text

The participants were asked to provide a statement of their perceived immersion; although not all participants provided a detailed statement, those that did said they felt immersed because they identified with the character in the story (participants 9, 12, 14); because the choices and consequences made them feel immersed (participants 2, 3, 11, 12); or because of the descriptions of the surroundings (participants 4 and 14). Of the 18 participants, six participants declared they had wanted to continue their adventure because they felt immersed and enjoyed the story.

The participant (Participant 5) who did not feel immersed in the game stated that to feel immersed in the game, the texts should have been longer and more advanced. Others that felt immersed, but not immediately, or to a lesser degree, accounted this to administrative tasks for the research, such as writing down paths and/or stats during fights.

Now I will discuss the degree of immersion in the text read from the video game version of *The Shamutanti Hills*. Again, the majority (N=11) of the participants felt immersed whilst reading the text from the screen. The pie-chart below depicts the division of degree of immersion.

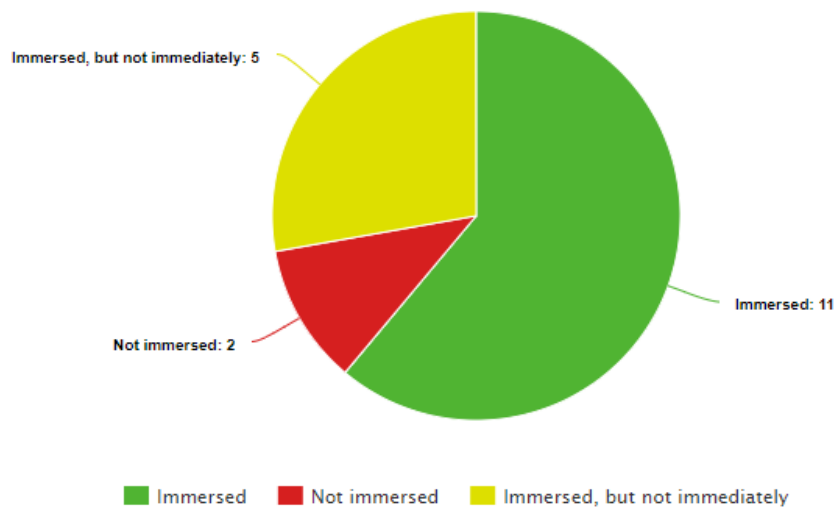


Figure 9: Immersion in the video game

Participants were more explanatory when giving statements about the degree of immersion after playing the video game. Many participants felt that the music or the graphics of both added to the immersion (participants 3, 5, 6, 7, 8, 10, 13, 14); others stated that the interactivity made for a more immersive experience (participants 2, 3, 14).

Participants that felt less immersed whilst reading the video game text were also more vocal about their opinion: a few participants stated that the faster pace of the game resulted in faster (but less precise) reading (participants 1, 11, 12); one participant ascribed a lesser degree of immersion to the interface of the video game (participant 8); and two participants opined that the visuals were more distracting and too generic to feel more immersed (participants 8, 11). This may demonstrate a lower degree of technologically enhanced immersion, where the enhancements should sustain the feeling of immersion. Participant 5 did not feel immersed in the video game text, stating again that the text was too simple.

Comparing the degree of immersion in reading from print to reading video game text from the screen, more participants felt more immersed whilst reading from print than from the video game.

Remarkable for the theory of immersion is that besides a lesser degree of immersion when texts are too long or difficult, texts that are too short and simple also have a negative effect on the degree of immersion. This has become clear through the answers Participant 5 has given in the questionnaire sections of the research.

3.3 Reading comprehension and reading speed

In this paragraph, I will discuss the results for reading comprehension and reading speed. First, I will start with reading speed. As explained in the methodology of the research, the reading speed of the participants is calculated as follows:

$$\text{Words read} / \text{time} = \text{reading speed}$$

In the research, the time allotted for reading was 30 minutes per medium. The following table shows the word count and reading speed in words per minute per participant per medium.

