

# **The impact of reading devices on affective and cognitive responses to fiction and non-fiction reading**

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This thesis is submitted for the degree of Doctor of Philosophy

**September 2022**

## Abstract

The belief that fiction reading can improve empathy has been prevalent in recent years, and research has provided arguments and evidence in favour of this belief (e.g., Mumper & Gerrig, 2017; Nussbaum, 2010). The emergence of screen interfaces, together with an increase in audiobook consumption, have raised questions about the potential effects of reading devices on readers' experience. To understand the association between empathy and fiction reading, as well as the impact of reading devices, the first chapter provides a literature review, exploring the notion of empathy, the association between empathy and reading, and presents empirical evidence from previous studies. It also addresses the phenomena of absorption and narrative comprehension and their role in readers' empathy. Then the literature review examines the role of the reading medium. It reviews existing literature on the differences between print and screen interfaces in reading processes as well as the differences between LCD and e-ink screen technologies. It closes by reviewing studies comparing the audiobook with the print reading experience.

The second chapter reports an empirical study conducted as part of this thesis, exploring the effect of literary reading on empathy, shedding light on the effects of fictionality and reading devices (print, e-reader, tablet, and audiobook). The third chapter reports a novel empirical study examining the effect of fictionality and reading devices on absorption, while it also investigates the role of absorption in readers' empathy. The fourth chapter is an empirical study that tests the effects of fictionality and reading medium on comprehension, and the role of comprehension in readers' empathy and absorption. The last chapter discusses the contribution of the presented results, noting that literary reading can decrease empathy, that fictionality affects this impact, the lack of differences between screen and print interfaces and the distinctiveness of the audiobook reading experience.

Word count: 76,840

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## Acknowledgements

Although they say that writing a thesis is a lonely journey, I had the good luck and privilege to be supported by many wonderful people, and I will try to capture my gratitude to them here.

First of all, I would like to thank my supervisors for their knowledge, time, effort, patience, and faith in me and this project. Specifically, I would like to thank Dr Francesca Citron for her constant presence, hard work, and attention to detail, Dr Erika Fülöp for her encouragement, patience, and support, and Prof Richard Harper, who not only offered me the great opportunity to work with The Institute for Social Futures and The Navigator Company, but he has also offered me great inspiration, a unique and reflective perspective, and a wealth of knowledge.

I would also like to thank The Navigator Company, S.A., which provided a scholarship for this research. Navigator are a paper manufacturing company with a natural interest in the role of paper in the future of reading. I am particularly grateful to António Quirino Soares who originally enabled this support and to Catarina Novais, current head of marketing, who continued it to the end. This project would not have been completed without them. I would also like to thank Mark Renolds, of Lancaster University, who finalised the agreement with Navigator. My connection with Navigator was made through Professor Harper whose prior research on the role of paper led him to prior collaborations.

I cannot omit crediting the North West Consortium Doctoral Training Partnership (NWCDTP) for funding the expenses of the empirical studies of this thesis. I am also thankful to the Maths and Stats Hub of Lancaster University for providing me with guidance and advice on the analysis of my results and the Psychology Department for giving me the necessary training and support.

Without those participating in the experiments, this thesis would not have been possible. Special thanks to all the readers who participated in my studies. Although in the middle of a pandemic, they had the willingness and time to engage with my project.

I had the good luck to meet some amazing people at Lancaster University. I would particularly like to thank Meeu, Neha, Martina, Marta, and Ariel; they gave me endless moral support and courage throughout this project and made the experience more enjoyable. It is my privilege to call them my friends.

I am extremely grateful for the moral support I received from my partner, Marvin. He experienced all the ups and downs of this journey, cheered me up for every little achievement, and helped me rise after every fall I had. Finally, I owe my family a debt of gratitude; their boundless love was a source of strength and courage throughout this project.

## Declaration

This thesis is the result of my own work and includes nothing that is the outcome of collaborations or the work of others except where specifically indicated in the text. It has not been previously submitted, in whole or in part, to any university or institution for a degree, diploma, or other qualification.

In accordance with the Department of Languages and Cultures guidelines, this thesis does not exceed 80,000 words.

Date: 27-09-2022

## General introduction

The idea of investigating the experience of reading started from inquiries that I had been developing during my daily activities. Participating in a reading club, for example, I was witnessing members reading the same book on different media, and I was wondering: Does the device have any role to play in the way different members of the club experienced the story? I myself, as an avid reader, have many times tried to listen to an audiobook instead of reading the print book: this way, I thought, I could add some exercise to my life without having to stay away from my books. However, I found out that my mind was my enemy: it was always wandering and never focused on the story I was listening to through my earphones. I also tried an e-reader: this way, I thought, I will not need to carry heavy books with me. Again, my attempt was unsuccessful. I was annoyed that the interface was reminding me of my computer screen and, hence, the work waiting for me in the office, instead of reminding me of my cosy evenings at home.

Many times, I wondered if it was just my experience. Whether it is because I am used to print books or because my hearing is not good enough for audiobooks. And so, I went online. I added some key terms to a search engine and obtained millions of results. I found many articles and studies on the effects of digital devices on education and, although this topic was also very interesting and made me wonder whether the next generation will ever sharpen a pencil to write their exercises or buy markers to highlight their history books, my interest was in leisure reading: What happens when you just want to read for the sake of reading? When you want to curl up and enjoy being lost in a book?

Lost in a book: that was the expression that led me to one of the terms thoroughly examined in this thesis: the term of absorption. Soon enough, I found out that a key ingredient to being lost in a book, to being immersed in a story, is to empathise with the characters of the story. This is what led me to an article in The Guardian, published back in 2011, which presented findings of studies suggesting that reading fiction improves empathy<sup>1</sup>. This was something that caught my interest because empathy had become a very regular word in my vocabulary while providing support during the refugee crisis as part of my day job, and it also added more questions: Can reading comprehension play a role? Will the reader's abilities be enhanced regardless of their understanding of the stories they read?

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<sup>1</sup> <https://www.theguardian.com/books/2011/sep/07/reading-fiction-empathy-study>. Date of last retrieval: 26/8/22.

Combining these topics, I started to look for studies that explore the effects of reading. Soon enough, I came across the field of the empirical study of literature which provided an interdisciplinary focus on the effects of leisure reading, and which is mostly based on literary studies and the psychology of reading. Most of the relevant studies were based on psychological methodologies, encompassing reader response experiments, correlational studies, and other empirical research techniques (e.g., eye-tracking).

The exploration of these techniques and methodologies helped me in designing the experiments of the present thesis. Before conducting the experiments (reported in Chapters 2, 3 and 4), a thorough overview of previously published work was essential. This overview resulted in the literature review presented in Chapter 1 that reported theories and findings of previous psychological studies while also providing relevant theories and definitions from other disciplines, including literary studies, cultural studies and theory and educational studies.

The foundation of my inquiry was based on previous evidence showing that the reading of literature increases empathy. Based on this, I wanted to investigate the role of reading devices by not only comparing print with screen, but also different screen interfaces, and also comparing the experience of reading with that of listening to audiobooks. To investigate the role of the different reading media in readers' empathy in depth, I also decided to examine their effects on absorption and comprehension. Meanwhile, a new question arose: does it matter if the story is factual or fictional? Most studies I had found were talking about the power of fiction to increase empathy, but what about non-fiction? What difference would it make if the protagonist were real or fictitious?

This was the background and goals behind this thesis. What I learnt in the research was not quite as I expected, however. The findings of the empirical studies that I conducted (reported in Chapters 2, 3 and 4) brought many unexpected results that were at odds with previous theories and empirical findings and indeed my own expectations. These perplexities led me not only to revisit my own understandings and expectations, but to revisit the literature too. As a result, I came to broaden my perspective and find explanations from different disciplines and points of view. This can be seen in Sections 2.7, 3.6, 4.7 and Chapter 5. In detail, this effort opened up a discussion about the limitations of the quantitative approach followed in the studies of this thesis. Although such an approach was necessary to measure broad phenomena such as empathy, absorption, and comprehension, it came with a price: these phenomena had to be narrowly defined in order for them to be measurable, while other disciplines, such as cultural studies, had a variety of definitions and explanations to offer. The last chapter of this thesis



discusses this issue and brings new questions to the surface which are beyond the scope of this thesis. For instance, is empathy that important? Should we really worry about digital reading devices?

Apart from generating questions, however, this research also provided me with many answers as well: four different reading devices were compared, and their effects brought a new understanding of readers' affective and cognitive responses to literature, while the comparison between fiction and non-fiction reading also offered new perspectives. This in turn made it clear that the relationships between readers' empathy, absorption and comprehension should lead to the crossing of disciplinary borders and open discussions about the interdisciplinarity of the study of reading. In short, my research has taught me many things about reading, both fictional and factual reading, but taught me as well that research naturally leads to more questions, new methods, and yet more insights.

# 1 First Chapter: Literature review

## 1.1 Introduction

This literature review will provide, first, an in-depth examination of the term empathy and will aim to discern it from other related phenomena, such as sympathy and theory of mind. It will then explore the effects of literary reading on empathy based on psychological, evolutionary, and literary studies, highlighting the role of fictionality and literariness. Relevant empirical evidence from previous studies will be presented. The majority of the findings reviewed are the result of psychological empirical studies. However, it is important to note that different approaches have also been used to address similar questions. For example, phenomenology has given different definitions of empathy (see Zahavi, 2017, as an example) and phenomenological research has provided insights into the reading experience from the point of view of the participants, highlighting the plasticity of the experience (Braun & Cupchik, 2001).

Two relevant issues, namely comprehension and absorption, will also be explored. Regarding comprehension, this review will focus on the different levels of narrative comprehension, the limitations relevant research has faced, the role of fictionality in reading comprehension, and the relationship between comprehension and empathy. As for absorption, an investigation of the different terms used for the experience of absorption will be presented and the effects of fictionality on absorption as well as the relationship between absorption and readers' empathy will be emphasised.

This literature review will then focus on the role of reading devices in readers' empathy, absorption, and comprehension. It will address the differences that screen interfaces evoke in the reading experience compared to print. It will present theories based on the embodied cognition paradigm and will then explore the role of the type of screen (e-ink technology versus LCD light). The evidence from relevant empirical studies will be reviewed. Lastly, this literature review will address the emergence of the audiobook, the different affordances, and the different reading experiences they provide to readers.

This literature review is mainly based on psychological studies and explores relevant findings from empirical studies. Some insights are also provided from different disciplines, namely sociological, evolutionary, educational, neuroscientific, and literary studies. Apart from empirical studies, however, qualitative approaches have also provided some insights on the above issues and are presented only limitedly in this literature review. In particular, phenomenological approaches have addressed the experience of empathy and the effects of fiction reading, highlighting the subjective experience of reading (Braun & Cupchik, 2001) and

stressing the role of the author in readers' engagement (Heap, 1977; Poulet, 1969). Finally, this literature review (as well as the empirical studies conducted in the following chapters) will focus only on typical reading, while atypical readers e.g., people with dyslexia or neurodivergent readers may have different reactions to literary texts and reading devices.

## 1.2 Empathy: origins and definitions

Empathy has become a popular word in our everyday lives. More and more posters, advertisements, cartoons, public speeches, and even businesses are filling the space of popular culture, urging people to become more empathic in order to succeed in their personal relationships, fight injustice, and, in general, build a better world. A striking example is the wine company named "Empathy" that is advertised with the slogan "Empathy for the farmer. Empathy for you"<sup>2</sup>.

Meanwhile, academics have also turned their focus to this term. Over the last two decades, many papers have been published investigating the origins of empathy from a philosophical (e.g., de Bruin et al., 2013; Nussbaum, 2010), psychological (e.g., Stueber, 2012), evolutionary (e.g., de Waal, 2008), and neuroscientific (e.g., Shamay-Tsoory, 2011) point of view. This multidisciplinary focus on empathy resulted in various theories, definitions, and categorisations. For instance, Cuff et al. (2016) reviewed the relevant literature and found forty-three different definitions of the term. At the same time, different terms and theories are found to be very closely related to empathy, leading to an even more complicated theory of empathy, with some researchers considering empathy an all-inclusive notion, while others making clear distinctions between empathy and other terms (Cuff et al., 2016). As Burke et al. (2016) note in their review, this situation introduced not only a variety of definitions, but also different conceptualisations, paradigms, methodologies, and measures and, as a result, "any attempt to establish common research frameworks" seems challenging (p. 11).

Nonetheless, the term has been present since 1909, when psychologist Edward Titchener introduced it as a translation of the German word *Einfühlung* that means "feeling into" (Burke et al., 2016; Spreng et al., 2009; Wispé, 1986; 1987), while etymologically the word empathy derives from the Greek word *empathia*, a combination of the prefix *em-* which means into and *pathos* that means feeling (Jamison, 2014).

In view of the above, the pursuit of a specific definition has been complicated. For this reason, I favoured a simple yet overarching definition, describing empathy as the capacity to "understand what others are thinking or feeling" and "emotionally resonate with other people's feelings"

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<sup>2</sup> <https://empathywines.com/>Date of last retrieval: 6/7/2020.

(Pino & Mazza, 2016, p. 1). However, to better describe this capacity, I will provide the characteristics of empathy and its discrepancies from other terms in the following paragraphs.

First, it is clear from this definition that empathy encompasses both a cognitive and an affective component (Spinella, 2005). The cognitive component refers to the ability to mentally represent other people's mental processes, thoughts, and feelings and is described as cognitive empathy. The affective component is the actual emotional reaction to other's emotions and, in particular, the ability to share the same feeling with the other, or as Reniers et al. put it, "the ability to vicariously experience the emotional experience of others" (2011, p. 85).

Affective empathy has also been described as emotional contagion and considered "low-level" empathy (Langkau, 2020). The reason behind this is that emotional contagion refers mostly to a pre-reflective mechanism (Hatfield et al., 2009), a primitive phenomenon that leads to an automatic copy of others' emotions and the synchronization of that emotional expression (Wallentin et al., 2013). A well-known example of emotional contagion is the phenomenon in which a newborn cries and induces other newborns in the room to start crying as well (de Waal, 2008; Hoffman, 1975). However, others distinguish emotional contagion from affective empathy, arguing that affective empathy occurs consciously, while emotional contagion occurs without the subject's control and intention (Bernhardt & Singer, 2012). Furthermore, according to Clark et al. (2018), emotional contagion is related to behavioural mirroring or else, motor empathy, which is the copy and synchronisation of bodily movements with another individual, and thus, it explains better the process of mimicking. Lastly, Ickes (2003) used the term "transpathy" for the experience of emotional contagion to distinguish it from other relevant experiences such as sympathy and empathy (see also Cuff et al., 2016).

In terms of this debate, I will follow the point of view of de Waal (2008), which proposes that emotional contagion is the lowest level of empathic reaction, something that happens without the subject's awareness, and thus it is not equivalent to affective empathy. Nevertheless, emotional contagion is considered the most elementary type of empathy, although in some cases emotional contagion may proceed at a later point in the empathic process. As Hodges and Biswas-Diener (2007) note, emotional contagion is the most primitive hint of empathy, but people are capable of much deeper, conscious, and complicated forms of empathy. To move from this primitive form of empathy, a conscious understanding of the feelings of others is required. As de Waal (2008) illustrates, this is the second level of an empathic reaction and requires the consolidation of emotional contagion, the assessment of the other's emotions, and the conscious effort to understand them. Jamison (2014) expresses this consolidation in a

figurative way when she writes that “empathy isn’t just something that happens to us—a meteor shower of synapses firing across the brain—it’s also a choice we make: to pay attention, to extend ourselves” (p. 23). In short, to progress to a higher, more complicated level of empathy, people need cognition as illuminated by the incorporation of cognitive components into the definition of empathy. The role of cognitive empathy is to support an individual to understand someone else by taking their point of view, a mechanism called perspective-taking, and relies on the ability to imagine what the other person feels and to define their emotions (de Waal, 2008).

However, in turn, perspective-taking is not enough to experience empathy, as the existence of affective empathy is essential. The path to empathy is not always the same. In some cases, affective empathy comes first, and then the cognitive component is added through appraisals. The process, though, can also begin with understanding another’s situation, which can bring to the subject the representation of the other’s emotions, which in turn can spark the same emotion in the subject as well and hence the experience affective empathy (Dadds et al., 2009; McCreary & Marchant, 2017). From another point of view, a combination of these two routes can occur. For instance, as Cuff et al. (2016) argued, even if affective empathy is a pre-reflective response, the cognitive component of empathy can influence the affective component and thus change the affective responses. They cited Eisenberg and Strayer (1987) to argue that the affective part is the content of empathy, while the cognitive part is the tool to shape the affective responses, showing this way that the interaction of the cognitive and affective processes is crucial for the experience of empathy.

Interestingly, empathy in lay terms is portrayed as a positive phenomenon, something people need to develop and express. In reality, for empathy to create positive connections between people, the emotional aspect of it, or else affective empathy, is needed. Otherwise, perspective-taking on its own can be used for torturing rather than helping (Deacon, 1997; de Waal, 2005; de Waal, 2008). To explain this negative aspect of empathy, Breithaupt (2012) coined the term negative empathy, explaining that the ability to understand someone else’s perspective without engaging emotionally and feeling with them is what makes opponents understand and therefore weaken each other. The description of cognitive empathy as “cold empathy”, distanced, and analytical in comparison to the warm, affective empathy (Breithaupt, 2012) accurately portrays these two facets of empathy and their interconnection.

Lastly, some theorists and psychologists refer to an additional level of empathy, namely behavioural empathy, which refers to the actions that are motivated by affective and cognitive

empathy (e.g., Irving & Dickson, 2004). I contend, however, that what is called behavioural empathy is in truth the manifestation of empathy or else the behaviours evoked by one's feelings of empathy towards someone else. One of these manifestations is, for example, what de Waal (1996) calls targeted helping, that is, the support provided to the receiver of empathic feelings. Empathy allows one to specify what kind of help the target needs, after understanding and feeling with them (de Waal, 1996). In addition, the subjects can imagine how it is to be, for example, discriminated and thus get into the shoes of victims of racism and discrimination. As research has shown, empathy can reduce racism and discrimination (e.g., Dovidio et al., 2004; Shapiro & Neuberg, 2008). In general, it has been shown that empathy increases prosocial behaviour, allows people to have a healthy social life, inhibits isolation and suffering and supports people's coordination towards a common objective (de Waal, 2008; Pino & Mazza, 2016; Singer & Frith, 2005).

In fact, the behavioural outcomes of empathy can be so strong and overarching that, as Breithaupt (2012) notes, empathy can become overwhelming and for this reason people have found some mechanisms to control their empathic tendencies and manifestations. He explains that there are some drawbacks to feeling empathy, such as extra cognitive effort and loss of one's perspective. For this reason, people have found ways to "block" empathic feelings, which require a conscious decision to not engage emotionally with others. Otherwise, he states, "we would live in a world of constant loss of perspective" (p. 85). To bypass these blocking mechanisms, he notes, one needs to follow additional mental procedures to sidestep the blocking and have empathic experiences, such as remembering relevant past experiences and consciously taking the decision to empathise with the other person (Breithaupt, 2012; Keen, 2007).

Following the aforementioned variety of definitions and levels of empathy, it is not surprising that empathy has been confounded with other related phenomena, namely that of theory of mind and sympathy. First, cognitive empathy is very closely related to theory of mind (ToM). As Reniers et al. (2011) point out, cognitive empathy is the accurate understanding of someone else's emotions, while theory of mind is generally "the ability to attribute mental states to others" (Völlm et al., 2006, p. 90). In other words, theory of mind is the ability to acknowledge that others have feelings and thoughts that differ from their own's, while cognitive empathy is the correct identification of these feelings and thoughts (Girolamo et al., 2019). Therefore, cognitive empathy can depend on an individual's skills that enable theory of mind, and thus the two phenomena seem to depend on the same mechanisms. In particular, two prevalent theories explain how ToM and, in turn, perspective-taking occur.

On the one hand, it is Theory Theory, the idea that people gather information from a very young age and create a theory about how the world works to make sense of others' behaviours, emotions, and actions. In short, people develop a "folk psychology" that helps them interpret and navigate their environment (Ratcliffe, 2006). In this way, people understand the feelings of others by creating analogies between their experiences and the situations of others (Burke et al., 2016). On the other hand, it is Simulation Theory that suggests that people understand others by simulating their state of mind, imagining how it would be if one were in someone else's position, or else by putting themselves "into their shoes" (Burke et al., 2016; de Bruin et al., 2013). Based on this argument, Simulation Theory has been widely used to explain the phenomenon of empathy. In particular, affective empathy occurs through the simulation of others' emotions, which involves the activation of a neural representation similar to the one of the person they empathise with (Burke et al., 2016). New theorists put emphasis on the role of the body as well, suggesting an embodied cognition paradigm, which claims that people experience and understand the world and others through bodily feedback and interactions (for a review, see Mangen & van der Weel, 2016). Nevertheless, despite these seemingly opposite theories, theorists started to suggest a hybrid model during the last decade, where the creation of a theory about how the world works and simulation mechanisms both have a role in understanding others and, therefore, achieving cognitive empathy, together with feedback received from embodied cognition (de Bruin et al., 2013).

Empathy has also been confounded with sympathy. Sympathy is an emotional reaction different from empathy, however, there are cases where it has been treated as equivalent to or as a component of empathy. Davis (1983), for instance, gave one of the most prevalent definitions of empathy, where he claimed that empathy includes sympathy, concern, and comfort for unfortunate others. Furthermore, Spreng et al. (2009) defined affective empathy as an emotional reaction to others' emotions, giving as an example the feeling of compassion and thus treating empathy as the same as sympathy as well. Notably, they used this definition to create the Toronto Empathy Questionnaire that resulted in a single-factor representation of empathy that contains 16 questions of which 13 measure sensitivity, sympathy, altruism, and tendency for prosocial help. Only two items ask if an individual can feel the same emotions with someone else (affective empathy), and only one is dealing with the comprehension of others' emotions (cognitive empathy).

However, definitions and measurements from this point of view should not treat sympathy as equivalent to empathy or as an aspect of it. In this view, affective empathy is the ability to feel what the other person feels, to synchronise and share the same feelings with an individual or

else to “feel with another”. Sympathy, in contrast, is about “feeling for the other” through understanding, concern, and compassion (Langkau, 2020). This difference has also been reported in neurological studies, showing that these two emotional responses are delivered by distinct neurological processes (Cuff et al., 2016; Decety & Michalska, 2010). The only correlation between the two phenomena is that sympathy can be generated after experiencing empathy toward another as an extra emotional response (Clark et al., 2018; Reniers et al., 2011). Lastly, empirical evidence suggested that sympathy can be a mediator for an empathiser to demonstrate a behavioural outcome (Cuff et al., 2016; Lishner et al., 2011).

In conclusion, from a psychological point of view, empathy has been a highly debated phenomenon, both in terms of its nature, the processes that enable it, and its relationships with other phenomena. Although I particularise the definition, levels, and processes of empathy with scrutiny, its relationship with sympathy and behavioural outcomes such as altruism is part of everyday narratives while other disciplines, such as cultural studies, provide different definitions and examinations that are, however, out of the scope of the present thesis. Therefore, I recognise that the positive outcomes advertised for empathy may not derive from empathy on its own, as defined by psychological research and theory, but by empathy as defined by the popular use of the term that has connotations of sympathy and compassion. In fact, following Pinker’s work (2011), the rise in the use of the term coincided with and I believe was caused by this mix of the popular notions of sympathy, compassion, and empathy.

### 1.3 Empathy and literary reading

#### 1.3.1 The connection between empathy and reading

The prevalence of this popular, as I call it, interpretation of the term empathy has been followed by the view that reading has the power to expand the empathic abilities of readers, and thus promote prosocial actions.

Beyond psychological perspectives, one of the main advocates of this idea, Martha Nussbaum stated that “citizens cannot relate well to the complex world around them by factual knowledge and logic alone” (2010, p. 95). The additional ability people have that supports the aforementioned two in human interactions and the creation of functional societies is, as she calls it, narrative imagination, which she defines as the ability to get into someone else’s position, an ability closely related to empathy. She then explains that the first expression of one’s imaginative ability starts at a very early age in the form of play, and she gives the example of nursery rhymes that motivate children to get in someone else’s shoes, demonstrating them that this is what they need to do with other real people as well. Following Winnicott’s ideas



(1971), she argues that people might stop playing when they become adults, but it is the arts that then create the opportunity to imagine being in someone else's shoes and, therefore, develop empathy. She suggests that human beings do not naturally realise and understand that others have deep thoughts and feelings, but the other way around. As she writes, "it is all too easy to see another person as just a body" (2010, p. 102). In adult life, the arts carry forward the opportunity to imagine someone else's point of view, to be exposed to deep thoughts and emotions of others: "It is an achievement to see a soul in that body, and this achievement is supported by poetry and the arts, which ask us to wonder about the inner world of that shape we see – and, too, to wonder about ourselves and our own depths" (2010, p. 102). Narrowing down the focus from arts to literary reading, Martha Nussbaum suggests that reading, and especially reading of novels, drives readers to adopt the viewpoint of the literary character, to see the world through the eyes of the character, and to understand their motives and emotions. This, she concludes, enhances empathy, and hence makes people better citizens (Nussbaum, 1990).

Following Nussbaum's ideas, Mar and Oatley (2008) proposed that literary narratives allow readers to simulate how to socially interact with people. They argued that readers experience and understand a narrative by bringing their own memories in order to simulate how the characters of the story must feel. As they note, narratives expose readers to the lives of others and engage them emotionally with the characters included in the stories, providing them with an opportunity to experience empathic feelings and, in turn, practise their ability to not only empathise with literary characters, but also with other people in real life.

However, the emergence of these ideas is related not only to the "popularisation" of the term empathy, but also to the crisis in the humanities. Many started questioning "what the return of investment was in the humanities" in the 1980s, and what society can gain from literature (Menand, 2010, p. 62). As a result, a movement of protectiveness was raised, and a debate emerged. On the one hand, some argued that art is pursued, created, and experienced just as an end on its own. On the other hand, others believed that there should be a reason why people create and enjoy art and, therefore, there should be beneficial outcomes from artistic engagements (Menand, 2010; Nussbaum, 2010; Pinker, 2011).

Tooby and Cosmides (2001) investigated this deliberation from the perspective of evolutionary theory. They pointed out that the enjoyment people receive from entering imaginative worlds through literature seems like an anomaly from an evolutionary point of view. Natural selection is, they note, "relentlessly utilitarian" (p. 10) and so, the neurocognitive systems that let people

experience literature, enter imaginative worlds, and take the perspective of their protagonists should either be instrumental to the survival of the species or be “an accidental and functionless byproduct—a susceptibility—of adaptations that evolved to serve functions that have nothing to do with the arts per se”, something similar to “catching a disease or becoming addicted to drugs” (p. 10).

In fact, the idea that reading literature is like catching a disease was prevalent some decades ago. When conducting a short search in old newspapers through the website [yesterday-prints.com](http://yesterday-prints.com), it was found that most of the newspaper excerpts between the end of the 1800s and the beginning of the 1900s that included the word “reading” portrayed reading as detrimental. For example, Walnut Valley Times (Texas) wrote in an article in 1881: “Not only is novel-reading an absolute waste of time but it is weakening to the mind. [...] It not only inculcates bad principles and gives false ideas of life, but unfits the mind for the reception of more solid mental fabulum. Parents and teachers should discourage the reading of novels at every opportunity”. Among other examples, newspapers’ headlines noted at the beginning of the twentieth century: “Effect of novel reading like that of drugs”<sup>3</sup>, “mind deranged by reading novels”<sup>4</sup>, and, in general, advised people to stay away from the experience of reading about imaginative worlds.

However, Tooby and Cosmides (2001) concluded that the tendency to engage with literature and artistic endeavours must have somehow supported human survival and reproduction. Drawing from Pinker’s work (1994; 1997), they posit that the arts and, particularly, literature take advantage of the way the mind is designed to operate and expand human adaptive skills, such as comprehending a language or creating healthy social interactions (p. 11). In turn, at some point in the evolutionary history of humans, people developed a motivational system that makes the arts enjoyable and rewarding. In this way, people had more opportunities to be exposed to the arts and to take advantage of the adaptations they could offer, which were then implemented in their social life. In more detail, they describe engagement with the arts as aesthetic motivations that give the appropriate and essential directions to organise adaptations in humans’ minds and then use them as a guide in real-life situations. Referring to fiction, they point out that when people use these adaptations, they can use not only real information, but also information that could have been true or possible, “a new and vastly enlarged universe” (p.

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<sup>3</sup> The Boston Daily Globe, Massachusetts, May 23, 1915, as found at [yesterdays-print.com](http://yesterdays-print.com). Date of last retrieval: 23/9/2020.

<sup>4</sup> The Oregon Daily Journal, Portland, Oregon, August 21, 1903, as found at [yesterdays-print.com](http://yesterdays-print.com). Date of last retrieval: 23/9/2020.

19) that allows identification with a variety of new behaviours that give an advantage in human survival.

Although scholars of philosophy, anthropology, and psychology such as Martha Nussbaum, Leda Cosmides and John Tobby, among others, advocated the benefits of literary reading and, in particular, fiction on empathy, civilisation and prosocial action, others, among them literary scholars as well, showed scepticism toward this utilitarian explanation of literature. As Pinker (2011) notes, “they see the idea too middlebrow, too therapeutic, too kitsch, too sentimental, too Oprah” (p. 711). For instance, Currie (2016) concluded that literature can, in fact, reduce our empathic abilities. He argues that literature can squander people’s empathic capacities by creating emotional engagement with the protagonists of stories, leaving them with reduced empathy for people in real life. Furthermore, he suggests that engagement with fictional characters breaks the connection between empathy and helping behaviour, because readers empathise with fictional characters without having the possibility of providing help, and this becomes a tendency that they then follow in their life as well. Currie (2016) also addresses the issue of “self-licensing” (p. 59), a psychological theory that posits that people’s moral sense is driven by one’s perception of being a moral and just person. In particular, previous behaviours or actions give a boost to one’s ego, which gives the feeling of being licensed to then behave in a questionable way. Currie gives the example of a study by Chiou et al. (2011), where smokers who took a vitamin supplement ended up smoking more than the control group, suggesting that the same can happen with the readers: if readers empathise with fictional characters, they might feel licensed to not be that empathic towards real people. Lastly, he posits that stories include richer representations of thoughts and emotions of protagonists in comparison to the access people have to the cognitive and affective processes of real people. Therefore, the empathy one might feel for a fictional character might be stronger and more accurate than one’s empathy for people in real life.

Among literary scholars, Suzanne Keen’s work is one of the most prominent investigations on the effects of reading and in particular of novels on empathy. In her book, “Empathy and the Novel” (2007), she expresses her scepticism towards the idea that literary reading can increase people’s empathic abilities. She, however, stresses the fact that empathy plays a fundamental role in the experience of leisure reading. As she notes, readers tend to empathise with fictional characters, and this is one of the reasons why people enjoy reading. These empathic reactions toward fictional characters are described as narrative empathy, but this does not always bleed over into real situations. As she notes, many factors can play a role in readers’ empathic reactions, such as their dispositions, their gender, the commonalities they have with the other

person, and their personal experiences, among others. Furthermore, she, among others (e.g., Koopman, 2017), notes that literature can also be disturbing; many stories are focusing on negative living experiences that can bring personal distress to the readers and might even lead to a diminished motivation to read. As noted above, empathy can be overwhelming and, for this reason, people developed blocking mechanisms to regulate their emotional engagement with others (Breithaupt, 2012). Therefore, it might not be the reading of a story itself that is disturbing, but the empathic feelings that readers develop when reading. Therefore, the simplest mechanism to block the overwhelming and occasionally disturbing empathic feelings is to stop reading. This, I assume, might also affect the choices of books a reader might make. If a person has the tendency to become hyper-empathic, then some stories might be overwhelming, and thus, their blocking mechanism is to choose to read stories that might not ignite a high emotional engagement.

Lastly, Langkau's recent work proposed a middle of the road position in the debate on the effects of reading on empathy. She argues that fiction reading indeed improves our empathic abilities, but she suggests a different mechanism that brings about this result (Langkau, 2020). Langkau refers to Oatley's position that fiction "might be the mind's flight simulator" (Langkau, 2020, p. 320; Oatley, 2016, p. 619) that illustrates the role of fiction as an appropriate environment to simulate empathic reactions before going out into the real world and empathise with real people. However, she explains that this is not really the case because, following Currie's position (2016), fictional worlds are richer in descriptions of the internal worlds of the protagonists and thus give more information for the reader to empathise accurately compared to the information provided in everyday life settings. Nonetheless, Langkau (2020) attributes some role to fiction reading in the enhancement of empathy. In particular, she suggests that reading fiction does not automatically improve empathic skills, but it gives the motivation to become more empathic in real life. She explains that reading makes people empathise with the story's protagonists and appreciate this engagement and, therefore, be more motivated to put the effort and empathise with real people as well.

Interestingly, medical studies have also investigated the effects of reading on empathy. The field of bibliotherapy has emerged in recent years to address the therapeutic effects of reading on mental and physical health issues (Brewster, 2008). Patients are prescribed books, either self-help or fiction and poetry that help them deal with a variety of situations, such as dementia, homelessness, abuse, depression, as well as general well-being. In fact, the results of these interventions boosted national initiatives and created a variety of programmes based on hospitals and libraries (see McNicol & Brewster, 2018, for a review). In the case of the

prescription of fiction books, they can provide escapism, and hence, take someone's mind off the problem they face. They can also provide a feeling that the readers are not alone, that others—even if fictional characters—are facing problems and find a way to deal with them. Most importantly, reading can give “a sense of engagement with literature that contributes to their wider mental health and wellbeing and does not just help them to deal with particular issues or patterns of behaviour” (Brewster, 2008, p. 116). The research on bibliotherapy has shown that there is indeed something beneficial in reading and that empathy might be a mechanism that allows people to feel with fictional characters and use this skill to empathise with real people and understand themselves.

In summary, there seems to be a connection between reading and empathy. First, feeling empathy towards the protagonists of a story is part of the experience of reading, considering that perspective-taking is fundamental for the readers to understand the motives, intentions, feelings, and actions of the protagonists and thus understand the story (Mano et al., 2009). Furthermore, empathising with the characters is one of the reasons why leisure reading is enjoyable (Keen, 2007), it may help train people's empathic skills (Mar & Oatley, 2008) and lastly, play a role in human evolution, personal relationships, and societal organisation (Tooby & Cosmides, 2001). This literature review will predominantly focus on the argumentation that reading can train people's empathic skills and will report relevant theories and evidence provided by experimental psychological studies.

### 1.3.2 The role of fiction in readers' empathy

In addition to literary reading in general, fiction is considered to have a special role in the connection between reading and empathy. Going back to the aforementioned work of Nussbaum and her statement that “citizens cannot relate well to the complex world around them by factual knowledge and logic alone” (2010, p. 95), it is evident that the focus of her research on the effects of reading on empathy has been mostly directed toward literary fiction. Whether fiction takes the form of nursery rhymes in childhood or an artistic expression during adulthood, it is considered to be that type of narrative that enhances people's empathy. Based on Nussbaum (2010), it is fiction that teaches narrative imagination, or else the ability to imagine something that does not exist with the help of a narrative and to train readers to get into others' shoes by learning to feel what fictional characters feel. Tooby and Cosmides's (2001) utilitarian function of reading is also focused on the consumption of fiction. They put emphasis on investigating the role of fiction in human evolution because this type of writing is not really giving any useful information, any practical guide to survive in the wild. Thus, they argued that fiction is the genre that provides not necessarily what is true, but what is possible, opening people to a

large reservoir of experiences that would not otherwise have but which can help them operate in a society.

These points of view raise questions about non-fiction works, and whether people cannot empathise the same with factual protagonists, and thus cannot use the factual reading experience to practice their empathic skills. In order, however, to answer these questions it is crucial to investigate more in depth what fiction and non-fiction really are in terms of written work. Fiction has been given semantic, syntactic, pragmatic and narratological definitions (for a review, see Gjerlevsen, 2016). There is, for instance, the definition of fiction as non-referential text as opposed to factual texts, or the idea that fiction proper is only when the texts are written in third person (Hamburger, 1993). However, these definitions do not describe only fiction, as there are fiction works written in the first person or factual, referential works that are read as fiction. Another approach was to find specific grammatical features unique in fiction, such as sentences of pure narration or sentences of represented speech (Banfield, 1982). Poststructuralists, however, criticised the distinction between fictional and factual narrative, concluding that every narrative representation is a human construction and hence all narratives can be considered fictional. Although this position might sound radical, some fiction and non-fiction works are indeed very similar when it comes to style, to their narratological unfolding of the events, and to the use of grammar. However, what can still discern them is the issue of fictionality per se, the fact that the fiction text refers to an imaginative entity, while the factual text refers to real people that existed or are still existing in the real world, even if their lives are portrayed through a human construction, the narrative. Nonetheless, this basic distinction is rarely that evident in research. For instance, Oatley (2012) gave a definition of fiction based on Bruner's definition of narrative (1986), describing it as a "narrative about human (or human-like) agents' intentions in their interactions with others, and how these intentions meet vicissitudes", adding that fiction is a "carefully constructed narrative for the purpose of engaging readers and audiences" (pp. 425-426), providing a definition of fiction that completely omits the main characteristic of fiction, its fictionality, and puts more emphasis on the narrative form mostly used by fiction works.

Furthermore, as Ronen (1994) veraciously argues, literary theory treats fictionality as a unique characteristic of literary texts, and hence tends to erroneously associate fictionality with literariness. In other words, a literary text is not bound to be fiction but it can be non-fiction too. Additionally, fictional texts are narratives (as defined by Bruner, 1986, see above), but both fiction and non-fiction stories can be narratives. For the above reasons, when this thesis refers to the term "fiction" it refers to narratives as defined above, with literary features that are based

on fictional story worlds and / or fictional characters as opposed to non-fiction that is about the real world and real people. It is also crucial to note that it is not only fiction that has the “purpose of engaging readers”, but engagement can accompany any literary reading experience that takes place for the reader’s pleasure (Nell, 1988), whether this is fiction or not.

Although scholars such as Nussbaum, Tooby and Cosmides suggested that the fictionality of literary works provides a fertile environment for readers’ empathy to develop, many have questioned how it is possible for people to feel empathy towards non-existing characters, what is commonly called “the fictionality problem” (see Hogan, 2003, for a review). The fictionality problem has been tackled by theorists since ancient times. First, a central theory of classical Indian aesthetics is that of “dhvani” translated as “suggestiveness”, the associations a reader creates between the suggestions of a work and the reality (Hogan, 2003). This idea was further developed by the Sanskrit philosopher Abhinavagupta, who argued that “... all our experiences leave traces in our memory. These traces bear with them the emotions we felt at the time. The mind accumulates these traces and they contextualise each new experience” (Hogan, 2003, p. 156). In other words, the source of the emotions we feel when we witness a new experience — even if this is a reading experience and our feelings are directed towards fictional characters — is found in a previous personal experience we had, and they are just reactivated by the story we read. This theory has also been supported by contemporary researchers, providing evidence that personal memories are fundamental in evoking emotions during reading (Seilman & Larsen, 1989) and people’s emotions when reading a story are closely related to empathy and personal memories (Oatley, 1996; 1998).

Other arguments are derived from Aristotle’s work “Poetics”, where he describes the concept of mimesis as the process that artists use in order to simulate or mimic the world with the goal of interpreting it. Therefore, the poet “speak not of events which have occurred, but of the kind of events which could occur, and are possible by the standards of probability and necessity” (Aristotle in Halliwell, 1987, p. 40). Furthermore, Aristotle considered mimesis to be superior to history, and thus factual narrative since fiction expresses the possible and the general, while history only expresses the specific that has already happened. As Mar and Oatley (2008) explain, the concept of mimesis is linked with narrative fiction in two ways: first, readers experience thoughts and emotions consistent with the events described in the narrative, and secondly, narratives portray the human social world in abstraction. This process might bring about what Jones and Nisbett (1971) called the actor-observer effect, which posits that fiction allows us to experience a story not only just as outside observers, but as actors of the story world. This theory highlights the fact that fiction narratives not only present the emotions and beliefs of other

people, but let readers experience them on their own. Thus, Mar and Oatley (2008) concluded that reading fiction makes readers feel more empathic towards the characters of the fictional world. Furthermore, they argue that narrative fiction not only brings feelings of empathy while reading but also, through the simulation of the real world, it trains people to show understanding towards other real people and as a result, to gain a better understanding of themselves.

When investigating the effects of fiction in comparison to non-fiction, researchers had suggested that readers treat fiction as if it is a factual text (Prentice & Gerrig, 1999), and people have the penchant for allowing any kind of information, whether it is factual or not, “to gain entry into their store of knowledge and to influence their beliefs about the world” (Prentice & Gerrig, 1999, p. 530). Mar and Oatley (2008) gave as an example romance novels that seem to bring unrealistic expectations to the readers about romantic relationships, while Hogan (2003) gave an example of fiction works that can influence readers’ judgments about historical events, and Marsh and Fazio (2006) gave empirical evidence that people adopt false information from stories although they know it is fiction.

Furthermore, fiction can cause an absolute sleeping effect (Hovland et al., 1949), a strong long-term persuasion effect that allows fiction to be as persuasive as non-fiction, as the persuasion power of fiction narratives can increase over time. This happens because readers tend to forget the source of the text, but the memory of the content of the text remains strong due to the strong emotions developed during the reading experience. The exemplification theory (Zillmann, 2002) and the theory of storytelling effects on memory (Schank & Abelson, 1995) are in line with this approach. The exemplification theory posits that human memory tends to better remember vivid, example-based descriptions rather than dry information, so this supports the claim that readers may remember for longer time the story of a narrative rather than the source of the text. As for the theory of storytelling effects on memory, it suggests that people tend to remember information by forming them into stories, so this conforms to the idea that fiction narratives are remembered for a longer time (Appel & Richter, 2007).

However, Hartung et al. (2017) suggested that it might not be the fictionality of a literary work that influences the reading experience but the narrativity of a text. This can be the case since, as noted earlier, non-fiction texts can be narratives too. For instance, many non-fiction works, such as memoirs and essays, do not use dry information but elaborate descriptions and narrative style. In addition, simulation is not only a product of fiction, as we can have simulations of real



people and events. Also, readers may use their own experience to understand and feel for the protagonist of a story, regardless of whether this protagonist is a real or fictional person.

An important theory, though, that has been used to argue that fiction promotes empathy more than non-fiction is the theory of aesthetic distance (Cupchik, 2002; Scheff, 1979). The optimal aesthetic distance of fictional narratives is their distance from reality, which makes fictional narratives a safe space to feel without having to face the repercussions of one's thoughts and feelings in the real world. As Keen (2007, p. 4) states, "fictional worlds provide safe zones for readers feeling empathy without experiencing a resultant demand for real-world action. This freedom from obligation paradoxically opens up the channels for... empathy". In other words, when it comes to non-fiction, empathising with a real person might have real repercussions on one's life. It might drive the reader to take action or change their behaviour. When reading fiction, however, empathising with a fictional character is a more distant experience, as it is limited to feeling for that character without taking any kind of action in the real world. As a result, the reader can practice their empathic skills without having to face the impact of these empathic feelings in the real world and for this reason, fiction can be considered to promote empathy more than non-fiction.

Finally, research has shown that it might not be the fictionality of a story that influences the reading experience but the expectation of fictionality (Zwaan, 1994). If someone believes that a text is fiction, they treat it in a different way, adopting different reading mechanisms and goals. For instance, readers tend to focus more on the causal relationships when reading a text that is labelled as non-fiction, they filter the information they receive and focus on what they consider important information (Zwaan, 1994), while the expectation of fiction motivates a more subjective experience with less attention to detail and less scrutiny (Zwaan et al., 1995; van den Broek et al., 2001; Mar and Oatley, 2008). Additionally, the expectation of reading fiction brings more emotional engagement compared to the expectation of reading non-fiction (Mar & Oatley, 2008; Oatley, 1999). Whether a text is based on fictional or factual events does not play a role; it is the expectation of the fictionality that changes readers' goals and thus their engagement with the narrative (Appel & Richter, 2007; Green & Brock, 2002; Hartung et al., 2017). In support of this argument, Altmann et al. (2014) used functional magnetic resonance imaging (fMRI) to show that brain activation was different for people who read texts labelled as fiction compared to people who read texts labelled as non-fiction. Readers who were exposed to fiction-labelled stories had a longer reading time compared to readers exposed to non-fiction-labelled stories, which might mean that they also had more time to reflect and create bonds with the characters of the text. Also, fiction-labelled reading brought an activation of brain areas connected with

perspective-taking processes, and thus theory of mind and empathy, while the brain activity of readers that read non-fiction-labelled stories did not show activation of those brain areas.

Nonetheless, these arguments were based on research using as materials texts labelled as novels compared to texts labelled as newspaper articles (for a review, see Hartung et al., 2017). This brought an important implication: The reported results may not have been driven only by readers' expectations about the fictionality of the texts, but also by readers' expectations about the writing style, their goals, and the reading situation. Furthermore, newspapers are used to provide information, but other non-fiction works can be used for purely recreational reasons, for example memoirs and biographies. Taking this implication into account, Hartung et al. (2017) used a different manipulation, that is, they labelled the reading material used as short stories based on true or fictional events, which made no difference in reader's absorption, appreciation, perspective taking, as well as memory of the stories' events, showing that labelling a text as factual or fictional narrative does not necessarily cause a difference. Moreover, some studies showed that labelling a story as non-fiction or as fiction did not have any effect on absorption and belief change (Green & Brock, 2000; Hartung et al., 2017; Koopman, 2015), showing that the expectation of fictionality did not change the reading experience.

Put succinctly, the role of fictionality in readers' empathy may play a role, but research needs to focus more on fictionality per se and not that much on the differences in genre and narrative style, since these factors could interfere in the reading experience. Nonetheless, fictionality might provide opportunities for readers' empathy to be enhanced. Various theorists suggest the idea that readers can feel for and with characters even if they are fictional. This can happen through a simulation process and by provoking emotions from personal memories, while fictional story worlds can provide an optimal distance from the real world, creating a safe place for the simulation of the real world where the reader's empathy does not interfere with their reality.

### 1.3.3 The role of literariness in readers' empathy

Another debatable point regarding the effects of reading on empathy is the role of the literariness of the text. Can any text bring about emotional engagement and empathy, or are the literary "striking" features of literary texts that allow the reader to feel with the characters of the story and train their empathy? And how strong or how extended should these "striking" features be?

These features, which can generally determine the level of literariness of a text, can be examined from different theoretical perspectives. Sociologists, for instance, claim that the texts are

distinguished between literary and non-literary based on social conventions (Koopman, 2016a). These conventions, in turn, affect the reader's choice and the way they feel about themselves about the choice of reading they are making (Nell, 1988). Meanwhile, literary critics have long separated "high" from "low" literature, and in turn the readers to "highbrow" and "lowbrow", creating canons of what is and what is not literary (see Nell, 1988, for a review). The movement of New Criticism, however, promoted a formalist view, suggesting that literary and non-literary texts can be discerned based on specific definable linguistic features (Erich, 1969; Nell, 1988; Pratt, 1977). The New Readers school brought a different perspective, though; they put the focus on the readers and their reading expectations, proposing that these factors determine what is literary and what is not, rejecting any distinctions made based on textual features (Fish, 1980; Nell, 1988; Pratt, 1977). They reached the extreme point of view that "the reader's response is not to the meaning of the text, it is the meaning" (Fish, 1980, as cited in Nell, 1988, p. 42), and drew attention to the subjective experience of the reader. This led to literary relativism that demolished all the absolute views about what is and what is not literary.

The emergence of the empirical study of literature brought a more scrutinised examination of the experience of reading, trying to quantify the effects of different types of text on the reader, and exploring the above questions with the help of psychological and neuroscientific frameworks and methods. For instance, Jacobs (2015) suggested a neurocognitive poetics model based on theories of formalists, which put emphasis on textual features to determine the literariness of a text; his model is connected to neurocognitive and psychological empirical evidence. Regarding the formalists' theories, he used the concept of foregrounding (term coined by Mukařovský in 1932) as a stepping stone and its distinction from backgrounding. Foregrounding refers to the elements of a text that provide striking stylistic features, and they can be found at the sentence level, with phonetic, grammatical, and semantic deviations (Mukařovský, 1976) such as novel metaphors, ellipses, oxymorons and phonetic repetitions, but also at a "global" level (Koopman, 2016a) such as striking narrative techniques, for example flashbacks or combinations of different points of view (Koopman, 2016a; Miall & Kuiken, 1994; 2002; Short, 1996). These elements make a text original and can bring about defamiliarizing responses (Miall & Kuiken, 1994; 1999) through deautomatising the reading process. This process, known as the defamiliarization hypothesis (Mukařovský, 1976; Shklovsky, 1965), suggests that these unexpected features force readers to slow down, to take their time to interpret and reflect on the text and its stylistic features. The readers' interpretations may be unique to each reader as they are highly dependent on individual factors, such as previous experiences and personal memories, that are used to support the meaning-making process.