Participant	Word count print	Reading speed print	Word count video game	Reading speed video game	Difference word count	Difference reading speed
1	5228	174	9031	301	3803	127
2	4689	156	9153	305	4464	149
3	3779	126	8107	270	4328	144
4	4062	135	4495	150	433	15
5	5467	182	8223	274	2756	92
6	2681	89	7911	264	5230	175
7	3462	116	6066	202	2604	86
8	3707	124	6087	203	2380	79
9	3408	114	5684	189	2276	75
10	3813	127	4075	136	262	9
11	4094	136	6265	209	2171	73
13	3639	121	8632	288	4993	167
15	4973	166	10339	345	5366	179
16	3579	119	5469	188	1893	69
17	5613	187	7571	252	1958	65
18	2919	97	4733	158	1914	61
19	3512	117	4894	163	1382	46
20	3601	120	8783	293	5182	173

Table 2: Word count and reading speed

The table shows that all participants read the text faster on a screen than from print, with clicking time, and time needed to flip pages and register paths included in the time limit of 30 minutes. Out of all participants, only Participant 4 and Participant 10 had word count differences of <500 words per minute, reading a similar amount of words regardless of the medium. All of the other participants (almost) doubled the number of words read. The largest differences in the number of words read from

print and text were Participant 6, Participant 15 and Participant 20, all of whom had a difference of >5000 words.

But word count alone does not determine whether or not the reader had comprehended the text. Reading comprehension was tested in two different ways:

- Reading cues within the text
- The recollection of text read in the questionnaire

The reading cues that were tested were two ‘demands’ in the video game text (the book did not contain cues that could be tested). Both cues were tested at the beginning of the video game: the first reading cue was a demand given by the *Sightmaster Sergeant*, telling the reader to defend. The majority of the participants (N=10) did not follow this reading cue. The second reading cue that was given was the spell to use to open the lock of the gate, which is DOP. The majority of participants (N=13) followed this cue unlocking the gate whilst others either zapped it with electricity or burned it.

The recollection of the text read was tested in the questionnaire: each participant could write down what they remembered in the game (either in full sentences or by using keywords). These sentences and keywords corresponded to passages in the text. Each passage can consist of multiple, consecutive excerpts of text with a consistent subject. To calculate the score for reading comprehension, the total number of passages was divided by the number of passages recollected in the questionnaire, resulting in a rounded-up score between 0 - low recollection - and 100 -high recollection. This resulted in the tables below, the first being for the recollection of passages in the book, the second being the recollection of passages in the video game.

Participant	Number of categories	Number of categories recollected	Recollection score
1	11	2	18%
2	15	11	73%
3	10	8	80%
4	12	2	17%
5	18	5	28%
6	7	6	86%
7	8	4	50%

8	12	7	58%
9	10	6	60%
10	12	6	50%
11	11	7	64%
13	12	6	50%
15	18	6	33%
16	9	5	55%
17	19	5	26%
18	8	5	63%
19	8	7	88%
20	11	6	55%