Furthermore, the extra time that is needed for the readers to re-familiarise themselves with the text provides the opportunity for the readers to develop aesthetic feelings (Kneepkens & Zwaan; 1994; Miall & Kuiken, 2002; Tan, 1996), feelings that are driven by the appreciation of the form and style of a text and not the story, making the readers reflect on the striking features. Kneepkens and Zwann (1994) argued that texts with many foregrounding elements, thus with higher literariness, drive readers away from the story and its characters, resulting in a lower emotional engagement with the protagonists of the story, and draw readers' attention to the beauty of the text (see also Koopman, 2016a).

In contrast, background elements denote those elements of a text that do not have that much of an aesthetic value but give information about the story by using everyday vocabulary and expressions, creating a feeling of familiarity in readers (Iser, 1978; Jacobs, 2015, p. 146). Background elements are considered to evoke narrative feelings<sup>5</sup> that are based on the simulation mechanism of literary reading and to evoke emotional engagement with the protagonists of a story. For this reason, Hogan (2018) also proposed the term "simulation emotions" which play a mimetic role (Miall & Kuiken, 2002), promoting feelings of sympathy and empathy by letting the reader become absorbed in the story, and arise when the reader is "caught up in a story" (Hogan, 2018, p. 98).

Jacobs (2015) based his research on the foreground- background hypothesis together with the connected theory of aesthetic and narrative feelings and provided empirical evidence based on neuroscience to show that foreground and background elements are processed by distinct brain networks. As he found, the right temporal pole of the brain is fundamental for foregrounding that brings about a slow reading pace and more aesthetic feelings, while background elements are mainly processed in the left hemisphere, facilitating faster and more automatic reading, followed by feelings of familiarity and narrative feelings.

Empathy is considered to be more related to narrative feelings rather than aesthetic feelings since narrative feelings are linked to the plot of the story, the story world, and its protagonists; the feeling of familiarity supported by the background elements provides an auspicious situation for readers to feel empathy with the protagonists. Additionally, the feeling of familiarity is facilitated by autobiographical emotions, the emotions readers develop based on their personal memories of experiences similar to the ones presented by the story (Braun & Cupchik, 2001; Jacobs, 2015). However, as Jacobs (2015) explains, all literary texts consist of both foregrounding

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<sup>5</sup> Narrative feelings have also been named "fiction emotions" by Kneepkens and Zwann (1994). This term is another example that shows that there has been an erroneous association of narrative with fiction, although a non-fiction text can be narrative and create narrative feelings as well.

and backgrounding, and, based on Miall and Kuiken (2002), the combination of these elements, and thus the combination of narrative and aesthetic feelings, can generate a third type of feelings, the self-modifying feelings. This type of feelings can emerge when the reader gets absorbed into the story world and feels empathy for the story's protagonist, and simultaneously experiences aesthetic feelings; in this way, readers reconstruct the narrative through the processes of defamiliarization and refamiliarization, which require a deeper reading experience, a slower reading pace that allows readers to reflect on themselves, to restructure their sense of self; these self-modifying feelings are considered the element that distinguishes literary texts from other genres. Based on this theory of self-modifying feelings, it might be argued that although narrative feelings promote empathy towards the protagonists of the story, the combination of narrative and aesthetic feelings may be needed for narrative empathy to evolve to empathy towards real people through the process of self-reflection and self-modification.

In conclusion, there are a variety of theories suggesting that different characteristics of a reading material may affect empathy. In particular, fictionality (i.e., the quality of a text when it refers to fictional people and/or events as opposed to non-fiction) and literariness (i.e., the quality of a text being literary as opposed to non-literary) may affect readers' empathy. The theory of optimal aesthetic distance (Cupchik, 2002; Scheff, 1979) has been used to suggest that fiction narratives can provide a "safe zone" (Keen, 2007) for readers to experience empathy and train their empathic abilities. Meanwhile, the theory of aesthetic and narrative feelings coupled with the foreground-background hypothesis (Jacobs, 2015) suggested that the combination of different elements of a text can bring about feelings that can promote the process of empathising with the protagonists of a story and create a deeper experience that can lead to self-modification.

#### **1.3.4 Empirical evidence on the relationship between reading and empathy**

Following the plethora of theories on the impact of reading on people's life, the empirical study of literature has flourished in the last decades, and a considerable number of studies have provided a variety of evidence on the effects of reading on empathy and related phenomena and on the role of fictionality and literariness. In this section, I will review the findings of these empirical studies that will help with the next chapter of this thesis.

Many empirical studies investigating the relationship between empathy and literary reading have been correlational, examining relationships between lifelong exposure to literature and empathy or other related phenomena. For instance, Mar et al. (2006) conducted a well-known study that showed that long-term exposure to fiction is correlated with higher empathic abilities as opposed to non-fiction exposure. In a subsequent study (Mar et al., 2009), individual

differences were controlled, and still a similar correlation was observed. However, these studies provide evidence of a correlation, not causation, and as a result, they are not adequate to support the claim that fiction reading increases empathy and other related phenomena since the correlation might be a result of more empathic people tending to read more fiction than non-fiction.

Other studies used an experimental design and mainly investigated short-term effects by providing participants with specific texts to read under experimental conditions and then measuring their levels of empathy with a variety of scales. The texts used were fictional short stories or excerpts from novels, and it was shown that people who read fiction performed better on tests of sociocognitive abilities, such as empathy, sympathy, prosocial behaviour, and theory of mind (Black & Barnes, 2015; Kidd et al., 2016; Pino & Mazza, 2016).

One of the much-cited studies of this type was conducted by Kidd and Castano (2013) and included five experiments, showing that participants who read literary fiction performed better on tests measuring theory of mind compared to participants who read non-fiction, pop-fiction, or nothing (control group). However, this study proved to be non-replicable (Panero et al., 2016; Samur et al., 2016) and its findings were found to have low evidential value (van Kuijk et al., 2018) calling into question the robustness of the effects and the reliability of its measures. Additionally, Bal and Veltkamp's study (2013) showed that reading fiction can increase empathy compared to reading non-fiction, as long as readers feel transported into the story world. Furthermore, they measured empathy again after one week and showed that even after a 7-day interval, empathy levels had not dropped, suggesting that the effects might not be short-lived. However, they proved that the feeling of transportation was crucial to these results since readers who reported low transportation scores had lower empathy scores compared to readers who experienced high transportation. These results are consistent with Johnson (2012), who also showed that readers who read a fiction story and were transported into it exhibited higher affective empathy compared to the readers that did not feel transported. Djikic et al. (2013) performed a similar manipulation, providing participants with either fiction or non-fiction stories, and measuring their empathy after reading, which showed an increase in their cognitive empathy.

However, both Djikic et al. (2013) and Bal and Veltkamp (2013)'s manipulations were problematic since they provided their participants with either a fictional short story or

newspaper articles<sup>6</sup> and essays on scientific, philosophical topics, or about hobbies (for example, George Bernard Shaw's "Killing for Sport" and Henri Bergson's "Why Do We Laugh?"). This choice of texts for the non-fiction condition might not provide clear results, since it might not be the factor of fictionality that brings about different responses but the factor of narrativity or the style of the text since the fiction stories consisted in narratives while the non-fiction texts were expository. Similarly, Black and Barnes (2015) used articles from the Smithsonian Magazine as non-fiction texts. One exception is provided by Pino and Mazza (2016) who used memoirs written in narrative form. In addition, Pino and Mazza (2016) measured empathy before and after reading to have a baseline level for comparison and found that fiction reading improved cognitive empathy but not affective empathy.

Furthermore, meta-analyses investigated the extent of the relationship between fiction reading and empathy. First, Mumper and Gerrig (2017) aggregated correlational studies investigating the effects of leisure reading on empathy and theory of mind and found that fiction reading is more correlated with theory of mind and empathy compared to non-fiction reading, but the magnitude of the effects was small, and they suggested that future research should focus more on causation rather than correlation, as these findings cannot be adequate to prove that fiction reading affects empathy. Dodell-Feder and Tamir (2018) also conducted a meta-analysis and included only studies with an experimental design, where participants were randomly assigned to different conditions and fiction reading was compared to non-fiction reading or no reading. The results showed that fiction reading has a small positive effect on social cognitive tests. However, out of the 14 studies included, the majority (12 out of 14) included non-narrative articles for the non-fiction condition, a choice which has problematic implications as explained above.

Regarding the effects of literariness specifically, Koopman (2016a) compared non-literary and literary texts; she manipulated a text in order to have three different levels of foregrounding and showed that people who read the version with high foregrounding had higher empathic understanding compared to the others, proving that literariness is an important factor for reading-induced empathy increase. In another study (Koopman, 2015), participants read an expository, a life narrative, or a literary narrative text with the same subject matter (depression and grief); readers of the life narrative showed stronger prosocial behaviour (donating)

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<sup>6</sup> The newspaper articles used by Bal and Veltkamp (2013) included personal experiences of people who experienced a riot and a disaster that were part of the current affairs. However, the fact that they were newspaper articles raises the question whether they were narratives and the knowledge of them being newspaper articles might have also played a role in the readers' responses.

compared to readers of the expository text, while no differences were found between the life narrative and the literary narrative on empathic understanding, and no genre effect on empathic understanding either. Furthermore, regarding the two narrative texts (life narrative and literary narrative), they were presented as either fiction or non-fiction; this manipulation, though, did not have any effect on prosocial behaviour and empathic understanding. Therefore, and based on these results, Koopman suggests that it could be the narrativity and not the fictionality of the text that affects prosocial behaviour.

#### 1.4 Comprehension: the case of the narrative

This part will focus on comprehension and specifically narrative comprehension, as it is a substantial ingredient of the reading experience. Among many, Emmott (1997) and Burke (2010) have provided very detailed overviews of the different theories on narrative comprehension, and here emphasis will be put on theories that are most relevant to the current thesis and on studies focusing on the role of comprehension in narrative feelings and empathy. Focus will also be put on the differences between the comprehension processes of fiction and non-fiction, the ways in which narrative comprehension can be assessed, and the limitations relevant research has faced.

The role of prior knowledge is well documented as a crucial ingredient of reading comprehension (see Burke, 2010 and Emmott, 1997, for reviews). Starting with Ruddell and Unrau's (1994) definition of comprehension as an interaction between reader, text, and environment, it is evident that the role of the reader is one of the main reasons why there is no universal way to comprehend since each individual reads and understands a text in a different way based on their prior knowledge and experiences. As Burke (2010) very accurately notes, narrative comprehension is a process of "predictable arbitrariness", it is a process "more oceanic, that is, dynamic, fluvial and fluctuating" (p. 1). As Emmott (1997) maintains, however, there is a common ground when comprehending a text since, apart from personal knowledge, readers support their understanding on general knowledge as well, that is, a general common knowledge that leads them to common assumptions and understanding. For example, if a text writes that someone is very sick, the readers make the assumption that this character might die, and this is based on world knowledge, common to everyone. These assumptions are called inferences (Emmott, 1997) and are vital for the reading process. However, as cognitive psychology and cognitive linguistics suggest, each individual adds extra personal information that changes their inferences and, as a result, the meaning they derive from the text (Burke, 2010). This process is so integral that readers can confuse what information was actually written and what information they personally added during reading (de Beaugrande, 1980; Emmott,



1997). For instance, readers might even add details to a story that is not part of the story's content simply because of their desire to create in their mind an image of an environment or of a protagonist due to their personal preferences. Emmott (1997, p. 67) gives the example of a description of a fictional character as beautiful in a text, which can result in readers picturing the character based on their own, personal standards of beauty, regardless of the detailed description that might or might not be given in the text and she explains that there are different factors that play a role on the inferences the readers make such as their cultural background, their generation, their education level, and so on.

Another important element of narrative comprehension is the individual differences in memory limits (Emmott, 1997). Memory is of paramount importance for reading comprehension, especially when reading longer texts. The reader needs to remember details from the beginning of the story, such as the location and the names and identities of the characters, to progress with the story. Good memory though is not always equivalent to good comprehension when it comes to narratives, as Emmott argues (1997, p. 65 based on Luria, 1987). As she explains, when reading narratives, the important information is not located in the peripheral details but in the sequence of events, the central ideas, the situation model, as van Dijk and Kintsch (1983) called it, that is, the representation of what a text is about, the events of the story, the characters, their actions, and, in general, the situation the text is portraying; this can be created through the combination of the information provided from the text and the previous knowledge and experience of the readers. The creation of a situation model allows comprehension and facilitates the reader to immerse themselves in the text, even without recalling the details. Additionally, personal experiences also play a role here. Readers' experiences guide their recall, and based on these, readers can omit or retain information. This leads to the generation of different inferences across readers and memory for different parts of the same narrative (Emmott, 1997; Holland, 1975).

Additionally, other types of background knowledge affect the narrative comprehension process as well. Based on Schema theory (Bartlett, 1932), no text has one specific meaning that is based only on the content of the text, its words, and sentences, but meaning is created when the reader's background knowledge interacts with the text (Burke, 2010, p. 6). Schemata are defined as specific background knowledge about a specific situation, entity, or event (Burke, 2010, p. 6). The expectations and background knowledge that readers have about a text, a genre, its style, and the story can be, for instance, crucial to the comprehension process. In detail, readers develop expectations about the text they are about to read that are supported by their knowledge and experience with previous texts. As a result, they give their own interpretations,

which can supersede the information provided by the content of the specific text that is read (Bartlett, 1932; Burke, 2010). In conclusion, Emmott summarises the types of prior knowledge that affect narrative comprehension, presenting four different types of mental representation: readers' general knowledge, their knowledge of typical text structures, the knowledge they develop while reading about the specific story world that is presented, and finally their knowledge about the style of the specific text that is read (Emmott, 1997, p. 21).

Psychological terms have also been used to explain the different types of knowledge used for reading comprehension. In detail, Tulving (1972) distinguished semantic from episodic memory. Semantic memory is what is remembered regarding the meaning of the text. On the other hand, episodic memory is autobiographical memory, the personal memories people store as they experience life. According to Albrecht and O'Brien (1991), episodic memory is more crucial for narrative texts compared to expository texts if the role of personal knowledge in narrative comprehension is taken into account. Graesser (1981) also argued that personal experiences influence narrative comprehension more in comparison to expository texts because narratives are dealing with issues related to life experiences in general, such as human relationships. Furthermore, Stein and Glenn (1979) noted that people are exposed to the structure of the narrative before even going to school (e.g., bedtime stories), so they have more experiences when processing stories. These frameworks propose that narratives are easier to comprehend than expository texts. In short, narratives can be more relevant to everyday life as readers experience it, and so this general knowledge coupled with reader's personal memories provides an advantage in reading comprehension (DuBravac & Dalle, 2002; Graesser et al., 2003). Best et al. (2008) agree that expository texts are more difficult, arguing that they put more demands on the reader "due to their greater structural complexity, greater information density, and greater knowledge of demands" (p. 140).

In fact, Kucer (2010) found that children performed better on recall tests when reading a narrative compared to an expository text. However, Weaver and Bryant (1995) pointed out that the comparison between narrative and expository comprehension could be problematic since narrative texts are less difficult than expository texts and if the readability of the texts is controlled, there will not be any discrepancy in the comprehension levels. Nevertheless, the reported differences of narrative and expository texts do not necessarily mean that there is a difference between fiction and non-fiction texts since non-fiction texts can also be narratives. As Colman (2007) accurately notes, "nonfiction and fiction can have many similar and overlapping characteristics" (p. 267) and can contain both narrative and expository elements. Therefore, comparisons between fiction and non-fiction texts while both being narratives are

needed. This is rare in the literature; however, studies have found that non-fiction is more challenging than fiction regarding reading performance of pupils (MacLean & Chapman, 1989; Topping et al., 2008). Lastly, it is also crucial to consider that reading comprehension might depend not only on the genre and style of the text but also on the reader's goals. If the reader wants to focus on the details to take a recall test, they will probably remember the descriptions of the story environment. If the reader wants to enjoy the reading experience and perhaps get absorbed, they will focus only on the details that they feel most relevant to them (Emmott, 1997).

As for the relationship between comprehension and empathy, text comprehension can be expected to be critical for narrative feelings, the emotional engagement with the text that can result in absorption, sympathy, and empathy (Hogan, 2018). The reader needs to understand the text to become absorbed into the story world, develop feelings for the characters, and subsequently train their empathic skills. Narrative comprehension is essential for readers to imagine the story world, to create a mental image of the place and the people described in the narrative, and, in turn, to “enter” this world, to be absorbed in the narrative, to take the perspective of the protagonist, to empathise with them, and to potentially train their empathic abilities (Mar et al., 2009; Taylor & Carlson, 1997). For instance, Henschel and Roick (2013) found that empathy correlates with literary text comprehension, and this correlation is stronger when reading fiction compared to non-fiction texts.

However, other studies propose that perspective-taking comes first and gives directions to the reader to understand a text: the reader follows the cognitive and emotional state of the characters to understand the text (Gernsbacher et al., 1992; Özyürek & Trabasso, 1997; Rall & Harris, 2000). Furthermore, emotions can evoke the understanding of specific information, which will then guide the comprehension of the rest of the text, creating an interplay between emotional and cognitive processes that affect each other while understanding a narrative, a phenomenon that has been described as ‘cognitive tuning’ (Frijda, 1989).

These theories bring to the surface another theory, that of mental fluency. Based on Kuzmičová (2016) mental fluency can be more important to readers than text comprehension. Mental fluency describes the phenomenon when the readers tend to continue reading even if they missed a part of the narrative (due to inattention or an unknown word, for example), instead of stopping and rereading the missed part. As Kuzmičová (2016, p. 229) suggests: “the recipients prefer trying to catch up with a narrative before taking the radical step of rereading or re-listening”. Therefore, it can be argued that readers favour absorption in a story world (and, in

general, the feelings a story evokes) more than understanding each word or segment of the text, a phenomenon that might be even stronger with suspenseful stories. Empirical studies have shown that mental fluency can predict aesthetic pleasure, the joy of reading, and the admiration of the way a narrative is written (Reber et al., 2004). As noted earlier, aesthetic feelings such as admiration are an important part of the reading experience, and their interaction with narrative feelings (i.e., absorption, empathy, and sympathy) can evoke self-modifying feelings through a process of deep reading, reflection on the literary text, and on oneself (Miall & Kuiken, 2002).

Therefore, comprehension seems to play an important role in narrative empathy, but this influence is more complicated if the four levels of text representation are taken into account. These four levels are the basis of the model of text comprehension developed by Kneepkens and Zwaan (1994) based on a previous model developed by van Dijk and Kintsch (1983). The four levels of reading comprehension they identify are the surface structure, the textbase, the situation model, and the pragmatic level. Following this theory, the situation model, that is, the mental representation of the situation described in a text (van Dijk & Kintsch, 1983), and the pragmatic level, meaning the situation in which the reading takes place (where, when, why we read a text) seem to be of paramount importance in the development of narrative empathy. On the other hand, the surface structure of the text, that is, the specific wording, and the textbase, that is, the meaning of the words, are suggested to play a more important role in expository rather than narrative texts. Nonetheless, even though reading for leisure does not require understanding each word of the text, and even if the readers do not pay attention to some parts of the text by letting their mind wander and miss some words, they still need to have some understanding of the meaning of the words to allow the creation of a situation model, which, together with the pragmatic level, interact with their feelings and traits, and thus develop narrative empathy.

Therefore, text comprehension is a complicated process, especially in the case of narrative reading; it is “a mixture of bottom-up and top-down processes” (Kneepkens & Zwaan, 1994, p. 127). The cognitive processes that evoke narrative feelings, the reader's own feelings, and their mood affect comprehension. Additionally, the text and its characteristics (e.g., complexity, narrativity, literariness, length), readers' personality traits, their previous experiences, and their reading goals (e.g., leisure or work) also play a role in both the text comprehension and the development of narrative feelings. These complicated processes that intertwine during reading indicate that narrative comprehension is not easy to assess, and only some aspects of comprehension are usually measured. For instance, most methods measure only the literal aspect of comprehension (i.e., the meaning of the text), the reader's ability to reorganise the

text (i.e., the ability to combine information provided from the text) and their inferences (i.e., the combination of literal understanding with general knowledge); other aspects such as the reader's predictions (i.e., assumptions of what might happen according to personal knowledge), evaluations and personal responses (i.e., readers' feelings regarding the text), which are also central to narrative comprehension, are not usually assessed (Day & Park, 2005). This is because these aspects are unique to each reader and therefore very difficult to evaluate and measure.

Moreover, studies on narrative comprehension are limited and measure comprehension as if the texts were not narratives, using mostly multiple-choice questions and recognition tasks that focus on recall of specific words, literal meaning, and inferences. This highlights the need for research that is more sensitive about the measures used since different types of measures are needed for different types of texts. In fact, some recent studies have started to focus on the situation model instead of the textbase, recognising that for narrative comprehension, recall of specific words is not as important as the central ideas of the story, the sequence of events, and the interaction of the text with the personal experiences of the reader. For instance, Mangen et al. (2019) used a "Plot Reconstruction Task", where they wrote 14 key events of the story on separate paper pieces and asked participants to put the events in the correct order according to the plot. In this way, they tested if the readers remembered the sequence of events correctly and the central points of the story. However, the interaction of the story with the personal experiences of the readers was not tested. In another study, Trites and McGroarty (2005) asked participants to recall, identify, and categorise information from the text they read on a table, showing causal relationships, and asking them to provide examples. This method gave more information than typical basic comprehension tests, including what the readers learned, the outcome of the reading experience, and their interpretation, giving some hints of their evaluation and personal knowledge. However, whether this method can be implemented in studies of narrative comprehension is questionable because, in the case of narrative texts, casual relationships are not that evident and reasonable, and emotion interferes with such evaluations. In fact, evoking emotions is so fundamental during narrative reading that the consideration of comprehension as a cognitive process is put into question, proposing the integration of cognition and emotion in the study of narrative comprehension.

In conclusion, narrative comprehension seems to play a crucial role in narrative empathy, but it is a complex process that includes more than a pure understanding of the text and the meaning of its words. Readers' goals and personal characteristics such as their background, knowledge and memories affect their understanding of the text, making it difficult to assess comprehension, and showing that cognitive and affective processes are very closely intertwined.

## 1.5 Absorption: the term and the experience

The experience of absorption has briefly been mentioned previously since it is highly related to narrative empathy, narrative comprehension, and leisure reading in general. Although this thesis refers to this experience with the term “absorption” as used by Kuijpers et al. (2014), many different terms have been used to describe it, such as transportation (Green & Brock, 2000), narrative engagement (Busselle & Bilandzic, 2009), immersion (Ryan, 2001), and entrancement (Holland, 2008). Although sometimes conceptualised differently, these terms are very closely related and sometimes even overlap. This thesis uses the term absorption to reflect the measurement used in the empirical studies of the following chapters and the definitions provided in this chapter.

For instance, regarding the term transportation, Green and Brock (2000, p. 701), defined it as “a distinct mental process, an integrative melding of attention, imagery, and feelings” that results in the reader being absorbed into a narrative world. They based their definition on Gerrig’s own definition (1993), who in turn describes it as an experience of traveling: “Someone (“the traveler”) is transported, by some means of transportation, as a result of performing certain actions. The traveler goes some distance from his or her world of origin, which makes some aspects of the world of origin inaccessible. The traveler returns to the world of origin, somewhat changed by the journey” (pp. 10-11). Much earlier, Nell (1988) described this experience as “being lost in a book” and titled his referred book with this expression. As Bilandzic and Busselle (2017) accurately noted, research seems to tend to describe this absorbing experience with metaphors. They argued that terms such as absorption, immersion, and transportation imply that the reading material has power over the reader; it makes them get lost, be transported, immersed, or absorbed. However, to my opinion, what seems to be more interesting is that researchers use these metaphors not to imply something about the power of the text, but because it is difficult to convey such a unique and personal experience. Besides, absorption is such a universal experience, and it has been investigated through so many different disciplines (e.g., virtual reality, gaming, marketing, psychology, film studies) that it is sensible that different terms have emerged.