Table 3: Recollection from printed text

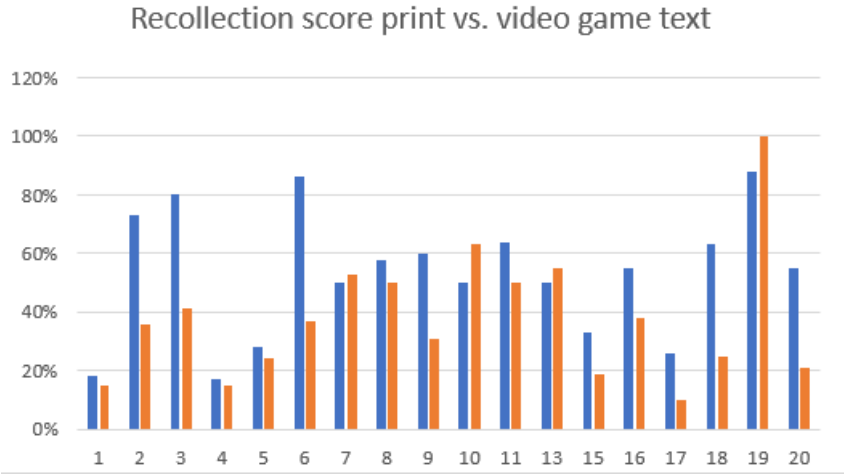


Figure 10: Recollection score print (blue) vs. video game (orange) text

Considering the results for the number of passages recalled for reading from print, the results strongly varied; from participants that recollected around 20% of the text to participants that recollected almost 90% of the text. The large difference could be explained by the manner in which participants wrote down their recollections; those using keywords could easily satisfy the requirements for the passages by writing down one keyword, whilst those who wrote down full sentences took longer to convey their recollections. Another reason some participants scored considerably lower on the recollections was the fact that some participants did not write down recollections of the text, but more general remarks about the text. An example of this is participant 4 who wrote the following

recollections: 'I remember most of the steps I had to follow, and how the journey started and the people I met'. This resulted in a score of 17% recollected passages. This, unfortunately, is not an accurate representation of the reader's actual comprehension of the text.

Considering the results for the number of passages recalled for reading from the video game, the scores for recollection varied from 10% to 100% recollection. Again, the lower scores for the recollection of the video game text could be explained by the manner in which the participant noted their recollections and whether or not they decided to give a general recollection or a detailed recollection. In the recollections of the video game text, participant 17 recollected 2 actual passages of the 21 passages identified, resulting in a score of 10 percent.

Comparing individual results of the recollections from print and from a screen, the majority of participants scored better recollecting the text from print (N=15); only three participants scored better when recollecting from the video game text. Analyzing this results further, only slight differences could be observed in the individual scores between reading from a printed text and from the video game text, and only six participants had a score difference of at least 25 score points.

Besides the aforementioned results for immersion, reading comprehension and reading speed, another factor played a role whilst analyzing the results, namely using the cursor as a reading aid in the video game text. All participants had used the cursor to help them read, or remember their spot in the text during the video game reading. This is similar to what some readers do while reading a physical book, by using their finger to track where they are in the text.

Considering the results of the research, immersion in a text on a screen is similar to immersion in a printed text. Out of the 18 participants, 13 felt immersed when reading from print and 11 felt immersed when reading from a screen. In terms of reading from a screen, the timing and quality of graphics can end up distracting the reader instead of functioning as reading aides. In terms of reading comprehension, the individual scores for reading comprehension per participant were similar for most participants; six participants had a score difference of 25 or more. The overall scores showed that most of the participants had a recollection of between 50-75% for reading from a printed text and video game text alike. Further results and interpretations will be addressed in the following chapter, the discussion.

Chapter 4: Discussion

In this chapter, the results from the immersion and reading comprehension research will be discussed and interpreted. The significance of the results and shall be discussed here as well. The goal of the research was to see if there are differences in reading from print or from a screen in terms of the degree

of immersion and reading comprehension. The hypothesis is that the degree of immersion in the text should be similar regardless of the medium. This hypothesis might be contradictive to recent research that suggest negative correlation between reading from a screen and the degree of immersion, but the distinct genre and the game-form of the text described in this thesis may partially disprove these negative correlations, albeit in this case study. In terms of reading comprehension, it is expected that the reading comprehension from print should be a bit higher, although still quite similar to the reading comprehension in reading from a screen.

Firstly, this thesis shall discuss the results considering navigation, then immersion in the printed text and the video game text of *The Shamutanti Hills*. After that, the results for narrative and reading comprehension results will be discussed. Finally, the significance of these results will be discussed and the hypothesis will be tested.

4.1 Navigability

In chapter one, the theoretical framework discussed the gamebook and video game texts in terms of navigability; the ability or disability to traverse through a text by mental mapping and use of physical guidelines. Considering the non-conventional manifestation of the texts researched in this thesis, the hypothesis was that conventional navigability tools, such as using weight of the book to feel how much the reader/player had to read until the end or use of visual cues or maps, would not be able to be used to navigate through the book. In terms of the physical book, this hypothesis can be accepted; although the books provided maps, it was not clear where on the map the reader/player was located.

In terms of the video game text, conventional methods such as the use of visual cues and maps could be used to navigate through the text. Despite not having a physical medium to hold, the video game offered an interactive map in which the reader/player's character could be dragged or moved automatically according to choices. The reader/player could zoom in and out of the map during gameplay to get a general idea of how far they were from the top of the map; the presumed successful end. An interesting result of the navigability research in the video game text is the confusing game mechanic to manually move the character across the map; more than half of the total amount (N=11) of participants, including the author during preliminary research, spent more than 30 seconds struggling to move the character. This had nothing to do with not having read instructions; the written command was to 'tap your character to continue'. The hypothesis must be rejected for the video game text; although the game mechanics were confusing at first, the use of an in-game map that interacted with the reader/player's choices offered means of conventional navigability.

4.2 Immersion

Considering the results for the immersion section of the research that were presented in the previous chapter, a significant number of participants felt immersed in the gamebook text (N=13) and in the video game text (N=11). Testing the hypothesis in terms of immersion, the initial hypothesis can be assumed; for this study, the degree of immersion participants experienced when reading the gamebook text and the video game text were similar.

Comparing these results to the theoretical information about immersion, the research into the different forms of the *Sorcery! The Shamutanti Hills* texts provided insights into immersion in gamebooks and video game texts. The theoretical framework discussed multiple methods of creating immersive environments such as the use of second-person perspective, use of technological or visual enhancements, motivation by in-text goals, detailed texts, and clearly distinguished boundaries between the real world and the fantasy world. Considering both texts, *Sorcery! The Shamutanti Hills* implements most of the techniques to create an immersive environment. When elaborating on their degree of immersion in the gamebook text participants commented in terms of motivation by in-text goals (N=4); or a higher degree of immersion due to detailed descriptions, speaking to the participant's imagination (N=4). When elaborating on their degree of immersion in the video game text, most participants commented on the addition of audio-visual elements (N=8) helping them feel more immersed in the story.

Regarding the significance of these results, the outcome may provide fundament for further study into immersion in digital leisure texts, such as video game texts and/or gamebook texts; many recent studies about immersion in text focus on texts that are written in traditional books or research the degree of immersion in hypertexts, that do not provide as many visual cues as the video game *Sorcery! The Shamutanti Hills* does. By recognizing that both forms of text may have provided distractions (a-linear flipping of pages in the gamebook and clicking of the mouse in the video game), it can be argued that these types of texts cannot be measured by the same standards and require additional research.

4.3 Narrative

When looking at the theoretical framework for narrative, it is clear that fits within the node-structure of future narrative design; by moving from node to node in a forking structure, the reader/player proceeds through the story without knowing what the consequences of their actions will be. The separate nodes themselves do not contain narrative, but by combining different nodes in a certain order, the nodes gain meaning and create narrative. This is evident in the gamebook text and the video game text of *Sorcery!*

The Shamutanti Hills; reading the nodes alone, there is no meaning and they often won't make sense. But once a couple of nodes have been combined, the story becomes evident, regardless of the order in which the nodes are read – although during each read-through a different story will emerge.

Another form of narrative that has been researched in the theoretical framework is that of ludonarrative; a form of narrative that considers textual context and game mechanics alike. Although this form of narrative is widely discussed in the literary studies, the importance of this form of narrative in this thesis is evident; the effects of the reader/player's choices – executed through game mechanics – are evident in the text. This ludonarrative resonance is especially present in the fighting scenes in the video game text of *Sorcery! The Shamutanti Hills*; a specific node can have multiple outcomes depending on what has happened in the meantime. For example, a fight with the Sightmaster Sergeant at the beginning of the story can contain multiple duplicate nodes that have different consequences and outcomes depending on the health points the reader/player's character or the Sightmaster Sergeant has.