Absorption as a reading experience is considered an integral part of leisure reading, the reason perhaps why readers read fiction and why they find such enjoyment in the reading experience (Kuijpers et al., 2014; Nell, 1988). It is related to research on the psychology of happiness and specifically on the notion of “flow” as called by Csikszentmihalyi (1975, 1990). Flow, as opposed to absorption that happens when reading, emerges from many different activities. It refers to the experience of being lost in an activity, of being “in the zone”, and it is conceived “as a

complete focus on an activity accompanied by a loss of conscious awareness of oneself and one's surroundings" (Busselle & Bilandzic, 2009, p. 324). Flow is considered rewarding for the person doing the activity and leads to enjoyment (Nakamura & Csikszentmihalyi, 2009). A wide variety of activities can bring the experience of flow, from dancing and painting to cleaning and running, and it involves the combination of the action with a certain mastery of doing that action, requiring a "balance between task challenge and skill" for the individual not to become stressed (in case the activity exceeds their abilities) or to get bored (in case of the activity is too easy for their level of expertise) (Bilandzic & Busselle, 2017, p. 17; Nakamura & Csikszentmihalyi, 2009, p. 196). Hence, absorption feels a lot like flow: the reader gets absorbed into a story by using their skills to read and comprehend the story (Green & Brock, 2000) in a similar way that a dancer or cook will also use their relevant skills. However, what is unique about reading in comparison to other activities and, in turn, about the term of absorption compared to the general term of flow is that through the experience of narrative reading, different worlds appear to the reader, and they get absorbed into them (Busselle & Bilandzic, 2009; Gerrig, 1993). A cook, for example, will stay in the same space in time, the present moment they cook, but the reader will be transported into another space and time, in a different world.

Following the definition of narrative as developed by Bruner (1986), Fitzgerald and Green (2017) define it as "a story or series of events with an identifiable beginning, middle, and end, during which characters may encounter and then resolve a crisis or crises" (p. 50), adding Dahlstrom's (2014) observation that narratives generally contain elements of character, temporality, and causality. This definition is useful for the exploration of absorption since aspects of the experience of absorption are built on elements of the narrative style: the story needs to have a time and space for the reader to be absorbed into, it needs to have realism, plot, and causality for the reader to not be distracted from unrealistic scenarios (Bradley & Shapiro, 2005; Busselle & Bilandzic, 2009; Gilbert, 1991), and it needs a character for the reader to connect with.

Specifically, different studies developed different self-reported measurements of absorption that focused on a combination of different aspects of the absorbing experience (Busselle & Bilandzic, 2009; Green & Brock, 2000; Kuijpers et al., 2014). Many of these aspects are closely related to theories of narrative comprehension and narrative empathy, showing the interconnection of these three phenomena. Specifically, Green and Brock (2000) designed the Transportation Scale, including the dimensions of emotional involvement in the story, cognitive attention to the story, feelings of suspense, lack of awareness of surroundings, and mental imagery (Green & Brock, 2000, p. 703). Busselle and Bilandzic (2009), on the other hand, designed the Narrative Engagement Scale that comprises four subscales: narrative understanding, attentional focus, narrative presence and emotional engagement. Finally,

Kuijpers et al. (2014), designed the Story World Absorption Scale that comprises four subscales, namely, attention, mental imagery, emotional engagement and transportation. This thesis will define absorption following Kuijpers et al. (2014) definition, which explains that absorption is composed of these four aspects that will be explored in detail in the following paragraphs.

First, one element that has been identified as part of absorption is readers' attention while reading, and it has been described as an effortless, deep concentration on the reading material that results in the readers losing awareness of themselves, the surroundings and time (Kuijpers et al., 2014). Kuijpers et al. (2014) emphasise that it is "the subjective experience a reader has of their own deepened concentration while being absorbed" (pp. 91-92) to discern it from definitions of attention that were given before. In detail, attention was explored before in terms of its underlying processes (Kuijpers et al., 2014) and, hence, as a cognitive process (Busselle & Bilandzic, 2009; Green & Brock, 2000) instead of a "*felt* experience" (Kuijpers et al., 2014, p. 92, emphasis in original). Busselle and Bilandzic (2009) put even more emphasis on the cognitive aspect of absorption, adding the aspect they call "narrative understanding", and highlighting the pivotal role of comprehension in absorption. They note that absorption comes forward when readers' prior knowledge and personal experience interact with the text to understand the narrative.

Another aspect of absorption is that of emotional engagement. Emotional engagement refers to the emotions that readers develop for or with the characters of the narrative and the vicissitudes they experience. Kuijpers et al. (2014) explain that emotional engagement encompasses empathy, sympathy, and identification with the narrative's character. Identification refers to the ability of perspective-taking and, as noted earlier, is an important mechanism for achieving empathy. The notion of empathy by Kuijpers et al. (2014) is essentially what Keen (2007) calls "narrative empathy", the reader's ability to feel empathy for the protagonist of a narrative or else to feel what the protagonist feels. Considering the importance of narrative empathy in theories that propose that reading increases empathy, it is not surprising that stronger absorption was found to bring greater empathy (e.g., Bal & Veltkamp, 2013; Johnson, 2012), suggesting that narrative empathy toward a story's protagonist, which comes through the experience of absorption, is needed to evoke higher empathy.

The next element of absorption, according to Kuijpers et al. (2014), is that of transportation and is described as the feeling of entering the story world without however losing complete contact with the real world. This element is related to the original concept by Gerrig (1993) as described above while other researchers have conceptualised and described this experience differently. In fact, Green and Brock (2000) called transportation the total absorbing experience, conceptualising it as a combination of the elements of emotional involvement in the story,



cognitive attention to the story, feelings of suspense, lack of awareness of surroundings, and mental imagery and created the Transportation Scale to measure the experience. Another conceptualisation was given by Busselle and Bilandzic (2009), who added the aspect of narrative presence in their scale and described it based on theories of narrative comprehension, considering it as a cognitive process instead of a subjective experience as described by Kuijpers et al. (2014). In detail, as Busselle and Bilandzic (2009) note, based on the Deictic Shift Theory (Segal, 1995a, 1995b), for a reader to understand a narrative, they have to be located within the story, they need to “switch to the time and location of the narrative and to the subjective world of the characters” (Busselle & Bilandzic, 2009, p. 323) and this is crucial for comprehension since some of the information provided in the narrative can be understood only if the readers adopt the deictic centre of the narrative. For example, deictic words such as “I” and “here” no longer refer anymore to the reader or their present place; the deictic centre has changed and they refer to the narrator and the story world (Busselle & Bilandzic, 2009; Segal, 1995a, 1995b).

Finally, the last element of absorption as identified by Kuijpers et al. (2014) is that of mental imagery, which is the construction of a mental image of the story world while reading (Kuijpers et al., 2014) and it is conceptualised based on Green and Brock’s (2000) term of mental imagery. Interestingly, Busselle and Bilandzic (2009) did not include a distinct dimension for mental imagery. This might be, as Kuijpers et al. (2014) note, a result of the narrative media Busselle and Bilandzic (2009) were studying, that is, films, which usually do not require mental imagery. Nonetheless, it is important to note that absorption can happen with both fiction and non-fiction narratives (Fitzgerald & Green, 2017). There is no need for the story world to be fictional for the reader to be absorbed into the story and transported to that world; even if the story world is a real place and even if events happen in the present, the reader could still create a mental image of that place and they could be transported there, away from their current reading space.

Investigating the aspects of absorption as separate elements generated some hierarchies that explore whether some aspects are crucial for others to emerge. In particular, narrative understanding and attention have been considered preconditions for emotional engagement to develop, suggesting that cognitive processes are necessary for affective processes to take place (Sukalla et al., 2015). On the contrary, Braun and Cupchik (2001) argued that absorption as a general reading experience comes before attention since it is necessary for the reader to engage emotionally with the story. Thus, it seems that both theories can be possible and the process of getting absorbed into a narrative may not always follow the same path. It may be that some level of attention is needed for the reader to get absorbed into the story, but it is the experience of absorption that keeps the reader’s attention focused and engaged with the narrative.

Lastly, Kuijpers et al. (2017) went a step further and distinguished absorption in two types: “story world absorption” and “artifact absorption”. This distinction is heavily based on the foreground-background hypothesis, suggesting that “story world absorption” occurs when the reader engages with the story and its content; this type of absorption is enhanced by suspense techniques that result in enjoyment. On the other hand, “artifact absorption” denotes experiences that derive from the discourse, or else the style of the story rather than the content per se, which emerges through the foreground elements of the text and the defamiliarization process, bringing about aesthetic feelings such as appreciation and a cognitive aspect of enjoyment (Green et al., 2004; Kuijpers et al., 2017); the authors connect artifact absorption with the experience of exercising a skill following the theory of flow (Csikszentmihalyi, 1975), compared to story world absorption that is conceptualised as an experience of vicarious living (Kuijpers et al., 2017, p. 37).

In general, it is evident that nowadays research casts absorption in a positive light as a mechanism to increase the enjoyment of the reading process (Busselle & Bilandzic, 2009; Hall & Zwarun, 2012; Johnson & Rosenbaum, 2015; Krakowiak & Oliver, 2012; Kuijpers et al., 2014), to increase empathy (Bal & Veltkamp, 2013; Johnson, 2012), self-examination, and personal change (Green, 2005). However, this celebration of absorption was not always the case. For instance, Brecht (1964) argued that absorbing experiences deprive us of being critical towards the narrative. More recently, Appel (2008) argued that absorption leads readers to confuse the real with the story world and adopt questionable attitudes (see Kuijpers et al., 2017, for a review). In a similar vein, Diekman et al. (2000) found that increased reading of romance novels brought risky choices regarding sex protection due to the “swept away by passion” narrative that is quite common in romance novels (see Mar & Oatley, 2008, for a review). Besides, research has shown that absorption increases the text’s persuasion power, brings attitudes consistent to the story, and changes beliefs relevant to the narrative (Busselle & Bilandzic, 2009; Green, 2005; Green & Brock, 2000). From a cultural perspective, Nell (1988) also gives us an idea of how reading and, specifically, absorption used to be treated. As his review demonstrates, readers who were getting absorbed in narratives (ludic readers as he calls them) were faced with the derogatory characterisation of escapists, readers who are “woolgathering at a time when the work of the world calls him” (Nell, 1988, pp. 32-33). Indeed, readers do lose their awareness of the real world and travel to another world, but, as Nell (1988) later concludes, calling readers escapists is a harsh judgement as it is condemning “both fantasy and the deepest kind of enjoyment reading offers us” (Nell, 1988, p. 234). Green (2005) chooses the middle road, suggesting that whether a narrative is used for escapism or self-expansion depends on the reader. If the readers are discontent with their lives, then they may indeed get absorbed in the

stories to escape their issues without dealing with them. On the other hand, readers may create “imagined selves” based on the narrative they read as a motivation to work toward becoming this desired, improved self. Therefore, she concludes, some narratives may have the power to promote or hinder personal growth. Nell (1988), however, draws attention to culture, stressing the decisive role of culture on what the readers read, but also “the effects of this choice on self-esteem and the positive rewards it is able to offer” (p. 13).

In conclusion, “literature is the most agreeable way of ignoring life” (Pessoa, 1982). You do ignore it when you are lost in another world and it can be said that you “escape” reality, but this other world can be so inspiring, enjoyable, self-challenging and expanding that not only is it acceptable to be in it, but it has been increasingly promoted and applauded in recent years. Although it can be studied as a separate experience, its theoretical connection with narrative comprehension and narrative empathy makes it an essential part of the subject of this thesis.

## 1.6 The role of the medium

In times of zoom calls instead of in-person meetings, swiping right and left instead of dating, and “find” commands instead of reading from cover to cover, leisure reading has also been affected by digital technologies. Instead of print books, turning pages, and the feeling of paper in our fingers, we have tablets with instant translation of every unknown word, e-readers imitating the sound of pages turning, and audiobooks with professional narrators trying to induce the listener into entering the story world. Therefore, a study on the effects of leisure reading on empathy, absorption, and comprehension would not be complete without exploring the consequences that different reading media may have on the reading experience.

### 1.6.1 Paper versus screen

As Baron (2015) reviews, screen reading started gaining popularity in the 1980s with the emergence of personal computers, and the trend spread even more with emails and the availability of digital versions of newspapers and magazines by the end of the 1990s. As Baron (2015) suggests, the appearance of Amazon’s Kindle in 2007 made e-books more and more trending due to its advanced technology, and reading whole books on a screen became common, while the arrival of the iPad by Apple and the prevalence of smartphones gave a new boost in screen reading. However, during all these years, many have feared that digital reading devices, such as computers, tablets, and smartphones, will harm the cognitive and affective abilities of readers. Technopanic, though, is not something new with moral panics re-emerging every time a new technological development becomes popular among a society, whether this is the train, the television, or the internet (Orben, 2020; Wartella & Reeves, 1985). Researchers have taken a stance and tried to investigate these concerns, producing an enormous number of

studies, the majority of which focus on cognitive aspects of digital reading regarding children and students.

Before diving deep into the relevant research, it is crucial to make a distinction “between reading digitally and digital reading”, as proposed by Singer and Alexander (2017, p. 1031). The former refers to the digitisation of texts with the use of digital reading technologies. It is works that were published in print book format and then (or simultaneously) presented in screen-based technologies (i.e., tablets, e-readers, computer screens, mobile phones) or audiobooks, or works that have been published electronically, but in a format that can be published in print as well without any needed changes in the text. Therefore, the text is not changing, and the difference is only in the medium used to represent it. On the other hand, digital reading refers to the process of reading texts that were produced to be read with the use of digital technologies, which enable a multimodal presentation of the text with the use of audiovisual and sometimes interactive storytelling (Bell et al., 2018). In turn, digital fiction can be divided into text-based fiction, such as hypertext fiction that uses hyperlinks to unfold the story, and multimodal fiction, such as narrative videogames (Bell et al., 2018). This review will focus on the phenomenon of reading digitally, putting attention on the effects of the medium, with limited references to digital fiction.

Some of the theories on the role of the medium in the reading experience have largely focused on the embodied cognition paradigm. The idea that the body has a role to play in cognitive processes emerged in the 1990s when scholars first started considering that the “mind [...] is not incidentally, but intimately embodied and intimately embedded in its world” (Haugeland, 1998, p. 237) and the embodied cognition paradigm started questioning the western distinction between body and mind (Kress, 2003, p. 171). This new perspective resulted in the need for a new definition of the act of reading since the body is no longer considered detached from the cognitive process of reading or, as Piper noted, “reading isn’t only a matter of our brains; it’s something that we do with our bodies”<sup>7</sup>. According to Mangen and van der Weel (2016), reading is a “human-technology interaction” and an “embodied process”, proposing that reading entails not only the ability to read and comprehend a text, but also the interaction of the body and senses with the cognitive process; readers use both their mind and their body: they hold the reading device, they feel its surface, its weight, they interact with it by swiping, turning pages, pressing buttons, using headphones, bookmarks, electronic and physical pens, etc.

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<sup>7</sup> Andrew Piper, “Out of Touch: E-reading isn’t reading”, Slate, 15 November 2012. Available at <https://slate.com/culture/2012/11/out-of-touch.html>. Date of last retrieval: 9/12/21.

Mangen (2016a) argues that the most prominent aspect of the embodied process of reading is that of the hands. She explains that the haptic sense when using a device includes both passive and active sensory processes. Passive processes provide to the reader information about the weight of the device and the texture of its surface. For example, print books are usually heavier than tablets and e-readers; their surface is usually rougher in comparison to the silky feeling of metal and glass; the paper is usually emitting warmth to the hands holding it, while glass and metallic materials are usually colder than skin temperature; the weight and thickness of the print book give an idea about the length of the text, while screen-based technology does not.

On the other hand, the active processes require the reader to interact with the device. The hands are manipulating the devices to proceed with reading. The reader turns the page, swipes, or scrolls. Noticeably, the interface of the digital devices does not provide the cues the print brings to the reading experience. Specifically, as Mangen and Kuiken (2014) argue, screen readers might see the page numbers and the progress bar to have an idea of where they are in the text, but the print provides more than visual cues; it can provide kinaesthetic cues of the reader's progress as they are turning the pages; the readers can not only see, but also feel how many pages are left in the right hand and how much they read in the left hand (Mangen, 2016b; Mangen & Kuiken, 2014; Sellen & Harper, 2002). As Baron (2021) puts it very accurately, "we feel a book's heft, consider what kind of paper it's printed on. We physically hold the book (or magazine or newspaper), stick a finger between pages to mark our spot, use a thumb and forefinger as pincers to measure how much of a tome we've finished or have left to go" (p. 15). The lack of this tactile interaction when reading from screens can affect the readers' ability to have an overview of the text and locate themselves in the text, which in turn can have implications to their ability to construct the cognitive map of the narrative they read, or else their ability to remember the organisation and structure of the text and where any information is located in the text (Hu et al., 2017; Payne & Reader, 2006). Therefore, based on this theory, digital devices and, in particular, the action of scrolling can hinder readers' mental representation of the text as a whole (Dillon, 1992; Liesaputra & Witten, 2012; McDonald & Stevenson, 1998; O'Hara & Sellen, 1997). As Hu et al. (2017) argue, when scrolling, readers "are transited to entirely new layouts from moment to moment. The spatial flexibility and instability of the text presentation make it hard for readers to reconstruct the physical layout of the text" (p. 37). As a result, readers may not recall when something happened in a story and confuse the order of events in a plot, which in turn can hinder text comprehension, the engagement of readers with the text, and hence their absorption and narrative empathy.

Apart from the lack of kinaesthetic cues when reading from a screen, reading digitally is also characterised by intangibility and virtuality. In her book, “Words on Screen” (2015) Baron wonders how we view the relationship between “content” and “container” (p. 15) and many studies have pointed out that print books’ container is unique for every content as opposed to screen devices. For instance, Mangen (2016b) notes that “print texts are tangible and fixed; they are physically contiguous with the storage and display medium” while “texts on screens are intangible and virtual; they are physically separable from their display medium” (p. 244). In later work, Mangen et al. (2019) further analysed the differences between print and screen reading, proposing that the tangibility and fixation of print books provide “material placeholders” (p. 8) which support the construction of a cognitive map and thus facilitate the cognitive processes of reading. Moreover, as Hu et al.’s (2017) review shows, people treat texts as if they were a real, tangible part of the physical world (see also Jabr, 2013; Wolf, 2007). As a result, the human brain perceives any text as if it were part of an environment, and links between the text and its surroundings are created (Hu et al., 2017). In other words, when the text is displayed in a for its content unique container, as it is in the case of print books, it is associated with the physical appearance of the book per se as well as the physical location of every part of the text in the book, such as the first or last pages, the right- or left-hand page, etc. (Hu et al., 2017; Jabr, 2013; Li et al., 2013; Payne & Reader, 2006; Waller, 1985). As Baron (2015) additionally notes, the physicality of the print book brings feelings of ownership and makes the book feel as something personal; as Paul Theroux once said, the reader is “living with it as an object, sometimes as a talisman”<sup>8</sup>. This association between the text and its physical appearance creates a “physically and functionally unitary object” (Hu et al., 2017, p. 85) in the case of print books, which results in the reading process feeling something “natural, intuitive, and immediate” (Hu et al., 2017, p. 85), which facilitates the cognitive process and therefore requires less cognitive effort from the reader (Hu et al., 2017).

On the other hand, Hu et al. (2017) argue that reading from a screen can be felt as a “mediated experience or that it takes place at a distance from the actual text” (p. 86). This is a result of the separation of the text from its surrounding; the text is only briefly presented on the screen, the same screen that previously hosted another text and will expose the reader to the next one soon enough, taking away the feeling of the text as a unitary, physical, personal object, and making it feel as something ephemeral, virtual, and even non-existent, a condition that might confuse readers and require more cognitive effort (Mangen, 2008; Mangen & Schilhab, 2012).

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<sup>8</sup> <https://www.theatlantic.com/magazine/archive/2010/08/fiction-in-the-age-of-e-books/308041/>. Date of last retrieval: 29/11/21.

Furthermore, according to multi-sensory learning theory (Mercer & Mercer, 1993; Shams & Seitz, 2008), the more senses engaged during the reading experience, the more information is retained and the better the text comprehension becomes. Therefore, considering the tangibility and physical attributes of the print book as opposed to the virtuality of e-books, more senses are engaged during the print book reading experience since touch plays a stronger role compared to the digital counterparts, and so, comprehension may also be better (Hu et al., 2017).

The superiority of print reading over screen reading has also been discussed many times by Maryanne Wolf and her colleagues in terms of the act of what they call “deep reading” (Wolf, 2007; Wolf, 2018; Wolf & Barzillai, 2009; Wolf et al., 2012). They define deep reading as “a slow, immersive process in which a reader requires time and cognitive space to engage in deep thought” (Wolf et al., 2012). In her latest book, “Reader come home: The reading brain in a digital world” (2018), Maryanne Wolf provides a more detailed exploration of the subject, and maintains that phenomena such as mental imagery, absorption, empathy, critical and analytical processes, and insight need deep reading in order to emerge. However, for deep reading to occur and to have the above results, she suggests that the reader needs to put time, have patience, and put cognitive effort into the process (Wolf, 2018). However, Wolf (2018) and others (e.g., Baron, 2015; Mangen, 2016b; Mangen & Kuiken, 2014) argued that screen devices are not suitable for deep reading, suggesting that they are made and used for fast reading, superficial and shallow, based on practices such as skimming and scanning, or as Baron (2015) puts it, they are “tailor-made for searching and consuming gulps of information” (p. 19). Wolf (2018) also argues that our exposure to digital devices has changed the way we read, regardless of the medium we use for our readings. In detail, she suggests that digital media and the stimuli they create led people to a need for constant new stimuli and new activities, a decline in their attention, and a tendency to get bored faster and easier, which affects the way people read. Furthermore, she goes a step further and argues that this tendency to a distracted, shallow way of reading not only appears when reading digitally, but has also “bled over” to print book reading, with people adopting the same reading practices regardless of the medium and material they read (Wolf, 2007, 2018).

Naomi Baron, on the other hand, in her more recent book, “How we read now: Strategic choices for print, screen, and audio” (2021), suggests that every medium has its advantages and disadvantages, noting, for instance, the feeling of familiarity print books provide with their tangibility, but also the affordability and convenience of e-books. In addition, she brings attention to consumer research (Brasel & Gips, 2014) that investigated the effects of

touchscreens in comparison to traditional mouse-operating computers on aspects of the reading experience and found that touchscreens enhance the feeling of ownership, showing that haptics do indeed play a role and the advance of technology puts attention to the role of hands and haptic feedback in general. Baron's study has also found another benefit of reading digitally: she found that older people (from 55 to 91 years old) show a greater preference for e-books compared to younger people and that was due to the function provided by digital devices to change font size. Digital devices have more functions that may lure people to use them too, such as instant translation, dictionary, adjustment of the screen brightness and open access to online texts. These functions, however, pose a risk; as Baron notes in "Words on screen: The Fate of Reading in a Digital World" (2015), when there is an internet connection, there is a higher chance of getting distracted.

#### *1.6.1.1 E-ink versus LCD displays*

The industry has tried to make the experience of reading digitally less distracting, more immersive, more book-like. First, the emergence of e-readers has tried to solve the issue of visual fatigue. E-readers use e-ink technology that reflects ambient light, as opposed to computers and tablets that emit LCD light. It is suggested that LCD light can make the reading experience more tiresome for the eyes, and as a result, it can increase the cognitive load for the reader, and thus impede the reading process (Baccino 2004; Benedetto et al., 2013; Blehm et al., 2005; Garland & Noyes, 2004; Noyes & Garland, 2003). Studies have in fact shown that tablet readers perform worse in comprehension measures due to visual fatigue (Noyes et al., 2004), while e-ink technology and print do not differ in terms of visual fatigue (Hu et al., 2017). In fact, research has discovered that e-readers can provide the same readability as print books, and even sometimes outperform print books (Benedetto, et al., 2013; Siegenthaler et al., 2011; Siegenthaler et al., 2012). However, the benefits of e-ink technology have been questioned, and it has been argued that the difference between e-ink and LCD technology is an issue predominantly emotional with limited evidence supporting the opposite (Siegenthaler et al., 2012). Visual fatigue, though, might not be the only factor that gives advantage to e-readers compared to other digital devices. As Hayler (2011) explains, tablets are "do-it-all" devices. They are not used only for reading texts, but they can be used for many other activities as well, such as taking photos, emailing, writing, browsing the Internet, chatting, scrolling in social media etc. Hence, the issue with tablets is not only that they might cause more eye strain than e-readers, but additionally, tablet users may be more prone to interrupt their reading to use other functions provided by the device or to get distracted. E-readers, on the other hand, are



“dedicated single-function devices” (Mangen, 2016b, p. 245) that are built to mimic print books and save readers from unnecessary distractions.

However, as Baron (2015) notes, by 2013, e-reader sales had dropped, and although new e-reader models have provided internet access, the tablet appears to be more favourable, and its sales have risen. This trend continues to hold, and it is predicted that the e-readers market will experience an even further decrease in sales<sup>9</sup>. The sales of tablets and smartphones are contrarily growing<sup>10</sup> showing that customers prefer a multifunctional device that they will use for many different activities and not only to read books. This, however, as noted earlier, comes at a price since readers are getting more easily distracted and end up engaging with other activities and as a consequence, they become slower readers, they buy fewer books, and read less (Baron, 2015).

Still, even if e-readers were more widely used, e-ink technology and the book-like experience it provides would not be enough to imitate the experience of print reading. The tangibility and fixity of the text are still missing in the e-readers since the texts remain virtual. In other words, as Anne Mangen argued, “no matter how print-like the quality of the e-book screen, the text as such remains digital and hence detached from the physical support” (2008, p. 416), and so a different reading experience and cognitive process could emerge.

#### *1.6.1.2 Empirical evidence on the differences between print and screen reading*

In view of the above, a lot of empirical research has been carried out to investigate the differences between print and screen substrates at different levels of the reading process and experience. As Kneepkens and Zwaan (1994) noted, most research is centred on the cognitive process of reading, overlooking the role of emotions, and it can be added that this is predominantly the case today as well when investigating the effects of reading media. The vast majority of relevant studies have only investigated the effects of reading media on comprehension, ignoring the effects on empathy and absorption (apart from some notable exceptions, namely Guarisco et al., 2017; Haddock et al., 2020; Mangen & Kuiken, 2014; Mangen et al., 2019; Schwabe et al., 2021). Furthermore, most empirical studies have used expository texts and have focused on comparing print books with computer screens (for a review, see Delgado et al., 2018), making it very precarious to draw conclusions regarding the emotional

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<sup>9</sup> <https://www.statista.com/topics/1488/e-readers/#dossierKeyfigures>. Date of last retrieval: 1/12/21.

<sup>10</sup> <https://www.pewresearch.org/internet/2015/10/29/the-demographics-of-device-ownership/>. Date of last retrieval: 1/12/21.

aspects of reading experience when exposed to narratives and fiction stories and when using e-readers and tablets.

Nevertheless, the results of empirical studies regarding the effects of reading devices on comprehension of expository texts are quite inconclusive. Some studies do not show differences in comprehension, while others report that the print book is the best medium for comprehension or that comprehension is better when reading on screen (see Singer and Alexander, 2017 for an overview). Additionally, most studies have used university students as a sample, which can be highly problematic since they are not representative of the population and, as Baron (2015) notes, they are highly educated and tend to read more carefully. In fact, Singer and Alexander (2017) found that out of the 36 studies they reviewed, only four used post-college people as a sample, with college students being by far the most common population used in relevant studies.

Summarising the results of the different studies, recent meta-analyses (Clinton, 2019; Delgado et al., 2018; Kong et al., 2018) found that print reading provides better comprehension in comparison to screen reading concerning predominately expository texts. Also, there are some consistent results regarding moderating factors that can affect reading comprehension on different media. First, it has been found that scrolling has a role to play in reading comprehension. Particularly, comprehension seems to lower when texts are more than one page long, which as a result requires scrolling, while no such effect was reported with shorter texts (Dyson & Haselgrove, 2000; Fisher & Frey, 2018; Singer & Alexander, 2017). As Hu et al. (2017) explain, it is not screen technologies per se that have adverse effects on comprehension when scrolling, but it is the difficulty of creating a spatial representation of the text that hinders reading comprehension, as explained above, and there is indeed empirical evidence showing that spatial representation strengthens readers' comprehension (Baccino & Pynte, 1994; Cataldo & Oakhill, 2000; Hu et al., 2017). Regarding the studies that were inspected in Singer and Alexander's (2017) meta-analysis, most studies do not report the length of the texts used and, when reported, the longest text used in the studies conducted from 2001 to 2017, was only 2500 words.

Another important parameter is the measures used in the experiments. In particular, when a study compared objective with subjective measurements (Kretzschmar et al., 2013), it was shown that readers believe that they can better understand a text when they use paper, but based on objective measurements, the reading media did not affect their comprehension accuracy. Interestingly, they used in total 9 different texts, both fiction and non-fiction.

However, an important issue is that the texts were extremely short, around 222 words. They divided the texts into 3 pages, but this resulted in very few lines per page. Furthermore, the paper medium was not really a book, but three pages fixed with a metallic clip. In the same vein, Mangen et al. (2019) found that there was no difference in comprehension between the print and the e-reader, but they covered the page numbers and progress bars from all mediums, an action that decreased the ecological validity of the experiment. However, they found that print reading provides better understanding and recall of temporal and chronological aspects of the mystery story they used as a material, indicating that print books can help form a more coherent situation model compared to e-readers and suggesting that print books provide necessary sensorimotor feedback for the construction of the cognitive map of a text.

Lastly, meta-analyses found that across the studies they explored, there was no difference between the media when the texts were narratives, but there was a discrepancy when the texts were informational or they combined informational and narrative characteristics, with print reading providing better comprehension in comparison to screen reading (Clinton, 2019; Delgado et al., 2018); this suggests that the reading process is affected not only by the type of the text or the reading medium but also by the interaction of the genre with the medium.

As noted above, there are very few studies exploring the effects of reading media on affective responses. The following paragraphs will review the studies that have investigated this issue. First, Mangen and Kuiken (2014) compared print with tablets while including a manipulation of paratextual cues, presenting the same text as fiction or non-fiction to their participants. They measured participants' narrative coherence, absorption, narrative empathy, sympathy for the protagonist, comprehension, and interface interference, namely how much participants could resist to distractions, were dislocated within the text, or felt awkward when handling the medium. They found that the effect of the medium was not significant when participants thought the text was fiction, while when it was considered non-fiction, they reported more dislocation, less narrative coherence, absorption, and sympathy when reading on a screen compared to print. Lastly, narrative empathy was predicted by absorption only when reading from print, both when receiving fiction and non-fiction paratextual cues. This study laid the first stone in the exploration of media effects on empathy and absorption, suggesting that print reading can facilitate the emergence of narrative empathy through the experience of absorption. However, this study faced some limitations; similarly to other studies, the story was quite short, and on top of that, the original story was altered due to the authors' concern that the original might be too distressing for the readers. Lastly, the text was provided in the form of stapled papers for the print condition, a format that is not representative of the book format

since the haptic interaction with the print book provides a different experience compared to stapled paper, which may entail different affective and cognitive responses as well.

Secondly, Guarisco et al. (2017) compared the effects of print books and tablets on empathy and theory of mind. Their sample consisted of 78 sixth-grade students (ages 11-12) who read two young adult fiction novels while taking part in a variety of activities to foster engagement, perspective-taking, and empathy during the school year. Empathy, theory of mind, and absorption were the dependent variables. Their results indicated that theory of mind scores increased after reading the print book but declined when reading on a tablet. However, this was the case only when exposed to one of the two available texts, with no effect being reported with the second text. This study also faces some limitations, most importantly the classroom environment that can intervene with children's reading behaviour.

Third, more recently, Mangen et al. (2019) compared print books with e-readers when reading a mystery story, and in addition to measuring a variety of cognitive aspects, as noted earlier, they also measured absorption, but found that the medium did not affect readers' absorption. This result might again suggest that there is no medium effect when reading (or believing you read) fiction, as well as that the e-reader could resemble the print book more compared to the tablet used in the study by Mangen and Kuiken (2014) and therefore provide a level of absorption similar to that of print books.

A year later, Haddock et al. (2020) compared print books with tablets regarding their effects on comprehension, absorption, and aspects of literary attitudes when reading either a traditional or a modern themed short story. The traditional themed story was a story that included references only to "traditional" ways of writing and reading (i.e., pen and paper), while the modern themed story was a science-fiction story that had references to screen technologies. They found that there was no effect of the medium on absorption, but they found that the type of text interacted with the medium, showing that when reading a traditional themed story, print books facilitated absorption more than tablets, a difference not found when reading a modern story. However, it is crucial to note that, as in previous studies, their sample was not representative of the population, as it consisted of only undergraduate students.

Lastly, the most recent relevant study (Schwabe et al., 2021) compared print books with e-readers when reading the first 20 pages of a novel and interestingly did not find any effect of the reading medium on a variety of cognitive and affective responses.

However, a criticism that can arise when overviewing these empirical studies is that the vast majority of them conducted the experiments in a lab environment, while providing the

participants with the devices to read the texts. This, however, may not reflect how people usually read: they read in their environment, e.g., their home, and most importantly, they read from the devices (either this is a tablet, e-reader, or a print book) that they have purchased themselves, they use on a daily basis and are accustomed to. Consequently, any difference found in studies comparing print with screen may face the limitation that participants may not have been accustomed to using the device the experimenters provided them with. This may have been the reason why they performed worse when reading on screen compared to print reading, a limitation that can challenge theories about the “shallowness” of the screen reading experience (Wolf, 2007, 2018).

In conclusion, many theories suggest that the reading medium can affect the reading experience, whether this is due to the lack of tangibility or the different sensorimotor feedback provided by the digital devices compared to the traditional print book. Although a variety of studies and meta-analyses might give an insight on the effects of reading media on comprehension, studies focusing on narratives and leisure reading are limited. Additionally, research on affective aspects of reading is very limited as well, but it provides some indications that there might be an interaction between the medium and the type of text, without, however, providing decisive evidence.

### 1.6.2 Eye-reading versus ear-reading

An unexpected influential factor in the history of reading is the audiobook. Although the audiobook was initially used mainly by children and the blind community rather than by the wide reading population, this has changed in recent years (Baron, 2021; Have & Pedersen, 2016). Historically, audiobooks rendered books electronic and digital before the emergence of e-readers (Have & Pedersen, 2019). The starting point is the invention of the phonograph by Edison in 1877. However, the audiobook became more popular among the wider population in the 1970s thanks to the appearance of audiocassettes, the Walkman and cassette players in cars (Kozloff, 1995). Since then, its popularity followed a steadily increasing trend that was supported by download and streaming technologies, the MP3 format, and more recently subscription services, such as Audible (Have & Pedersen, 2016). This development brought much attention to audiobooks from the commercial and publishing sector, and metaphors such as “the digital renaissance”, “the silent revolution” and the “game-changer” were designated to characterise the audiobook format (Have & Pedersen, 2016; 2019). These statements have been rightfully given based on the annual review of The Publishers Association for the sales of books in 2018: Physical books experienced a decrease of 5% in sales, while digital editions showed an increase of 5% driven by a surprising 43% increase in audiobook downloads (PA, 2018).

It is obvious then that the audiobook is a format many prefer today, but it leads to various changes in the publishing sector, in the way people read and in the way “reading” and “book” are defined. Many interconnected factors led to this change. First, from a technological perspective, if it were not for MP3, there could not have been such an increase in audiobook consumption. A single cassette in the 1970s and a compact disc in the 1980s could not contain a whole novel, which made their use difficult and brought about abridged editions (Tattersall Wallin & Nolin, 2019). Only with the MP3 format and streaming technologies could this evolution take place, as they provide easier access to a whole book than their technological predecessors. Also, as Have and Pedersen (2016) point out, from a sociological viewpoint, it is the changes of how people live that brought the audiobook to the foreground: people commute for work more than ever (although this trend has changed in 2020 due to the outbreak of the COVID-19 pandemic, which led to many people working from home), they have little free time, which leads them to multitasking, and the fashion of exercising alone either by running or doing repeated, trivial exercises at home or at the gym is prevalent in modern society (Have & Pedersen, 2016). An audiobook seems to succeed in making the everyday commuting, household chores, and exercising more enjoyable. Lastly, the modern way of living and working requires many people to spend most of their time in front of a screen, reading emails, reports, and the news. Audiobooks, thus, may offer them an escape from eye-reading and allow them to spend their free time enjoying a book without putting effort into word decoding that is required during eye-reading.

Audiobooks, however, faced a lot of resistance. As in the case of most remediation, the audiobook has been portrayed as a risk to books and literacy. Most evidently, Kozloff’s study argued that listening to audiobooks was associated with laziness, illiterate and preliterate children, passivity, abandonment of control of reading pace, lack of commitment to the act of reading, and with titles “low-brow” dealing with business advice and self-help (Kozloff, 1995, p. 83). However, Kozloff’s study was conducted more than 20 years ago and, as Have and Pedersen (2016) note, opinions on the value of audiobooks have changed drastically since then. Kozloff’s study was dealing with audiocassettes, which restricted listeners’ mobility, while now digital distribution and modern lifestyle are bringing attention towards the mobility that audiobooks offer as an advantage. Furthermore, audiobooks have become more accessible with the use of smartphones; anyone who owns a smartphone can listen to an audiobook. In addition, there is no need for abridgement now, and lastly, while self-help titles are still highly present in audiobook subscription services, the presence of classic and modern literature is strong as well.

From a theoretical perspective, the emergence of the audiobook brought up discussions about the importance of orality in society, language, and literature. One of the most relevant and prominent theories is phonocentrism, a Western idea according to which the spoken voice is more superior than the written voice (Derrida, 1998). This idea was present since ancient times, with Plato expressing a reservation towards the written word (Ong, 1982). Also, Rousseau (1997) advocated for the spoken word, noting that it is more natural than the written word, while Saussure, the “father of linguistics”, argued that speech should be the first interest of linguists, before the written word (Saussure, 1916).

Ong’s studies on orality are of paramount importance in the field. First, he accentuated the role of sound in the experience of reading and in the experience of thinking, noting that “reading a text means converting it to sound, aloud or in the imagination” (Ong, 1982, p. 8) and “not only communication but thought itself relates in an altogether special way to sound” (Ong, 1982, p. 7). Also, his theory of primary and secondary orality is relevant to the study of audiobooks. Primary orality is the orality of a culture totally “untouched by literacy” (Ong, 1982, p. 6), while secondary orality is the technologised orality that exists through electronic devices and depends on print and writing. Although he was referring to radio and television, the audiobook is relevant to this theory because, while it belongs to secondary orality due to its dependency on writing and technology, it is experienced in time and not in space, in contrast to the written word (Bednar, 2010). Audiobooks brought back some of the characteristics of the past, or, as Havelock (1986) writes regarding the new technologies in general; they brought a “richer form of communication and perhaps of experience” that existed in societies of primary orality before writing and printing (Havelock, 1986, p. 27).

The importance of the written word and the available technology in the existence of audiobooks is the foundation of the definition of digital audiobooks given by Have and Pedersen. Their book, “Digital Audiobooks: New Media, Users, and Experiences” (2016) deals with the new age of audiobooks that do not depend on cassettes or compact discs but are available through streaming and MP3 files. They study digital audiobooks from a theoretical and empirical point of view and provide us with the definition of an audiobook as an audio recording that has been already or simultaneously published as a print book or e-book. The narrator can be an actor, an amateur, a synthetic voice, or even the author. The audiobook is only fiction or non-fiction works made for leisure reading and not educational or informatic work (e.g., newspapers) (Have & Pedersen, 2016, 2019). This definition is very important because it puts emphasis on the fact that an audiobook depends on the existence of written work, and this way, the audiobooks can be discerned from other types of entertainment based on audio files, such as podcasts and

music. This differentiation has not always been clear, mainly because of similarities with the radio drama and the common device and/or service used for listening both audiobooks and podcasts or music (i.e., the smartphone and services such as iTunes) (Have & Pedersen, 2016). But the definition of Have and Pedersen clarifies the picture and brings the dependency of audiobooks on written books to the foreground.

Audiobooks offer a very different experience when it comes to reading literature. Have and Pedersen (2016) used the theoretical framework of Elleström's model of four modalities (2010) to determine the differences between, as they call it, eye-reading and ear-reading. According to this model, these modalities can characterise every medium. They are the material, sensorial, spatiotemporal, and semiotic modalities. The material modality refers to the differences in the materials used: the letters printed on paper versus the sound waves that transport the narrator's voice. The sensorial modality refers to the senses that form part of the experience: the tactile feeling of the paper and the sight of the text versus the tactile feeling of the interface of the MP3 player or the smartphone and the earphones together with the auditory sense of listening to the story. The spatiotemporal modality refers to the perceived space and time portrayed in the story, and finally, the process of delivering meaning either by reading on paper or listening to the narrator's voice is analysed based on the semiotic modality. Have and Pedersen (2016) compared the print book and the audiobook based on these modalities, and apart from the apparent differences noted above, they indicated some audiobook characteristics that can be used as a theoretical background when studying the effects of audiobooks on affective responses in comparison to print and screen reading.

First, the main apparent difference is based on the sensorial modality; audiobooks are experienced with our ears, not with our eyes. This becomes possible not only with the technology provided but also with the moderating role of the narrator. Have and Pedersen (2016) introduced the term "performing narrator" to discern the narrator who is recorded to produce an audiobook (performing narrator), from the diegetic narrator (i.e., the way the events are narrated at the textual level, such as the point of view chosen by the author) and this term is adopted in this thesis for the same reason. They studied in detail the mediating role of the performing narrator and its effects on the reading experience. They describe the narrating voice as a "kind of translation" and an "interpretative act" (Have and Pedersen, 2016, p. 88). They emphasise the fact that the performing narrator can give a specific style in the narration, create a unique, specific atmosphere, and can influence the feeling a story gives and even its meaning by their tone, rhythm, diction, and tempo. These influences, as Bednar (2010) puts it, demonstrate the power of the performing narrator to "make or break an audiobook" (p. 78).



This is very apparent in the search engine of streaming services of audiobooks, where the consumer can search for a title not only by the author's name, but also by the narrator's name. Consumers can feel the difference a narrator can bring to an audiobook, and they might even search for titles narrated by their preferable narrator and not the author (Have & Pedersen, 2016). The audiobook industry has realised the power of the performing narrator and is appointing famous actors to narrate audiobooks to capture the interest of costumers. For example, when the top 10 best-sellers of the audiobook subscription service Audible were checked, names of famous actors such as Stephen Fry, Jude Law, and Russell Tovey were found. In fact, when writing this chapter (April, 2020), all the fiction titles of the top 10 best-sellers of Audible included a famous actor as a narrator.

Frum (2009) criticised the audiobook due to the very existence of the narrator's moderating role because the narrator breaks the "intimate" relationship between the writer and the reader (p. 95). However, other studies argued that the narrating voice creates more presence and intimacy, a feeling of a social company, or better, "parasocial company" as described by Horton and Wohl (1997). Furthermore, the narrating voice has been linked with childhood nostalgia, the feeling of warmth, the affection and comfort that come from the feeling of snuggling and it has been seen as a symbol of the mother's voice (Casbergue & Harris, 1996; Kozloff, 1995).

Additionally, the presence of the performing narrator has also the benefit of giving a more consistent experience. The fact that the narrator imprints a specific atmosphere on the story means, according to Have and Pedersen (2016), that there is an "interconnection" surrounding the story that results in a stronger cohesion. On the other hand, they argue that the shift from eye-reading to ear-reading decreases the reader's ability to create a cognitive map of the events of a story, an argument that has also been used for screen reading devices. Furthermore, the feeling of the atmosphere and the intimacy delivered through the audiobook experience may mean that listening to an audiobook creates more aesthetic feelings, or has hedonistic purposes (Kuzmičová, 2016).

Secondly, one very basic difference between eye-reading and ear-reading is that, in the case of audiobooks, the eyes are free to travel. When reading a book, either from paper or screen, the eyes are fixed on the text, decoding letters and words. In the case of the audiobook, the ears take the lead for the reading comprehension and the eyes are free to look around at the surroundings. This brings many changes to the reading experience. According to Have and Pedersen (2016), listening to an audiobook enhances the daily environment of the reader and can even absorb the environment and include it in the story. They explained this phenomenon

giving an example of someone listening to an audiobook while gardening. This person connected in their mind specific moments or characters of the story with the garden, bridging the imagined world with the real world. This, however, means that the experience of the audiobook is dependent on the external environment. It might also mean that the audiobook reader does not focus on the events of the story as much as they focus on the feeling the voice of the narrator brings in combination with the feelings their environment induces. Lastly, it can be argued that eye-reading might also be influenced by the noises the ears receive, whether this is the traffic noises, the birds singing, the washing machine, etc. Nonetheless, the interference of the environment as perceived by the eyes seems to be stronger than the interference of the sound of one's environment. In summary, this freedom of the eyes can characterise not only the sensorial modality of the audiobook, but also the semiotic modality, because the external environment influences, enhances, and perhaps changes the meaning of the story.

Another theoretical framework that has been used to uncover the differences between media in general and reading devices specifically is the theory of affordances. According to Gibson (1979), affordances are the possibilities that arise from a person's perception of the use of an object. Hence, in the case of audiobooks, as Have and Pedersen (2016) explain, their affordances are of two categories. First, it is the affordances of the technology used, such as the device, the service used (e.g., Audible) and its characteristics (e.g., touchscreen). Secondly, it is the possible ways the audiobook can be used, e.g., its mobility, portability, the possibility of multitasking, its flexibility, and multimodality (Have and Pedersen, 2016). Having this theoretical framework in mind and following the study by Have and Pedersen (2016), light will be shed on the main differences between the experience of eye-reading and ear-reading and their effects on the cognitive and affective responses of the readers.

First, the audiobook experience is ephemeral in contrast to the experience of reading a print book. The experience of sound is also intangible and time-fixed. Sound is not an object that one will save in the bookcase, lend to friends, skim or open casually to only read a sentence or a page, while social relationships are affected by the audiobook. For example, people on the bus cannot really tell what the person next to them is reading and so they cannot open a conversation about the book. In fact, one might seem distant when wearing earphones during their everyday activities (Have & Pedersen, 2016).

Moreover, the pace of the reading experience is controlled by the performing narrator, not by the reader. The reader cannot easily go back and reread, skim, or skip some parts. If one gets distracted when reading a print book, they can easily go back a few sentences and find the part

they missed. In the case of the audiobook, though, that is not that simple. Depending on the device and the service that one uses, it may be a bit more complicated. If one listens to an MP3 using their smartphone, they have to use the touchscreen and manually slide the time bar backwards. That is not that easy most of the time. They might slide too much and then be forced to re-listen to a bigger part of the audiobook, or they might slide too little and still miss parts of the story. If they use the Audible service, they have the option to go back 30 seconds with the touch of an icon. This might be useful in some cases, if, for example, one gets distracted only for a moment, if there was an external noise interrupting them, or if one just continued listening to the audiobook after a long break and wants to remember where they left the story the previous time. Still, however, 30 seconds might be too long or too short and they might again need to manually find a specific point in the narration, which may feel quite bothersome.

Interestingly enough, however, Aron (1992) interviewed some audiobook users and received an unexpected response from two people: “You cannot skim, so you get the true essence of the author’s words” (p. 211). Furthermore, according to Kuzmičová (2016), although distraction might be more common with the use of audiobooks due to the visual experience of the environment, the reader’s mind wanders when reading a print book as well and the reader may still not go back to reread the part they missed, even if it is easier when manipulating a print book. This is because readers – whether when eye-reading or ear-reading – prefer to continue reading, trying to catch up with the story no matter how much they missed when they were distracted in order to maintain the mental fluency of the reading experience. Kuzmičová (2016) explains that going backwards will be a very “radical step” only in the case that the readers cannot make sense of what they are reading.