4.4 Reading Comprehension

In terms of reading comprehension, the scores for comprehension indicate that reading comprehension in a gamebook text and a video game text are similar; the majority of participants had score differences of <25, with only a few (N=6) participants with larger differences between scores for reading the printed gamebook text and the video game text. The results allow the hypothesis to be accepted; the reading comprehension scores per person were similar.

This, in contrast to the common stance on reading comprehension from a screen or from print, demonstrates that reading comprehension skills do not have to be compromised by the use of a digital medium; the majority of participants had similar results in reading comprehension from the text on a screen and from text from print.

Chapter 5: Conclusion and Recommendations

In this chapter, this thesis will be concluded and recommendations for further research into this subject will be presented.

Conclusion

Referring back to the initial research questions and hypotheses of this thesis, the goal of the thesis was to:

(R1) Find out if reader/players experience immersion differently when reading a text from a physical gamebook or from a screen in video game form, and;

(R2) Find out if reader/players comprehend the text read from a physical book similarly to a text read from a screen in video game form.

For R1, the initial hypothesis was that participants were expected to feel a similar degree of immersion whether reading from the physical gamebook or the video game text. The visual cues and other methods of creating an immersive environment should be applied to both the physical text and the video game text.

Considering the results of the research in this thesis, the initial hypothesis can be assumed; the majority of participants felt immersed in both texts (N=13 for the physical text and N=11 for the video game text), albeit in a different degree and the feeling of immersion being affected by different elements of the text. Looking at the participants individually, those who did not feel immersed at all did not feel immersed in either text.

For R2, the initial hypothesis was that reading comprehension scores should be similar whether reading from a physical book or from a screen in video game form.

This hypothesis may also be assumed; although overall reading comprehension scores varied greatly, individual scores between reading from a printed text and from a screen were similar; 12 participants scored within a 25 point difference between reading from print and from a screen.

Analyzing these results, it is safe to say that within the framework of this thesis, and with comparing a gamebook with its video game adaptation, the degree of immersion and reading comprehension of text does not suffer under the use of a screen for this genre of text. Although this can be concluded for this specific case study, further research into the subject of leisure texts read from gamebooks and text-rich video games is required to make general assumptions. The following paragraph will discuss recommendations for further research on this subject.

Recommendations

The following paragraphs will discuss recommendations for further research into the subject of reading leisure texts from a gamebook format or a video game format, as well as look into further applications of digitally disseminated text.

Recommendations for methodology

Considering future recommendations for the methodology of reading comprehension, the automated generation of gap-fill questions and/or multiple-choice questions might provide a more reliable assessment of reading comprehension. By creating automated questions for the gamebook text and the video-game text, the participants would be questioned more personally about the specific passages they read, instead of having to answer a general question about the text. Past studies on this subject create

automated gap-fill questions for advanced biology exams using keywords in sentences.⁷⁸

Considering the methodology for text extraction from the video game playthrough recordings, the software was not yet efficient in extracting the text without transcription pollution; because the text stayed in the screen, each screen capture made by the software would contain double entries. Identifying the double entries was made difficult by strange cut-offs made by the software; words would be split in the middle, with the second half appearing paragraphs later. Each transcription needed to be cross-examined for double texts or wrongly identified words. The recommendation is to wait for video-transcription software to become more efficient; by using a better product, the margin of error will become smaller.

Considering the media that have been researched, further research can be done with the smartphone version of *Sorcery! The Shamutanti Hills*. Because smartphones are widely used in the modern world (2.71 billion smartphone users in 2019), it is interesting to see what effects reading the text from a smartphone has on immersion and reading comprehension.⁷⁹

Recommended areas for future research

The subject of this thesis was reading comprehension and immersion in leisure texts that are read in gamebook format and video game format. The subject intersects with many different areas of study, such as education, pedagogy, and game studies. Because of this, I believe further research can be done in the following areas: gamification of school books, gamification of museum exhibition texts, and additional research into reading leisure texts from digital media.