Nevertheless, the audiobook reader will probably face problems in their effort to create a cognitive map of the story (Have & Pedersen, 2016). As explained in the case of screen technologies as well, the audiobook user will have a different, limited feeling of the length of the text, of the point of the story they listen to, of what preceded a scene of the story and of what followed it. The only hint available is the sliding bar, noting how many minutes one listened to and how many minutes remain. There is no tangible information of the process of reading, no turning pages, weight in the right and left hands, visual, paratextual cues of how much is left. This fact can negatively affect the reader’s memory, comprehension, and reconstruction of the story. Furthermore, the voice of the performing narrator deprives the audiobook listener of the opportunity to imagine the voice of the character. When reading a book, one silently produces in their brain the voices of the characters, while when listening to the audiobook, the opportunity to create this verbal imagery is gone (Kuzmičová, 2016).

Another important affordance of the audiobook is its portability. The portability of the audiobook allows multitasking and brings exposure to literature in new environments and situations. When reading a print book, one is confined to a sitting position, fixed, almost immobile. When listening to a book, one's eyes and hands are free to engage in other activities. Also, one can be running, cycling, driving, and generally be on the move. This is valuable for busy people who want to find a bit of time to read books. As Have and Pedersen (2016) put it, audiobooks make "wasted time [...] valuable" (p. 138) and are a better fit for the modern way of living. For example, Massey reported in 2014 that British people spend more than a year of their lives commuting, data that fit with Aron's survey (1992), showing that audiobook users are professional, commuters, and highly literate. Other trends of the modern way of living were noted earlier, showing how the way people exercise and the way they organise their everyday lives favours audiobook use over print book use.

Hence, audiobooks have many advantages, but it is questionable to what extent this mobility and multitasking allow the audiobook readers to experience the story world with attention, to comprehend the story, to get absorbed into it, and to experience empathy. When reading a print book, the flow is interrupted only when one stops looking at the page, whereas in the case of audiobooks one is continually being exposed to the story even if they are not consciously paying attention. For this reason, Have and Pedersen (2016) made a valuable distinction between "hearing" and "listening". Hearing is when one's attention is lost; when one is exposed to sound waves but does not follow the story, they are distracted and the audiobook plays in the background. Listening is when one is consciously listening to the voice of the narrator, they are paying attention, and they are putting in effort to comprehend and follow the story. Thus, it requires effort to listen to an audiobook, and the more one is exposed to the environment they see with their eyes or the tasks they simultaneously do, the greater the danger of losing their concentration.

In addition, the audiobook experience prominently influences the readers' mental imagery. Creating rich mental imagery is an important component in bringing affective responses to readers but, as noted above, there is an interconnection between the story world and the real world when using an audiobook. The reader connects the mental imagery with the images in front of their eyes, and maybe a garden will always be somehow connected with a specific story. Although this can give a new twist in the reading process and create an aesthetic experience, the story world will always be occupied by the real world. This can be of great importance, especially in the case of empathic responses. As noted earlier (p. 19), according to the theory of the optimal aesthetic distance (Cupchik, 2002; Scheff, 1979), the distance of the fictional

narratives from reality makes the stories a safe space for the readers to feel for and with the protagonists, in other words, to empathise with them, without facing the consequences of these feelings in their real life. Therefore, it can be argued that, in the case of the audiobook, when the real environment is entangled with the story world, the reader might not feel the appropriate distance from the reality in order to develop feelings without worrying for their meaning in their personal life.

In view of the above, it comes naturally to think that the experience that audiobooks give is very different from print or screen reading, and it leads to questioning whether an audiobook is really a book (Have & Pedersen, 2016). From a material and technological point of view, it seems that the audiobook is completely different from the print book. Also, if the production and distribution methods are taken into account, audiobooks have more similarities with the music and podcast industry (Have & Pedersen, 2019; Kuzmičová, 2016). On the other hand, from a pragmatic point of view, the audiobook is just another remediation of the print book (Bolter & Grusin, 2000). Following the definition of the audiobook by Have and Pedersen, as explained above, there is no audiobook without a printed edition of the book. The audiobook depends not only on the print version, but also exists through the print version (Have & Pedersen, 2016). They even take the issue of definition a step further and discuss whether an audiobook is being read or listened to. They acknowledge that people prefer to say “I listen to an audiobook” in their daily speech; however, they argue that “I read an audiobook” would be a more accurate way to talk about this experience. Following this position, the present thesis also uses the expression “reading an audiobook” as well as the distinction between “ear-reading” and “eye-reading”. If the accepted definition of reading is the activity of making meaning from a text, then both audiobooks and print books (or e-books) are being read (Have & Pedersen, 2016). As Tattersall Wallin and Nolin (2019) explained, it is just that in the first case we read by listening and in the second case we read by seeing. Have and Pedersen (2016) argued in favour of this using the example of Braille system. When using the Braille system, people still say that they are reading a book, even if they use their tactile senses, so there is also the case of reading by touching. In the same vein, the founder of Audible, Don Katz, stated that “we’re moving toward a media-agnostic consumer, who doesn’t think of the difference between textual and visual and auditory experience [...] It’s the story, and it is there for you in the way you want it” (Don Katz in an interview by Alexander Alter, 2013).

#### *1.6.2.1 Empirical evidence on the differences between eye-reading and ear-reading*

Studies comparing ear-reading with eye-reading are much more limited compared to studies comparing print with screen interfaces. Most of the relevant research belongs to the educational

field and has explored the effects of audiobooks on the development of reading skills. For instance, Wolfson (2008) suggested that audiobooks can increase vocabulary size and improve language skills of adolescent students, while Casbergue and Harris (1996) noted that students are relieved of the burden of word decoding and, this way, the activity of reading is more enjoyable for them. However, these studies focus on children and the school environment, which is not the focus of this thesis. Baron's recent book (2021), although it also focuses on the effects of reading media on education, gives an extended review of studies on audio comprehension, and the most related are presented below. First, research has shown that the human brain when listening to a text works almost in the same way as reading a text regarding the representation of semantic information (Deniz et al., 2019). However, it is evident that most studies focusing on informational and educational materials when comparing print books with audiobooks indicate the superiority of print in terms of reading comprehension. For instance, Furnham and Gunter (1989) found that reading news stories in print format is better than listening to them concerning the readers' memory of the stories, while other studies suggested that the length of the text plays a role, with audiobooks giving an advantage when the text is very short, but noting that comprehension is better when reading in print book once the text becomes longer (Schüler et al., 2013). Another study found that print is better than audio regarding text comprehension when reading an informative text, and it additionally found that the factor of mental effort put by the participants was detrimental for these results, with audiobook users putting less effort than print users (Rubin et al., 2000). Based on Baron's review (2021), there are two studies using non-informational texts that examine the differences between audiobook and print regarding comprehension. First, Rogowsky et al. (2016) used a non-fiction novel with narrative style and examined comprehension immediately after reading and two weeks later, finding no difference between the print and audiobook reading conditions. Secondly, another study used a transcript of a videotaped fiction film and found that print readers performed better in text memory compared to participants who listened to the transcript or watched the film (Furnham, 2001). This second study, though, might be difficult to interpret, as a transcript is a very distinct type of text; even though it is fictional, it might lack the narrativity and literariness provided by novels or short stories. In short, although studies on educational and informational texts, such as scientific or news articles, show that print readers perform better in comprehension tests, the effect of audiobooks is more obscure when investigating narrative comprehension.

As for the affective aspects of reading, Have and Pedersen (2016) interviewed four regular audiobook users to find more behind the reason for their preference for audiobooks and the

way they read them. They found that audiobooks were giving more job satisfaction (i.e., in a case of a post officer and a trucker) or were making their commuting more enjoyable. However, they noticed that some of the interviewees were missing the possibility of going back and rereading some pages. They all described the audiobook experience as more distracted compared to reading in print book, which, according to them, allowed for a deeper way of reading. In another study, Gorichanaz (2016) compared the product reviews of the hardcover, audiobook, and e-book editions of *Ulysses* and *Infinite Jest* on the online shop Amazon. He found that the hardcover reviews showed that the print book readers got more absorbed in the stories in comparison to the e-book and audiobook readers. Also, he noted that the reviews that were referring to the hardcover editions tended to copy the writing style of the authors when commenting the book, which might mean that there has been a higher influence, and this is even more evident from the fact that only the hardcover reviewers noted that they had been personally transformed by the book.

In summary, taking these studies as a starting point and based on the aforementioned theoretical background, the effect of ear-reading on readers' absorption, empathy, and comprehension compared to eye-reading seems quite uncertain, but it might be suggested that the concentration of audiobook readers might be more likely to be compromised by their external environment and the tasks they perform simultaneously. Also, their mental imagery may be influenced by the environment they perceive with their eyes, while their absorption might be compromised when the story world is entangled with the real world, which can also negatively affect their feeling of empathy. Lastly, it may be that ear-readers' comprehension is lower in comparison to eye-reading due to the lack of tactile and visual paratextual cues, which are essential for constructing the cognitive map of a story, but more empirical studies are needed to support such arguments.

## 1.7 Conclusion

This literature review attempted to summarise the different factors that can play a role in the relationship between reading and empathy. After an investigation of the term empathy, its definition, and a presentation of its affective and cognitive components, it was concluded that it can be treated as either a psychological notion with a specific meaning or as a general term that encompasses other phenomena, such as sympathy and prosocial behaviour.

The theories investigating the power of literary reading on readers' empathy were explored from a multidisciplinary perspective, presenting on the one hand theories proposing a utilitarian

function of reading and on the other hand theories questioning whether reading can somehow affect people's empathy.

The role of the text genre was examined, uncovering the problematic association between literariness and fictionality (Ronen, 1994), which brings problems not only in the theoretical study of reading and empathy, but also in empirical studies, making it precarious to draw conclusions about the role of fictionality in readers' empathy. Two very related phenomena, comprehension and absorption, were also examined, putting emphasis on the unique and personal characteristics of narrative comprehension and its role in the emergence of narrative empathy. Regarding absorption, the term and its components were reviewed and attention was put on the role of the absorbing experience in narrative empathy and in the enjoyment of leisure reading.

Apart from the role of the text, it was argued that the reading device can also affect the reading experience. Digital media may hinder the process of deep reading, which is considered necessary to have an absorbing reading experience and to deeply comprehend and feel with the characters of a story (Wolf et al., 2012). Furthermore, the screen interface may affect the reading experience, as scrolling and the lack of paratextual cues may undermine the reader's ability to reconstruct the order of the narrated events of a story, while e-readers may provide a better interface compared to tablets due to the reduced eyestrain and the lack of distractions compared to tablets (Mangen, 2016b). However, it was found that research on the role of digital devices in affective responses towards texts, such as empathy and absorption, is very limited and inconsistent, calling for more investigation. Meanwhile, audiobooks are becoming more and more popular, with subscription platforms such as Amazon's Audible providing a plethora of titles at an affordable price and advertising that it provides "another way to get away", taking you on a "trip to Hogwarts" or "back in time in Ancient Greece".<sup>11</sup> Although the lack of tactile, visual, and paratextual cues of audiobooks might negatively affect readers' comprehension, they can bring a unique experience to the reader due to the interconnection of the real with the story world and the fragility of readers' attention (Have & Pedersen, 2016).

In summary, psychological, sociological, evolutionary, educational, neuroscientific, and literary studies were investigated to discern the effects of reading on empathy, comprehension, and absorption, while stressing the role of fictionality and that of the reading interface. This literature review, however, is not conclusive, as the need to interpret the findings of the

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<sup>11</sup> <https://www.youtube.com/watch?v=9DC881PWbU>. Date of last retrieval: 17/8/2022.



empirical studies of the following chapters will lead to revisions and additions to the present literature review. This chapter reported mainly psychological evidence and theories because they provide techniques and findings that will be used in the next three chapters of this thesis. This focus may be criticised because it does not account for different factors (e.g., individual and cultural factors) but it was needed to conduct the empirical studies of the next chapters. These studies will attempt to empirically investigate the effects of fictionality and reading devices on empathy, absorption, and comprehension and provide a clearer picture of their interconnection in the literary reading experience.

Specifically, the following chapter will investigate the effect of fictionality on readers' empathy. It will examine empathy as a distinct phenomenon to disengage it from the related phenomena that were noted above. It will also focus on the effect of fictionality with the use of fiction and non-fiction literary narratives to address the problematic association between fictionality and literariness as explained earlier. Finally, it will explore the effects of reading devices on readers' empathy to address the questions that arose in the literature review, comparing print, e-readers, tablets, and audiobooks. This way, it will be possible not only to compare print with screen, but also to study the role of e-ink technology compared to the LCD screen, as well as the difference the audiobook format might make to readers' empathy.

Chapter 3 will focus on the experience of absorption and will also explore the effect of fictionality through the comparison of fiction and non-fiction literary narratives to address the questions that emerged during the present literature review. Furthermore, it will compare the four devices mentioned above with respect to their effects on absorption, while it will also examine the effect of absorption on readers' empathy to provide insight on the relationship between narrative empathy and empathy.

Lastly, Chapter 4 will explore the effect of fictionality and reading devices on comprehension. It will focus on narrative comprehension to address the gap of knowledge in the comparison between fiction and non-fiction literary narratives, and it will compare the four aforementioned devices to provide evidence in this field. Finally, Chapter 4 will investigate the effect of comprehension on empathy and absorption to address the questions that arose in the first part of this literature review.

## 2 Second Chapter: The effect of reading on empathy: the role of fictionality and reading device

### 2.1 Introduction

The above literature review focused mainly on psychological aspects of reading that indicated the need for further research on the relationship between empathy and literary reading, focusing on the role of fictionality and reading device. First, previous studies made it clear that there is an erroneous association between literariness and fictionality (Hartung et al., 2017; Ronen, 1994), with relevant studies claiming that they investigate the effects of fictionality on empathy while, in reality, they compared literary fiction with non-literary factual texts and reported differences between, e.g., reading novels versus newspapers (e.g., Black and Barnes, 2015; Djikic et al., 2013; Johnson et al., 2013)<sup>12</sup>. For this reason, the present study explores the effects of fictionality on readers' empathy per se by comparing literary narrative texts that differ only in the aspect of fictionality.

Secondly, although there exist many studies that examine the effects of digital devices on reading, the limited number of studies that focus on the affective responses to literature made the need to study the role of the device in readers' empathy apparent. Furthermore, it was considered of paramount importance to not only compare print with screen, but also compare print and screen interfaces with audiobooks, as well as to compare tablets with e-readers to have a conclusive picture of the differences each device can bring to readers' empathy.

Third, Mangen and Kuiken's (2014) study indicated that there could be an interaction between the reading device and the genre of the texts. In particular, they found that there was no effect of the reading medium when the text was labelled as fiction, while when it was labelled as non-fiction, participants reported more absorption and sympathy when reading in print book compared to reading on a tablet. For this reason, the interaction between the medium and the text (fiction versus factual) will also be examined.

Lastly, it was considered vital to also examine whether there are any long-term effects of literary reading on empathy since there is very limited evidence on this issue (Bal & Veltkamp, 2013).

Since the literature review of the previous chapter focused on psychological studies, this study will follow a relevant empirical methodology to explore these issues.

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<sup>12</sup> Dodell-Feder and Tamir's meta-analysis (2018) provides a useful table with the relevant studies and the texts they used for their experiments.

## 2.2 Hypotheses and Research Questions

First, **(1)** based on the literature review, this study predicts that literary reading will increase readers' empathy and **(2)** fiction stories will evoke stronger empathy than non-fiction stories. It also predicts that **(3)** this effect will decrease after a period of time, but will still be evident.

Based on the literature review, it is also hypothesised that **(4)** print reading will elicit more empathy followed by e-readers, tablets, and lastly audiobooks.

Furthermore, **(5)** this study will investigate whether there is any interaction between the genre of the text (fiction versus non-fiction) and the reading medium when studying their effects on readers' empathy, as well as **(6)** whether there are any long-term effects of the reading medium and text's fictionality on empathy. In a more exploratory fashion, this study will also test **(7)** whether a number of individual differences (i.e., readers' experience with literature and reading devices, their personal experiences relevant to the subject matter, the personality trait need for affect, the interference of the reading interfaces, multitasking, disruption and breaks while reading) can influence the effect of literary reading on empathy and the role of reading devices.

## 2.3 Methodology

### 2.3.1 Design

This study had a mixed design. The first independent variable, reading device, was between-participants, with four levels: print book, e-reader, tablet, and audiobook. The second independent variable, time, was within-participants, with three levels: before, immediately after reading, and two weeks after reading.<sup>13</sup> The third independent variable, text, was between-participants, with two levels: fiction and non-fiction. The dependent variable, empathy, was measured three times, before, immediately after, and two weeks after reading. The measurement before reading was meant to measure baseline empathy.<sup>14</sup>

Before reading, the following measures were also collected: the personality trait need for affect, the experience with literature, with reading devices, and with the subject matter. Immediately after reading, aspects of the reading experience were also measured: interface interference, breaks and disruption while reading, and, specifically for the audiobook device, multitasking while reading. These extra measurements were added to examine their role in the effects of reading devices on empathy. Immediately after reading, absorption and comprehension were

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<sup>13</sup> A two-week period was chosen to investigate the long-term effects on empathy. However, the selection of a two-week period was arbitrary and can only be indicative of long-term effects.

<sup>14</sup> The study has been pre-registered at AsPredicted.org (<https://aspredicted.org/r8s4z.pdf> and <https://aspredicted.org/bc2i2.pdf>).

also measured for the purpose of future studies of this thesis (see Chapters 3 and 4). Two weeks after reading, only empathy and comprehension were measured. Details about all the dependent variables and how they were measured are reported in the Procedure section.

### 2.3.2 Participants

First, participants for the fiction condition were recruited. That sample consisted of 344 participants from all over the UK. There were 286 female and 56 male participants. Two participants preferred not to say their gender. The mean age was 37.62 (range 18–76). The recruitment of the non-fiction condition took place at a later point<sup>15</sup>. Two-hundred-forty-two participants of the fiction condition participated in the non-fiction condition as well, while 102 new participants were added to reach the total sample size of 688 participants (344 for each text condition). Regarding the participants of the non-fiction condition, there were 293 female, 50 male, and 2 transgender participants while 3 participants preferred to not give information about their gender. Their mean age was 38.78 (range 18–85). All participants were over 18 years old, native English speakers, and living in the UK.

Although some participants were both in the fiction and the non-fiction condition, they were treated as independent participants and the factor of text was treated as a between-participants factor because there was a long time period between the fiction and non-fiction study, which could impact participants' baseline empathy. For this reason, a correlation was conducted to compare the baseline empathy of the participants that were tested twice. It was found that there was a positive correlation between these baseline levels ( $r(240) = 0.71, p < .001$ ) showing a moderate to high correlation. Therefore, it is crucial to note that the following analyses assumed independence despite the design and this correlation of the baseline levels for part of the sample.

The sample size was determined through power analysis using the software G\*Power, for an effect of  $\eta^2 = 0.02$ , power = 0.80, alpha = 0.05, 4 conditions (the 4 devices) and 3 numbers of measurements (time 0: baseline empathy, time 1: empathy immediately after reading, time 2: empathy 2 weeks later). The four devices had an equal number of participants, with 86 participants per device. I opted for an effect size of  $\eta^2 = 0.02$  because, first, no reported effect sizes of studies exploring the effects of reading devices on affective responses were found when this study was designed; secondly, only small effect sizes have been reported in studies on the effects of reading technologies on comprehension. Also, the effect sizes provided by the

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<sup>15</sup> The recruitment of the participants for the fiction condition took place from June to September 2020. The recruitment for the non-fiction condition took place from April to June 2021.

previous studies were calculated for ANOVAs rather than a Growth Curve Analysis that this study used (see Section 2.4 for details) which limited this study's ability to draw comparisons. In particular, the meta-analysis by Delgado et al. (2018) showed a small effect size ( $g = 0.221$  that is equal to  $\eta^2 = 0.012$ ) regarding the effect of reading devices on comprehension. With this knowledge, I opted for a small effect size, but I restrained from looking for an extremely small size, questioning whether this would be meaningful. At a later point, the condition of text was decided to be added to the study, so the sample size had to double, reaching the 688 participants, with 344 for each text condition and 172 participants per device.

The participant recruitment was organised in a way to avoid any personal contact due to the COVID-19 outbreak. Flyers and descriptions of the experiment were shared online, via social media, email lists, and blogs. Interested participants were asked to contact the researcher via email. Also, every participant was encouraged to share the flyer with their acquaintances. Potential participants were required to be over 18 years old, native English speakers, and based in the UK. It was fundamental for participants to be based in the UK in order to send them the print book via post with a low cost and to send the Kindle edition of the book via the online shop [amazon.co.uk](https://www.amazon.co.uk). When the recruitment of the participants of the non-fiction condition took place, participants of the fiction condition that showed interest in participating in future research were first contacted. After recruiting these participants again, the rest of the 100 participants were recruited with posts on social media and email lists using the same recruitment procedure.

### 2.3.3 Procedure

This study used online questionnaires with Qualtrics software ([qualtrics.com](https://www.qualtrics.com)). Data for the fiction condition were collected before the data for the non-fiction condition, as explained earlier. First, 20 people, 5 per device, were recruited for a pilot study, to check if they experience any problems with the questionnaires and procedure. Their feedback was positive and slight changes were made. Participants of the pilot study were not included in the analyses.

Before completing the first questionnaire, participants read the study information sheet and gave their informed consent by agreeing with a list of statements (see Appendix B). When they completed the study, debriefing was provided (see Appendix B). The participants received a £10 Amazon voucher as a compensation for their time. This study was approved by the Lancaster University Faculty of Arts and Social Sciences ethics committee (reference FL19005 - see Appendix A).

Prospective participants contacted the main researcher via email to show their interest. The researcher then gave them a short description of the experiment and asked them whether they

owned a tablet or e-reader device. In case they did, they were assigned to the condition of tablet or e-reader, respectively. If they did not, they were assigned either to the condition of print book or audiobook. The distribution of the participants between the audiobook and print book conditions was made in an arbitrary way. Then the first questionnaire of the study was sent to the participants, which included the information sheet and consent form, the empathy measurement together with the need for affect, experience with literature, reading devices and subject matter measurements and personal details (age, gender, ethnic group, education level). The information sheet did not include a full disclosure of the study's objectives and research questions, but it provided a general description noting that the study investigates the experience of reading short stories (or non-fiction essays in the case of non-fiction condition) to gain an understanding of people's reactions to literature. Thus, the participants did not know that the reading device they used played any role.

After completion of the first questionnaire, participants received the reading/listening materials. For the print condition, the paperback was sent via post within one to three days. For the e-reader and tablet conditions, the e-book was sent via the Kindle store of amazon.co.uk, while participants in the audiobook condition received a link to download it as an mp3 file. Together with the materials, participants received the link to the second questionnaire, which included the measurements of empathy, absorption, comprehension, and measurements of individual factors (i.e., interface interference, multitasking, disruption and breaks rate). For the e-reader and tablet conditions, the second questionnaire had an additional question, asking which specific device model the participants used to make sure they used the device to which they were assigned. All participants were asked not to open the questionnaire link before reading/listening to the story, but to open and complete it immediately after reading/listening. The last questionnaire of the study was sent to participants 13 days after completion of the second questionnaire and asked participants to complete it within 48 hours. This time frame was given to ensure completion would take place within a reasonable time, yet giving participants some flexibility. The last questionnaire included the empathy and comprehension measurements. Upon completion of the third questionnaire, a £10 Amazon voucher was sent to participants via email. Data from participants who did not complete all three questionnaires were excluded from the study. The same exact process was then followed for the non-fiction condition.

## 2.3.4 Materials

### 2.3.4.1 *Empathy*

When measuring the effects of literary reading on empathy (e.g., Djikic et al., 2013; Koopman, 2016a), the most common measurement used from previous studies has been the Interpersonal Reactivity Index (Davis, 1983) or subscales of it, for example, the empathic concern scale (Bal & Veltkamp, 2013).

This questionnaire includes four subscales; two of them are suggested to measure cognitive empathy (Perspective Taking and Fantasy), and the other two measure affective empathy (Empathic Concern and Personal Distress). However, there were a few limitations. First, the questionnaire is based on Davis' (1980) definition of empathy that includes sympathy as part of it, and secondly, the Personal Distress subscale seems to have a close relationship with neuroticism rather than affective empathy (Spreng et al., 2009). Most importantly, the empathic concern subscale focus is exclusively on the feeling of sympathy, with questions such as "I often have tender, concerned feelings for people less fortunate than me" and "Sometimes I don't feel very sorry for other people when they are having problems" or "I am often quite touched by things that I see happen". As a result, research on the effects of reading on empathy that uses only the empathic concern subscale to measure empathy after reading is not really measuring empathy but sympathy (e.g., Bal & Veltkamp, 2013). Moreover, the Fantasy subscale measures an individual's tendency to transpose themselves "imaginatively into the feelings and actions of fictitious characters in books, movies, and plays" (Davis, 1983, p. 114). Therefore, this scale seems to create a confusion between the experience of absorption, sympathy, and empathy.

Other studies investigating the effects of literary reading on empathy (see, e.g., Kidd & Castano, 2013; Mar et al., 2006; Mar et al., 2009) have used the Reading The Mind in The Eyes Test (Baron-Cohen et al., 2001), but this test was found to lack internal consistency, homogeneity, and content validity (see, e.g., Black, 2018; Olderbak et al., 2015; Turner & Felisberti, 2017). In detail, the Reading The Mind in The Eyes Test (RMET) asks participants to infer emotional states from pictures of actors' eyes; thus, as the authors of the test explain, RMET can provide information only for the very first stage of theory of mind, and thus very basic cognitive skills rather than empathy (Baron-Cohen et al., 2001; Koopman & Hakemulder, 2015). Another research studying the relationship between empathy and literary reading (Wallentin et al., 2013) has used the Balanced Emotional Empathy Scale (BEES) (Mehrabian, 1997) that focuses only on the affective component of empathy, and so, it ignores cognitive empathy. Lastly, the Toronto Empathy Questionnaire (Spreng et al., 2009) is another measure of empathy; it was constructed to measure empathy as a homogeneous phenomenon, but measures mostly sympathy, sensitivity,

and altruism rather than empathy while it is based on a definition of emotional empathy that considers it as equivalent of sympathy.

Taking into account the aforementioned measurements, I chose to use a more recently developed measurement, the Questionnaire of Cognitive and Affective Empathy (QCAE) by Reniers et al. (2011) because it clearly measures empathy and not sympathy, prosocial behaviour, or absorption as previous measurements did. Also, it was chosen because it focuses on the multidimensionality of the concept of empathy and allows the investigation of the effects on empathy in total, but also the exploration of affective and cognitive empathy separately. This questionnaire consists of 31 items that were rated on a 4-point Likert rating scale ranging from -2 (strongly disagree) to 2 (strongly agree). The QCAE consists of two subscales, the cognitive empathy subscale (19 items; e.g., “Other people tell me I am good at understanding how they are feeling and what they are thinking”; “I can tell if someone is masking their true emotion”) and the affective empathy subscale (12 items; e.g., “I often get emotionally involved with my friends’ problems”; “I am inclined to get nervous when others around me seem to be nervous”), allowing us to measure empathy in total and affective and cognitive empathy separately. As a result, the scale limits of the QCAE are 31 to 124 points. The affective subscale can have a range from 12 to 48 points, while the cognitive subscale can range from 19 to 76 points.

#### *2.3.4.2 Individual differences*

##### *2.3.4.2.1 Interface Interference*

To explore the potential interference of the devices in the reading experience, the Interface Interference scale developed by Mangen and Kuiken (2014) was used. It consists of 12 items with a 5-point Likert scale ranging from 0 (definitely false) to 4 (definitely true). This scale consists of three subscales, namely the resistance to distraction subscale (6 items), which assesses whether and how the device used caused distraction during the reading experience; the awkwardness subscale (2 items), which reflects readers’ awkwardness when handling the reading device; and the dislocation subscale (4 items) that assesses readers’ ability to locate where they are in the text.

##### *2.3.4.2.2 Breaks, disruption, and multitasking*

I also added two 2-item scales in the questionnaire to measure breaks and disruption while reading. These scales were added because the study did not take place in a research setting but instead it happened in the participants’ home, and thus, I could not control or witness whether the participants took a break. Also, the chances of disruption due to external reasons were higher due to the non-academic setting (e.g., disruption by other household members, phone calls, household chores, or noises). Therefore, I asked participants if they were disrupted while



reading/listening to the story, with two options (yes or no). If they chose yes, then a second question would appear, asking them to rate how much they were disrupted on a 4-point Likert rating scale ranging from -2 (very little) to 2 (very much). The same process was administered for the measurement of breaks while reading. For the condition of audiobook, an extra question was added, asking whether the participant engaged with other activities while listening to the story, with two options (yes or no) to explore the potential complications of multitasking when listening to an audiobook.

#### 2.3.4.2.3 Experience with literature

Participants' experience with literature may also affect their empathy (see Mumper & Gerrig, 2017, for a meta-analysis). This was measured with the Author Recognition Test (ART), which was first developed by Stanovich and West (1989). This test provides a list of names and asks participants to choose the ones they recognise as names of authors, among some foils. This measurement has been used as an alternative to more direct questions dealing with the assessment of reading habits that faced the issue of social desirability. Although ART does not directly ask participants to note the authors they read, it is a valid measure of experience with literature (Acheson et al., 2008; West et al., 1993). Participants are informed that the list includes foils; therefore, guessing is discouraged. For this study, I used a short version of ART developed by Moore and Gordon (2015), which includes 65 items (50 names of authors plus 15 foils) and it is based on the 65-author edition by Acheson et al. (2008). Moore and Gordon (2015) found that 15 authors included in the Acheson et al. (2008) edition were highly correlated with guessing, and thus eliminated them, resulting in a 50-author edition.

#### 2.3.4.2.4 Experience with reading devices

Participants' experience with different reading devices could provide alternative explanations for their effects on the reading experience. Consequently, I measured participants' experience with different reading devices asking them directly how much they use them. I provided them with a list of four options (print books, tablets, e-readers, and audiobooks) while I added an extra option where they could add a different device they might use. They rated the frequency of their use of the above devices with a 5-point Likert scale from -2 (never) to 2 (always).

#### 2.3.4.2.5 Personal experiences relevant to the story

Based on the literature review (Green, 2004; Keen, 2007), personal experiences with the story's subject matter can increase readers' empathy, so I added a 2-item question, asking participants whether they had experiences relevant to the subject matter of the story. I assessed both direct experiences ("Have you ever been discriminated because of your ethnicity?") and indirect

experiences (“Do you have close friends or family that faced discrimination because of their ethnicity?”). The participants had two options to choose from (yes or no) to answer the questions. A question about the participants’ ethnicity was also added to examine participants’ personal experiences, assuming that people of Black background might identify and thus empathise more with the protagonist of the story resulting to higher empathic scores.

#### 2.3.4.2.6 Need for affect

Relevant research has shown that some personality traits may have an effect on empathy (Dal Cin et al., 2004; DeYoung et al., 2007; Finn, 1997; Kuijpers, et al., 2019; Mar et al., 2009; McManus & Furnham, 2006).

Dal Cin et al. (2004) proposed that the reading experience is affected by the trait transportability, that is, the tendency of becoming immersed in a narrative. However, the scales developed to measure this trait are almost identical to the scales of absorption. For example, Dal Cin et al. (2004) suggested the Transportability Scale, which includes questions such as “I am often emotionally affected by what I’ve read”, and “I can easily put stories out of my mind after I’ve finished reading them”. Therefore, it is evident that the Transportability Scale imitates questions of the scales measuring absorption. The same issue is apparent in other scales used to measure this trait, i.e., the Immersive Tendencies Questionnaire (Witmer & Singer, 1998) and the Trait Absorption Scale (Tellegen & Atkinson, 1974). In the same vein, the use of the Fantasy subscale of the Interpersonal Reactivity Index (IRI; Davis, 1983), is highly precarious as well, because it was developed to measure empathy, but it has been used to measure absorption, which will bring implications to the present study and the use of these scales will be problematic. As Appel and Richter (2010, p. 106) note, “the construct of transportability merely describes rather than explains the fact that there are stable individual differences in the degree of transportation”.

In contrast, the personality trait need for affect seems the most relevant personality trait that might predict readers’ empathy. Need for affect is defined as “the general motivation of people to approach or avoid situations and activities that are emotion inducing for themselves and others” (Maio & Esses, 2001, p. 585). Notably, Appel and Richter (2010) showed that individuals high in need for affect get more absorbed in a story world when reading a narrative text, and in turn, absorption might increase their empathy. I did not measure other relevant traits that have been connected with readers’ empathy, namely the trait openness to experience because previous research showed that it does not predict empathy (Mar et al., 2009) and when an effect was shown, it was highly correlated with need for affect and need for cognition (Fleischhauer et

al., 2010; Kuijpers et al., 2019). I also excluded need for cognition because it plays a secondary role in literary reading and it is again highly correlated with need for affect (Kuijpers et al., 2019). To measure need for affect, I used the measurement that was developed by Appel et al. (2012). This is a short version of the scale that was first created by Maio and Esses (2001). It consists of 10 questions, and it includes two subscales, the avoidance subscale (e.g. “If I reflect on my past, I see that I tend to be afraid of feeling emotions”; “I find strong emotions overwhelming and therefore try to avoid them”) and the approach subscale (e.g. “I think that it is important to explore my feelings”; “It is important for me to be in touch with my feelings”), with a 7-point Likert scale from -3 (strongly disagree) to 3 (strongly agree). As a result, the scale can range from 30 to -30 points.

#### 2.3.4.2.7 Additional questions

The first questionnaire included some personal questions, namely age, gender, ethnic group, and education. The last questionnaire had an additional question asking participants if they would like to be contacted to participate in other similar studies for the same project. Participants could choose between two options, yes or no. This last question was provided only to the participants of the fiction condition and it supported the recruitment process for the non-fiction condition as noted above.

#### 2.3.4.3 Stories

The choice of texts used in this experiment was based on a review of an extended list of books. The criteria for the stories to be considered suitable for this experiment are given below.

- There should be one literary fiction and one literary non-fiction, both in narrative form.
- They should be realistic, i.e., excluding sci-fi.
- They should be available on the UK market in both print book and e-book editions.
- They should be written in English.
- They should be of similar length, around 9.000 to 11.000 words.
- They should have a common subject matter.

The subject matter of Black experiences was chosen because there are plenty of slave narratives that can be used for the non-fiction condition and fiction short stories as well. The underrepresentation of Black authors from relevant studies has also been a motivation to use texts with this subject matter. It was important to have texts of similar subject in order to have

a clearer investigation of the effect of fictionality, and to draw comparisons minimising the risk that the subject matter might be a reason for the reading effects (if any).

The search was based on the use of keywords such as 'black', 'fiction', 'short stories', 'black history month', 'slave narrative' 'non-fiction', 'essays' in databases provided by the websites of The British Library, the Library of Lancaster University, Amazon Books, and Goodreads.

Regarding the fiction condition, the review resulted in the short stories "The American Embassy" by Chimamanda Ngozi Adichie included in the short stories collection "The thing around your neck" (Adichie, 2009), "The Finkelstein 5" by Nana Kwame Adjei-Brenyah included in the short stories collection "Friday Black" (Adjei-Brenyah, 2018), "Negro Progress" by Anthony Grooms, from the collection "Trouble no more" (Grooms, 1996) and "Father and Son" by Langston Hughes from the collection "The ways of white folks" (Hughes, 1934).

For the non-fiction condition, the review resulted in the essays "Where are you from?", by Afua Hirsch included in the book "Brit(ish): On race, identity and belonging" (Hirsch, 2018), "Notes of a Native Son", "Stranger in the Village" and "Equal in Paris" from the book "Notes of a Native Son", by James Baldwin (Baldwin, 1955).

Of these, the story "Father and Son" by Langston Hughes was chosen for the fiction condition and the story "Notes of a Native Son" by James Baldwin for the non-fiction condition since they were the longest, close to length (11368 words for the fiction condition and 9217 for the non-fiction) and they were both dealing with the relationship between a father and his son.

Hughes' "Father and Son" was published in 1934. It is comprised of 9 sections and is a rich narrative with many events occurring. The story is written in third person; it takes place in a plantation of Georgia in the 1930s and it exposes the power relationship between the patriarch owner of the plantation, his black mistress and servant of 30 years and their son that comes back to claim his right to his patrimony. The story has a tragic ending, with the son killing his father, the neighbours trying to lynch the son, and the son killing himself.

Baldwin's "Notes of a Native Son" was published in 1955. It is comprised of 3 parts and is a narrative written in first person, with the author recalling parts of his upbringing, his relationship with his father that was of the first generation of free men, his father's attitudes and behaviours while dealing with tuberculosis and paranoia, as well as the author's experiences as a young adult in New Jersey and the troubles and emotions segregation and racism brought into his life. The essay evolves around the death of his father that coincided with the birth of the author's youngest sibling and the Harlem Riot in 1943.

#### 2.3.4.4 Devices

##### 2.3.4.4.1 Print book

Participants of the print book and fiction condition received the paperback “The ways of the white folks” by Langston Hughes (eds. 1990) via post and were asked to read only the last story included in the book, titled “Father and Son”. For the non-fiction condition, the paperback “Notes of a Native Son” by James Baldwin was sent via post and participants were asked to read only the sixth essay included in the book that bears the same title as the book. Due to the limited availability of the book on the market, some participants received a different edition of the book than others. However, the only difference between the two editions was the cover of the book, the quality of the page, and the weight of the book. The essay was on the exact same page (page 71) and with exactly the same content in both editions. In particular, the two editions used were by Penguin Modern Classics (eds. 2017) and by Beacon Press (eds. 2012).

##### 2.3.4.4.2 Tablet

Participants were asked to use their own tablet, but to note in the relevant question what model they used. For the fiction condition, 52 participants used an Apple iPad, 14 used an Amazon Fire tablet, 7 used a Samsung tablet, 3 used an Asus Nexus tablet, 2 used the Hudl tablet, 2 a Lenovo tablet and 1 a Microsoft Surface Go. The rest of the participants were unable to identify the specific model of the tablet they used. All of them used the Kindle app on their tablet to access and read the e-book “The ways of the white folks” by Langston Hughes (eds. 1990). The edition was precisely the same as the print book, and they were asked to read only the story “Father and Son”. Regarding the non-fiction condition, 50 participants used an Apple iPad, 13 used an Amazon Fire tablet, 11 used a Samsung tablet, 5 used a Lenovo tablet, 3 used a Microsoft Surface Go, 2 an Asus Nexus tablet, and 2 used the Hudl tablet. As with the fiction condition, all participants used the Kindle app on their tablet to access and read the e-book “Notes of a Native Son” by James Baldwin (eds. 2017). The edition was precisely the same as that of the Penguin’s paperback edition and they were asked to read only the essay “Notes of a Native Son”.

##### 2.3.4.4.3 E-reader

Participants were asked to use their own e-reader, but to note in the relevant question which model they used. Concerning the fiction condition, 84 participants used an Amazon Kindle e-reader and 2 used a Kobo e-reader. Among Kindle users, 27 used the edition Paperwhite, 3 the Oasis, and 1 the Voyage. The remaining number did not specify the model. For the non-fiction condition, 85 participants used an Amazon Kindle e-reader and 1 used a Kobo e-reader. Among Kindle users, 38 used the edition Paperwhite and 5 the Oasis. The remaining participants did not specify the model. As in the case of the tablet condition, everyone used the Kindle app on their

e-reader to access and read the same e-book provided to the tablet users and asked to read only the relevant story. In both tablet and e-reader conditions, some participants did not give clear descriptions of the device they used (e.g., “kindle app”, “kindle tablet”, “Apple e-reader tablet”). In these cases, I contacted the participants via email and asked for clarifications to ensure they fit the criteria and to be added in the correct device condition. All participants were happy to explain what type of device they used. Some participants did not follow the instructions given and read the story on their mobile phones or on their laptops. These cases were excluded from the study.

#### 2.3.4.4.4 Audiobook

Regarding the fiction story, no audiobook edition was available on the market. Therefore, an actor was appointed and narrated the story “Father and Son”. The narration was recorded, edited using the free software Audacity ([audacityteam.org](http://audacityteam.org)) and exported as an mp3 file. It has a duration of 1 hour and 6 minutes. The file was then shared with six independent reviewers who are regular audiobook users and were asked if the quality of the narration and sound is similar or comparable to those commonly found on the market. After receiving positive reviews from them, the mp3 file was sent to participants via email and they were free to listen to it on whichever device they would normally use for audiobooks. The audiobook edition for the non-fiction condition was provided by Blackstone Publishing; it was released in 2015 and it is narrated by Ron Butler. It is an unabridged edition and has a duration of 53 minutes.

## 2.4 Data analysis

Linear Growth Curve Analysis (Mirman, 2014) was used to model empathy with fixed effects of device (print, e-reader, tablet, audiobook), text (fiction and non-fiction), and time (time 0: before reading, time 1: immediately after reading, time 2: two weeks after reading) and their interactions, while including the random effect of participants on the intercept. Random effects on the slope were not included since the text and device conditions were between units (Barr et al., 2013). Although time was a within-units measure, it was not included as a random effect on the slope because the time points of the testing were long apart and that is likely to reduce the effect of time at the individual level. The software R (version 4.0.3.; R Core Team, 2020) with lme4 package (Bates et al., 2014) was used, following a “minimal to maximal-that-improves-fit process” (Meteyard & Davies, 2020, p. 17). The lmerTest package (Kuznetsova et al., 2017) was also used to add parameter-specific p-values calculated with the Satterthwaite approximation for degrees of freedom (Mirman, 2014, p. 57). The fixed effects were added progressively, and each addition was tested separately to check if it improves the fit of the model. The comparison of the model fit was tested using Likelihood Ratio Tests (Field et al.,

2009; Meteyard & Davies, 2020). The model with the best fit was kept for the results of the analyses.

In detail, the fixed effect of time was tested on its own, ignoring the predictors device and text (and thus not needing to proceed to the model comparison), and adding the random effect of participants (id) on the intercept (empathy ~ time + (1|id)). After that, the fixed effect of the text was added to the model and tested to check if it improved the fit of the model, while ignoring the effect of the device. It was first added on the intercept to find the main effect of device and then on the slope to see the interaction between device and time and these two models were compared with the initial model that included only the effect of time (empathy ~ time + text + (1|id) for the intercept, empathy ~ time \* text + (1|id) for the slope). The same procedure was used to investigate the effect of device while ignoring the effect of the text (empathy ~ time + device + (1|id) for the intercept, empathy ~ time \* device + (1|id) for the slope). Since the fixed effect of device included four categorical predictors, the models with the best fit were re-fitted using a different reference level each time following the instructions of Mirman (2014) in order to perform multiple comparisons of categorical predictors. Afterwards, an investigation of the fixed effect of device was explored for each text separately, as it was expected that the effect of device would be different for the two texts. The database was separated in two (one fiction database and one non-fiction database) and, for each database separately, the fixed effect of device was fitted on the intercept and then on the slope term, and these models were compared with the baseline model that included only the time term. The interaction between time, device and text was explored by adding both the fixed effects of device and text on the slope (empathy ~ time \* device \* text + (1|id)) and comparing this model with simpler forms, in particular with a model with only the device as fixed effect on the slope and the baseline model that included only the effect of time.

In a more exploratory fashion, the variables that were expected to affect readers' empathy regardless of device (i.e., experience with literature, personal experience with subject matter, need for affect) were added on the intercept (e.g., empathy ~ time + need\_for\_affect + (1|id)) and slope term (e.g., empathy ~ time \* need\_for\_affect + (1|id)) and these models were compared with the baseline model that included only the time term (empathy ~ time + (1|id)), following the same methodology as the factors of text and device. Each variable was examined separately. Some individual factors (i.e., disruption, breaks, interface interference) were expected not only to affect readers' empathy but also to influence the effect of the device. For this reason, if there was an effect of these factors on the change of readers' empathy, an additional analysis was performed to examine whether the device had a unique contribution to

the change of empathy or whether some of the variance was instead explained by one of these factors. This analysis was performed based on Mirman (2014) and compared a model that included both the effect of device and individual factor with a model that included only the effect of the individual factor (each individual factor was examined separately). Based on this comparison, if the model including both the fixed effects of device and individual factor fitted the data better than the model including only the effect of the individual factor, this was an indication that the reading device had a unique contribution to the change of empathy.

In the case of the effect of multitasking, it was measured only for the audiobook condition, and its potential effect was explored by the model comparison of three models: one baseline model including only the effect of time, one model that added the fixed effect of multitasking on the intercept, and one model adding it on the slope term. Regarding the factor experience with the reading device, I investigated whether adding the experience with each of the four devices on the intercept and slope term improved the model when including participants of the specific condition. For example, experience with audiobook was added as a fixed effect when exploring the audiobook condition only, and so forth.

In an effort to simplify the models and explore the results of the analyses, the empathy slope was modelled in three phases: first the empathy slope from the baseline level (time 0) to the immediately after reading level (time 1), then the empathy slope from the time 1 level to the two weeks after reading level (time 2) and then the empathy slope from time 0 to time 2.

This way, when investigating the change of empathy from time 0 to time 1, when the model with the best fit was the one including only a fixed effect on the intercept (whether that was the text, the device or an individual difference), this was meaningless for the purpose of this study. This is because it showed an effect on baseline empathy (time 0), that is before readers' exposure to the reading materials and devices. In a similar fashion, when exploring the change of empathy from time 1 to time 2, if an effect was found on the intercept, that did not give any information about the effect on the change on empathy through time. On the other hand, when an effect was found on the slope, it showed that the fixed effect affected the change of empathy, which was the focus of this study. For example, an effect of the device on the slope shows that the device affected the change of empathy. In contrary, an effect of the device on the intercept shows that simply, e.g., people that were in the print group had higher baseline empathy (regarding the models from time 0 to time 1 or from time 0 to time 2) or that people in the print condition had stronger empathy immediately after reading (regarding the model from time 1 to



time 2) without these effects giving any information about the effect of device on the change of empathy that is found when the fixed effect was on the slope.

#### 2.4.1 Preparatory analysis

The participants' scores on the different dependent measures were summed for each subscale and scale to compute the total score of empathy and the affective and cognitive empathy subscales, the scores for the need for affect scale, for the Interface Interference scale and its subscales. The scales of empathy proved reliable for this sample in all three time points (Cronbach's  $\alpha > .85$ ). The scale need for affect proved reliable as well (Cronbach's  $\alpha = .83$ ). The Interface Interference scale showed low reliability (Cronbach's  $\alpha = .52$ ), but its subscales, namely Resistance to Distraction, Dislocation and Awkwardness had higher reliability (Cronbach's  $\alpha = .64, .83, \text{ and } .89$ , respectively), and so they were studied separately as distinct scales. Regarding the experience with the subject matter scale, the scores of the two questions were summed as well, giving a range of 0 to 2. Lastly, following the instructions of Moore and Gordon (2015), regarding the Author Recognition Test, participants received one point for each author they recognised and lost one point for each foil name they checked. Although checking many false names may indicate that participants are responding in a socially desirable way, participants were not excluded if they indicated false names, but their score in ART was affected accordingly.

## 2.5 Results

### 2.5.1 Descriptive statistics

The descriptive statistics are provided in Table 2.1.