The results of this thesis demonstrate that, at least for some text genres, reading comprehension and degree of immersion do not suffer from using an electronic medium, such as a computer screen. Therefore, it might be plausible to provide new formats for education through digital media. In recent years, gamification in an educational sphere has been widely researched, with some experts claiming that gamification of educational sources 'is the future of learning'.⁸⁰ Although gamification does not necessarily mean digital gamification, the development of educational sources into digital games might be seen as a natural progression; educational sources can take advantage of the popularity of video games and the digital games can cause children to become accustomed to digital

⁷⁸ M. Agarwal & P. Mannem 'Automatic Gap-fill Question Generation from Text Books' in *Proceedings of the 6th Workshop on Innovative Use of NLP for Building Educational Applications* (Portland, OR, USA (2011) p. 56.

⁷⁹ Statista Research Department, 'Number of smartphone users worldwide from 2014 to 2020 (in billions)', <<https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>> , (18 July, 2019).

⁸⁰ R. Tulloch & H. E. K. Randell-Moon, 'The politics of gamification: Education, neoliberalism and the knowledge economy' in *Review of Education, Pedagogy, and Cultural Studies*, 40:3 (2018), 204.

learning methods at a young age. This being said, the author of this thesis wishes to emphasize that the digital games for educational purposes should not be developed for younger audiences only; digitally enriching sources for older students should be researched as well.

Another recommended research would be to build on this thesis and research conventional, linear leisure texts and the effects on reading comprehension and immersion when reading them from a video game setting. Although not all leisure texts can be adapted into video games without adding or removing content, Inkle Studios, the developer of the *Sorcery!* adaptations has already attempted to make an interactive version of Mary Shelley's *Frankenstein*. In this version, the reader/player is Dr. Frankenstein's confident and advisor.⁸¹ The developer uses aforementioned methods such as the use of the vocative case and detailed information to create an immersive environment for the reader/players. These digital adaptations could also be used as motivation for (high-school) students that are otherwise not interested in literature; adding another dimension to the text may motivate them to read.

Acknowledgment

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References

Published primary and secondary literature

Aarseth, E.J. , *'Cybertext – Perspectives on Ergodic Literature'*. (Baltimore/London: The Johns Hopkins University Press, 1997), p. 1.

⁸¹ Inkle Studios, 'Frankenstein', <<https://www.inklestudios.com/frankenstein/>>, (18 July, 2019).

- Agarwal, M. and P. Mannem 'Automatic Gap-fill Question Generation from Text Books', *Proceedings of the 6th Workshop on Innovative Use of NLP for Building Educational Applications* (Portland, OR, USA: 2011), p. 56.
- Arya D.J. and J. Yu, 'Reading comprehension' in *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation* (Thousand Oaks, California, United States of America: SAGE Publications, Inc, 2018), p. 1383.
- Ball, R. and J. P. Hourcade, 'Rethinking Reading for Age From Paper and Computers', *International Journal of Human-Computer Interaction*, 27-11 (2011), p. 1067 – 1068.
- Barthes, R., 'S/V.' (New York: Blackwell Publishing, 1974), p.13.
- Berghammer, G. and A. Holmqvist, 'Pleasing the reader by pleasing the eye—part 1. the role of format and design in readability' *Medical Writing*, 21 - 3 (2012), p. 211.
- Buckingham, D., 'Studying Computer Games', in D. Carr: *Computer Games: Text, Narrative and Play*' (Cambridge: Polity Press, 2006), p. 1.
- Clemens, N.H. et al. "Interpreting Secondary Students' Performance on a Timed, Multiple-Choice Reading Comprehension Assessment: The Prevalence and Impact of Non-Attempted Items.', *Journal of Psychoeducational Assessment*, 33:2 (2015), p. 154.
- Cuddihy, E. and J.H. Spyridakis, 'The effect of visual design and placement of intra-article navigation schemes on reading comprehension and website user perceptions' *Computers in Human behavior*, 28-4 (2012), p. 1402.
- Domsch, S., *Storyplaying – Agency and Narrative in Video Games* (Berlin: De Gruyter, 2013), p. 1.
- Farner, G., *Literary Fiction : The Ways We Read Narrative Literature* (New York: Bloomsbury Academic & Professional, 2014), p. 6.
- Grimshaw, S., N. Dungworth, and C. McKnight, 'Electronic books: Children's reading and Comprehension' *British Journal Of Educational Technology*, 38(4) (2007), p. 584.
- Jeong, H., 'A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception' *The Electronic Library*, 30-3 (2012), p. 390.
- Knulst, W. and G. Kraaykamp, 'Trends in leisure reading: Forty years of research on reading in the Netherlands', *Poetics*, 1998.
- Mangen, A., 'Hypertext fiction reading: haptics and immersion', *Journal of Research in Reading*, 31-4 (2008), p. 406.
- Mangen, A., B.R. Walgermo and K. Bronnick, 'Reading linear texts on paper versus computer screen: Effects on reading comprehension' in *International Journal of Educational Research*, 58 (2013), p. 61.
- Mangen A., and A. van der Weel (2015) 'Why don't we read hypertext novels?' *Convergence*, 23:2 (2015), p.6.
- Mason, S., 'On Games and Links: Extending the Vocabulary of Agency and Immersion in Interactive Narratives' in: Koenitz H., Sezen T.I., Ferri G., Haahr M., Sezen D., Çatak G. (eds) *Interactive Storytelling. ICIDS 2013. Lecture Notes in Computer Science*, vol 8230 (2013), p. 28.
- Meifert-Menhard, F., *Playing the Text, Performing the Future: Future Narratives in Print and Digiture*' (Berlin: De Gruyter; 2013), p. 8.
- Murray, J.H., *Hamlet on the Holodeck*' (Cambridge, MA: MIT Press, 1998), p. 53.
- Murray, J.H., *Hamlet on the Holodeck: The Future of Narrative Cyberspace*', (Cambridge MA: The MIT Press, 2016), p. 138.
- Nakamura, J. and M. Csikszentmihalyi, 'Flow Theory and Research' in S. J. Lopez & C. R. Snyder (eds.)

- The Oxford Handbook of Positive Psychology* (Oxford: Oxford University Press, 2018), p. 2.
- Payne, S.J., and W. R. Reader, 'Constructing structure maps of multiple on-line texts', *International Journal of Human-Computer Studies*, 64:5 (2006), p. 461.
- Pearson, P.D., and G. Cervetti 'Fifty years of reading comprehension theory and practice' in P.D. Pearson & E.H. Hiebert (eds.) *Research-based practices for Common Core literacy* (Teachers College Press, 2015), p. 1.
- Pérez-Latorre, O., M. Olivia and R. Besalú, 'Videogame analysis: a social-semiotic approach', *Social Semiotics*, 27:5 (2017), p.587.
- Russell, C., *Demographics of the U.S. : Trends and Projections*. (East Patchogue, NY: New Strategist Press, LLC, 2017), p. 479.
- Sabatini, J., T. O'Reilly, J. Weeks and Z. Wang 'Engineering a Twenty-First Century Reading Comprehension Assessment System Utilizing Scenario-Based Assessment Techniques' in *International Journal of Testing* (2019), p.2.
- Singer, L.M., and P. A. Alexander, 'Reading Across Mediums: Effects of Reading Digital and Print Texts on Comprehension and Calibration', *The Journal of Experimental Education*, 85:1 (2017), p. 156.
- Sullivan, S.A., and S. Puntambekar, 'Learning with digital texts: Exploring the impact of prior domain knowledge and reading comprehension ability on navigation and learning outcomes' *Computers in Human behavior*, 50 (2015), p. 300.
- Tulloch, R. & H. E. K. Randell-Moon, 'The politics of gamification: Education, neoliberalism and the knowledge economy' *Review of Education, Pedagogy, and Cultural Studies*, 40:3 (2018), p. 204.

Websites

- Bashaw, N., 'Progress bars while reading — yay or nay?', *Medium*, 15 May 2015, n.pag. <<https://medium.com/@nbashaw/progress-bars-while-reading-yay-or-nay-a31cae61ab28>>, (14 May, 2018).
- Books and Magic, 'The Little Mermaid' <<http://booksandmagic.com/>>, (21 June, 2018).
- Brice, M., 'Narrative Is a Game Mechanic' < <http://www.mattiebrice.com/narrative-is-a-game-mechanic/>>, (17 July, 2019).
- Care, J., 'Classifying and Rating Linearity' <<http://jakecaregamebooks.blogspot.com/2012/07/classifying-and-rating-linearity.html>>, (29 June, 2018).
- Carter, A., 'What is the role of the reader on a text?', <<http://arts.brighton.ac.uk/re/literature/brightonline/issue-number-two/what-is-the-role-of-the-reader-on-a-text>>, (5 July, 2018).
- Coffey, M., 'One Year Later, Coady's Atavist Books Set to Launch' *Publisher's Weekly* <<https://www.publishersweekly.com/pw/by-topic/industry-news/publisher-news/article/59418-one-year-later-coady-s-atavist-books-set-to-launch.html>>, (14 May, 2018).
- Delight Games, "Home" <<http://www.delightgamesllc.com>>, (27 June, 2018).
- Griffey, H., 'The lost art of concentration: being distracted in a digital world', <<https://www.theguardian.com/lifeandstyle/2018/oct/14/the-lost-art-of-concentration-being-distracted-in-a-digital-world>>, (11 July, 2019).

- Hillesund, T., 'Digital reading spaces: How expert readers handle books, the Web and electronic paper', *First Monday*, 15-4 (2010) <https://firstmonday.org/article/view/2762/2504>.
- Inkle Studios, 'Frankenstein', <<https://www.inklestudios.com/frankenstein/>>, (18 July, 2019).
- Inkle Studios, Ink "<https://www.inklestudios.com/ink/>", (3rd June 2019).
- Jabr, F., 'The reading brain in the digital age: The science of paper versus screens', <<http://www.scientificamerican.com/article/reading-paper-screens>>, (8 May, 2018).
- Publisher's Weekly, 'Atavist Books to Close', <<https://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/64463-atavist-books-to-close.html>>, (14 May, 2018).
- Reid, C., 'Rudin, Diller, Coady partner for Brightline, Multiplatform Book Publisher' <<https://www.publishersweekly.com/pw/by-topic/industry-news/publisher-news/article/54018-rudin-diller-coady-partner-for-brightline-multiplatform-book-publisher.html>>, (21 June, 2018).
- Reid, C., "Enriched E-Books: Multimedia, Mystery, and 'Cathy's Book'", <<https://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/43030-enriched-e-books-multimedia-mystery-and-cathy-s-book.html>>, (21 June, 2018).
- Sci Fab: Science Fiction-Inspired Prototyping, 'Sensory Fiction' <<http://scifi2scifab.media.mit.edu/2013/12/19/sensory-fiction/>>, (21 June, 2018).
- Sheikh, K., 'Most Adults Spend More Time on Their Digital Devices Than They Think' <<https://www.scientificamerican.com/article/most-adults-spend-more-time-on-their-digital-devices-than-they-think/>>, (8 May, 2018).
- Statista, 'Number of video gamers worldwide in 2016, by region (in millions)' <<https://www.statista.com/statistics/293304/number-video-gamers/>>, (14 May, 2018).
- Statista Research Department, 'Number of smartphone users worldwide from 2014 to 2020 (in billions)', <<https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>>, (18 July, 2019).
- Souppouris, A., 'Sensory Fiction is a prototype that lets you feel a book's emotions', <<https://www.theverge.com/2014/2/2/5370844/sensory-fiction-mit-media-lab-immersive-storytelling-concept>>, 28 November 2018).
- We Are Social, 'Digital in 2018: World's Internet Users Pass the 4 Billion Mark' <<https://wearesocial.com/us/blog/2018/01/global-digital-report-2018>>, (8 May, 2018).

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