*Table 2.1 Descriptive statistics of the variable of empathy in total and for each condition separately.*

		Time 0				Time 1				Time 2			
Empathy		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
<b>Total</b>		92.86	10.42	43	117	92.08	10.09	38	119	92.20	10.92	37	119
<b>Fiction</b>		93.01	10.58	57	116	91.06	8.21	59	109	92.60	10.87	44	116
<b>Non-fiction</b>		92.71	10.25	43	117	93.11	11.60	38	119	91.79	10.94	37	119
<b>Print</b>		94.10	10.13	53	117	93.76	9.45	59	119	93.03	11.52	44	119
<b>E-reader</b>		92.16	10.56	63	110	90.83	10.90	56	115	92.07	10.78	51	115
<b>Tablet</b>		93.40	9.79	65	116	91.97	9.68	64	114	91.99	10.40	57	116
<b>Audiobook</b>		91.78	11.07	43	116	91.77	10.15	38	115	91.70	10.98	37	116
<b>Fiction</b>	<b>Print</b>	94.50	10.00	57	115	91.62	7.69	59	106	92.73	11.45	44	113
	<b>E-reader</b>	92.48	10.86	64	110	90.58	8.64	72	108	92.88	10.82	64	112
	<b>Tablet</b>	93.36	10.88	65	116	90.45	8.47	66	105	92.33	11.23	57	116
	<b>Audiobook</b>	91.70	10.53	65	114	91.58	8.08	67	109	92.47	10.12	66	116
<b>Non-fiction</b>	<b>Print</b>	93.70	10.29	53	117	95.91	10.55	72	119	93.33	11.66	45	119
	<b>E-reader</b>	91.85	10.30	63	110	91.08	12.81	56	115	91.26	10.73	51	115
	<b>Tablet</b>	93.43	8.63	68	114	93.48	10.58	64	114	91.66	9.55	65	110
	<b>Audiobook</b>	91.86	11.65	43	116	91.97	11.91	38	115	90.93	11.79	37	116

### 2.5.2 Correlations of individual differences

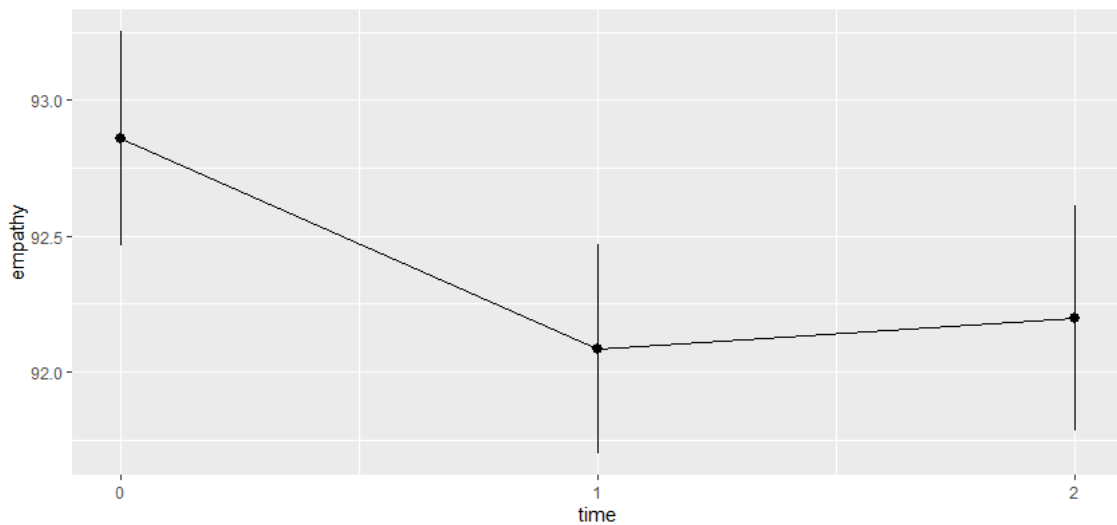
The correlation coefficients of the relationships between the different individual differences are provided in Table 2.2.

Table 2.2 Pearson's correlation coefficients of the individual differences. \*  $p < .05$ . \*\* Disruption and breaks were categorical variables and a point-biserial correlation was used to explore their relationship with the other variables. For the correlation between breaks and disruption, Cramer's V was calculated. \*\*\*multitasking was measured only when readers used an audiobook, so the correlation of multitasking with the other variables refers only to the audiobook condition.

Correlation coefficient	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
<b>1. Need for affect</b>		0.03	-0.02	0.16*	-0.07	-0.11*	0.02	0.05	-0.004	-0.07	-0.09*	0.01	-0.05
<b>2. ART</b>	0.03		-0.08*	0.09*	0.05	-0.11*	-0.15*	-0.11*	-0.06	0.06	-0.12*	-0.05	-0.03
<b>3. Personal experience</b>	-0.02	-0.08*		-0.10*	0.01	0.08*	0.08*	0.04	-0.07	-0.09*	0.04	-0.04	-0.10
<b>4. Resistance</b>	0.16*	0.09*	-0.10*		-0.10*	-0.40*	-0.15*	-0.09*	-0.19*	0.19*	-0.03	0.08*	-0.09
<b>5. Dislocation</b>	-0.07	0.05	0.01	-0.10*		0.18*	0.01	-0.05	0.03	0.04	0.04	0.01	0.25*
<b>6. Awkwardness</b>	-0.11*	-0.11*	0.08*	-0.40*	0.18*		0.10*	0.04	0.16*	-0.16*	-0.04	-0.04	0.04
<b>7. Disruption**</b>	0.02	-0.15*	0.08*	-0.15*	0.01	0.10*		0.44*	-0.01	-0.02	0.08*	-0.02	0.18*
<b>8. Breaks**</b>	0.05	-0.11*	0.04	-0.09*	-0.05	0.04	0.44*		0.03	0.04	0.06	-0.01	0.09
<b>9. Print experience</b>	-0.004	-0.06	-0.07	-0.19*	0.03	0.16*	-0.01	0.03		-0.62*	-0.16*	-0.09*	-0.14
<b>10. E-reader experience</b>	-0.07	0.06	-0.09*	0.19*	0.04	-0.16*	-0.02	0.04	-0.62*		0.29*	-0.01	0.11
<b>11. Tablet experience</b>	-0.09*	-0.12*	0.04	-0.03	0.04	-0.04	0.08*	0.06	-0.16*	0.29*		0.07*	-0.04
<b>12. Audiobook experience</b>	0.01	-0.05	-0.04	0.08*	0.01	-0.04	-0.02	-0.01	-0.09*	-0.01	0.07*		0.03
<b>13. Multitasking***</b>	-0.05	-0.03	-0.10	-0.09	0.25*	0.04	0.18*	0.09	-0.14	0.11	-0.04	0.03	

### 2.5.3 The change of empathy through time

Concerning the main effect of time regardless of device and text, it was shown that empathy decreased significantly immediately after reading (time 1) compared to the baseline empathy (time 0) ( $b = -0.78$ ,  $SE = 0.27$ ,  $p = .004$ ), while empathy did not change significantly from time 1 to two weeks after reading (time 2) ( $b = 0.1$ ,  $SE = 0.25$ ,  $p = .65$ ). However, there was a significant change from baseline empathy (time 0) to empathy levels after two weeks (time 2) ( $b = -0.33$ ,  $SE = 0.11$ ,  $p = .004$ ). These results are visualised in Figure 2.1.



*Figure 2.1* The effect of time on empathy, ignoring the effects of device and text. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

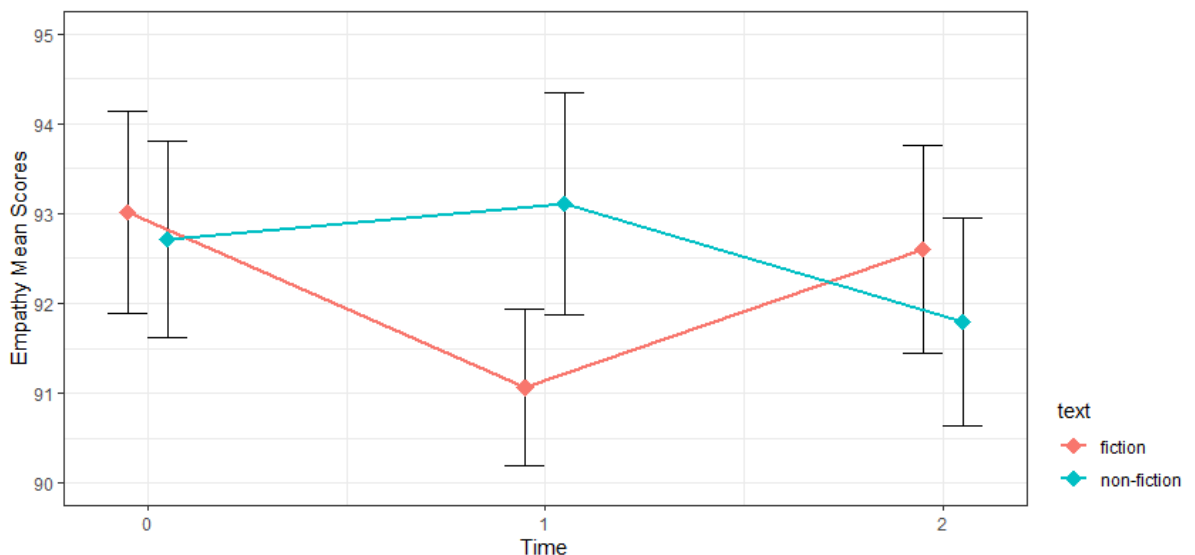
### 2.5.4 The effect of fictionality over time

Regarding the effect of fictionality on empathy regardless of device and in particular on the change of empathy between time 0 and time 1, it was shown that the model fit did not improve when the fixed effect of text was added on the intercept term ( $\chi^2(1) = 1.42$ ,  $p = .23$ ) but it improved when the text was included on the linear slope term ( $\chi^2(1) = 19.82$ ,  $p < .001$ ), showing a significant difference in the change of empathy between the fiction and non-fiction text ( $b = 2.35$ ,  $SE = 0.52$ ,  $p < .001$ ). This means that while participants who read fiction experienced a decrease in their empathy immediately after reading, participants who read non-fiction experienced an increase.

Secondly, regarding the change of empathy between time 1 and time 2, the model comparison showed that adding the fixed effect of text on the intercept did not improve the model fit ( $\chi^2(1) = 0.67$ ,  $p = .41$ ), but adding it on the slope improved the model fit ( $\chi^2(1) = 33.42$ ,  $p < .001$ ), showing that fictionality had a significant effect on empathy change: while fiction readers

experienced an increase in empathy, non-fiction readers experienced a decrease ( $b = -2.86$ ,  $SE = 0.49$ ,  $p < .001$ ).

Third, both the addition of the fixed effect of text on the intercept and on the slope term did not improve the model fit when investigating the effect of fictionality on the change of empathy from time 0 to time 2 ( $\chi^2(1) = 0.5$ ,  $p = .48$  and  $\chi^2(1) = 1.23$ ,  $p = .27$ , respectively), showing that the type of the text did not have any effect on the change of empathy between time 0 and time 2. In short, these results show that the fictionality of the texts used in this study plays a role in the change of readers' empathy; while fiction readers experienced a decrease in their empathy immediately after reading, non-fiction readers experienced a small empathic growth. This growth, however, did not last long, with the non-fiction readers experiencing a decrease to levels similar to their baseline empathy after two weeks, while the empathic decline experienced by the fiction readers did not last long either, with their empathy increasing to a level similar to their baseline empathy after two weeks. These results are visualised in Figure 2.2 below.



**Figure 2.2** The effect of fictionality on empathy: the change of empathy over time for fiction and non-fiction readers. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

### 2.5.5 The effect of reading device over time

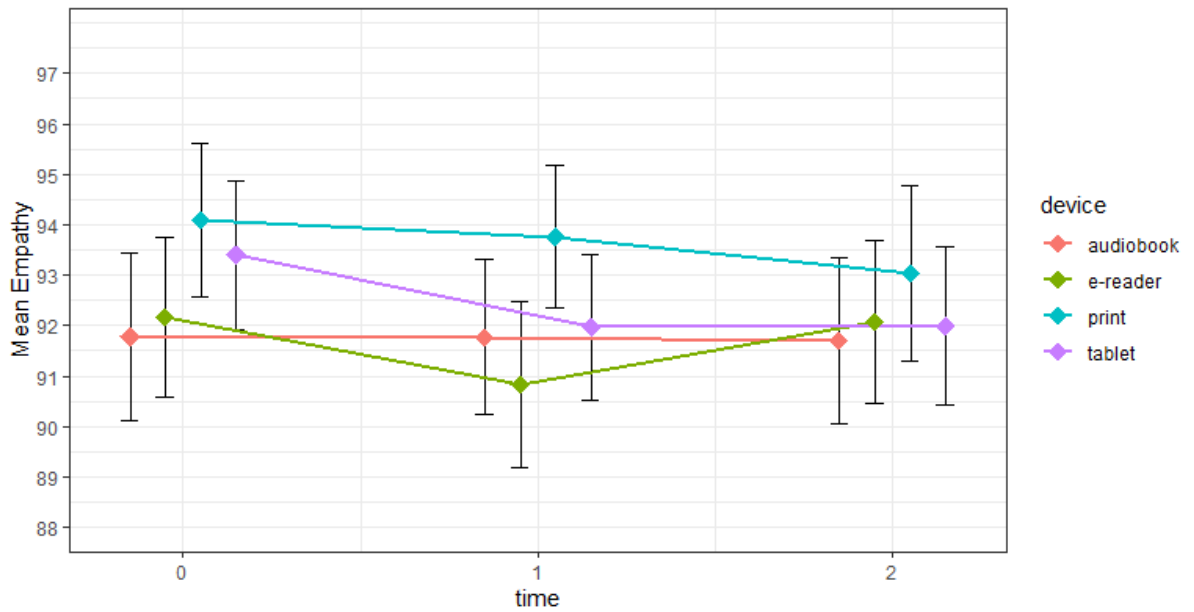
As for the effect of device on empathy and, in particular, between time 0 and time 1 and regardless of text, it was shown that the model fit did not improve when the type of device was included on the intercept ( $\chi^2(3) = 6.71$ ,  $p = .08$ ), nor when it was included on the slope term ( $\chi^2(3) = 5.41$ ,  $p = .14$ ), showing that the device did not play any role in the empathy change from time 0 to time 1. As for the change of empathy between time 1 and time 2, when device was added on the intercept, there was no improvement of the model fit ( $\chi^2(3) = 3.88$ ,  $p = .27$ ), but it improved when the device was added on the slope term ( $\chi^2(3) = 8.13$ ,  $p = .04$ ), showing a

significant difference between the slopes of the e-reader and print ( $b = -1.97$ ,  $SE = 0.70$ ,  $p = .01$ ), indicating that while print book readers experienced a small decrease in their empathy, e-reader users experienced an increase in their empathic levels two weeks after reading compared to immediately after reading the texts. The pairwise comparisons revealed that there was no significant difference between the rest of the devices (Table 2.2).

**Table 2.3** Detailed results of the pairwise comparisons showing the effect of devices on the empathy slope (time 1 – time 2). Statistically significant values are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – print	-0.66	0.70	-0.93	.35
audiobook – e-reader	1.31	0.70	1.87	.06
audiobook – tablet	0.10	0.70	0.15	.88
e-reader – print	-1.97	0.70	-2.80	.01*
e-reader – tablet	-1.21	0.70	-1.72	.09
print – tablet	0.76	0.70	1.08	.28

Lastly, with respect to the change of empathy between time 0 and time 2, it was found that the device had no effect with the model fit not improving when the device was included as a fixed effect on the intercept ( $\chi^2(3) = 3.12$ ,  $p = .37$ ) or when it was included on the slope term ( $\chi^2(3) = 6.53$ ,  $p = .09$ ). Therefore, when I disregarded the type of the text, the reading devices did not have any effect on readers' empathy, with the only exception of the print and the e-reader devices: the print caused a decrease in empathy from time 1 to time 2 while the e-reader caused an increase. These results are visualised in Figure 2.3 below.



**Figure 2.3** The effect of device on empathy: the change of empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

### 2.5.6 The effect of reading device: the case of fiction reading

Fiction reading, regardless of device, reduced participants' empathy from time 0 to time 1 ( $b = -1.95$ ,  $SE = 0.34$ ,  $p < .001$ ), while it led to an increase in empathy from time 1 to time 2 ( $b = 1.54$ ,  $SE = 0.32$ ,  $p < .001$ ). However, there was no significant effect when examining the change of empathy from time 0 to time 2 ( $b = 0.20$ ,  $SE = 0.17$ ,  $p = .23$ ). When investigating the effect of the device on empathy for the fiction readers only, the model comparisons (Table 2.3) showed that the device had an effect on the change of empathy from time 0 to time 1 and on the change of empathy from time 0 to time 2.

**Table 2.4** Results of the model comparison when adding the device parameter on the intercept and the linear slope term for the fiction text. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		1.59	.66	11.62	< .001*
time 1 – time 2	Device	0.37	.95	3.18	.36
time 0 – time 2		0.99	.80	9.44	.02*

In detail, regarding the empathy change from time 0 to time 1, it was shown that there was a significantly stronger decrease in empathy in the print compared to the audiobook device ( $b = -2.77$ ,  $SE = 0.93$ ,  $p = .003$ ), and a stronger decrease in the tablet compared to the audiobook



device ( $b = -2.79, SE = 0.93, p = .003$ ). There was no significant difference between the slopes of tablet, e-reader, and print devices nor between the audiobook and e-reader devices (Table 2.4).

**Table 2.5** Detailed results of the pairwise comparisons showing the effect of device on the empathy slope (time 0 – time 1). Statistically significant values are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – print	-2.77	0.93	-2.96	.003*
audiobook – e-reader	-1.78	0.93	-1.91	.06
audiobook – tablet	-2.79	0.93	-2.99	.003*
e-reader – print	-0.99	0.93	-1.06	.29
e-reader – tablet	-1.01	0.93	-1.08	.28
print – tablet	-0.02	0.93	-0.03	.98

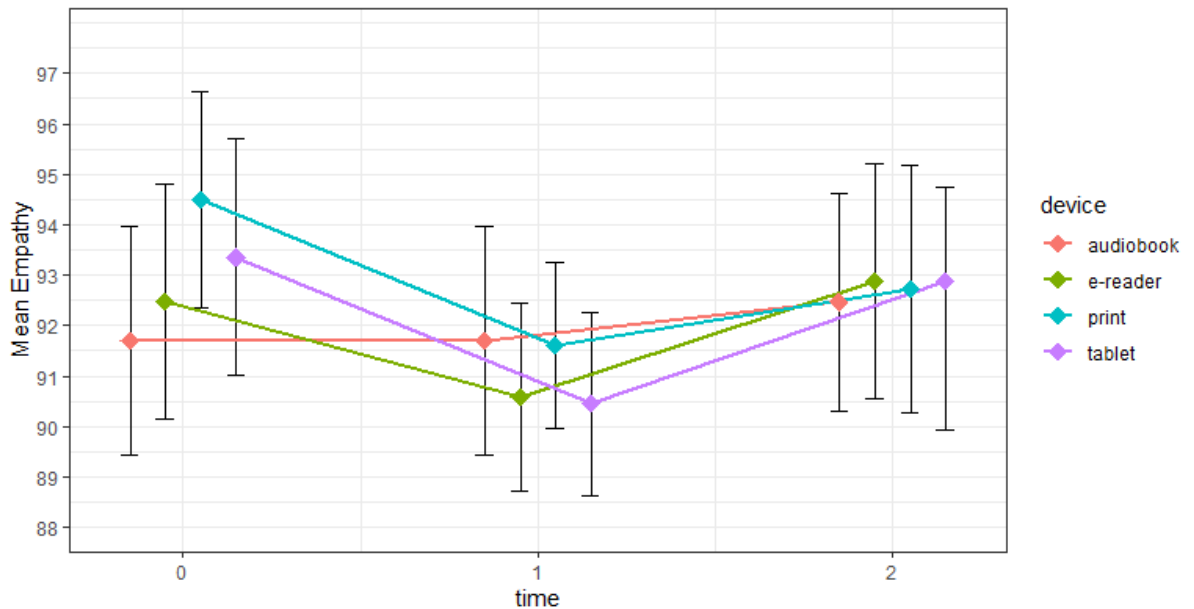
Regarding the empathy change from time 0 to time 2, it was shown that there was a significant difference between the slopes of audiobook and print devices ( $b = -1.27, SE = 0.47, p = .01$ ), with the audiobook recording an increase while the print a decrease. There was also a significant difference between the slopes of the print and e-reader devices ( $b = 1.09, SE = 0.47, p = .02$ ), with the e-reader exhibiting a slight increase in empathy compared to a drop in the case of the print device. Details can be found in Table 2.5.

**Table 2.6** Detailed results of the pairwise comparisons showing the effect of device on the empathy slope (time 0 – time 2). Significant effects are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – print	-1.27	0.47	-2.68	.01*
audiobook – e-reader	-0.18	0.47	-0.38	.70
audiobook – tablet	-0.90	0.47	-1.90	.06
e-reader – print	-1.09	0.47	-2.30	.02*
e-reader – tablet	-0.72	0.47	-1.52	.13
print – tablet	0.37	0.47	-0.77	.44

In summary, these results indicate that the audiobook device had a significantly different trajectory in empathy levels between baseline empathy and empathy immediately after fiction reading. In particular, tablet and print devices showed a strong decrease in empathy, while the audiobook device displayed a slight increase. There was no significant difference between e-

reader and audiobook devices. When comparing empathy levels between baseline empathy and two weeks after reading, the results showed a significant difference on slopes only between audiobook and print and print and e-reader devices, with the print device showing a decrease, while e-reader and audiobook devices had an increase in empathy. These results are visualised in Figure 2.4.



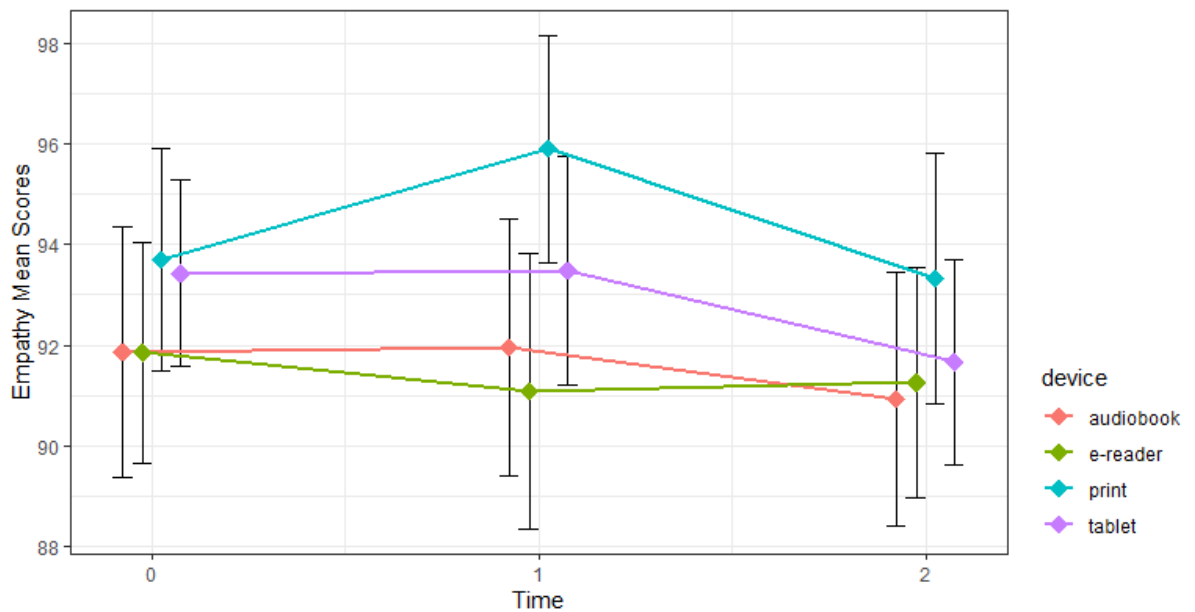
**Figure 2.4** The effect of device when reading fiction. The change of empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

### 2.5.7 The effect of reading device: the case of non-fiction reading

The investigation of the change of empathy between time 0 and time 1 when reading non-fiction regardless of device showed that there was no significant change ( $b = 0.39, SE = 0.40, p = .32$ ), but empathy had a significant decrease from time 1 to time 2 ( $b = -1.31, SE = 0.37, p < .001$ ) and there was also a significant decrease from time 0 and time 2 ( $b = -0.46, SE = 0.15, p = .003$ ). When examining the effect of device on the levels of empathy of non-fiction readers, the model comparison showed that the device did not affect the empathy change when reading non-fiction (Table 2.6). These results are visualised in Figure 2.5.

**Table 2.7** Model comparison results when adding the device parameter on the intercept and linear slope term for the non-fiction text.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		5.71	.12	7.58	.06
time 1 – time 2	Device	5.53	.14	7.73	.05
time 0 – time 2		2.40	.49	2.95	.40



**Figure 2.5** The effect of device when reading non-fiction: The change of empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

### 2.5.8 Three-way interactions

To explore the interactions between time, device, and text, the fixed effect of device and text were added separately, and their effects on the model fit were assessed using model comparisons. In particular, three models were compared for each of the three phases of the empathy slope: one including only the effect of time, a second including the fixed effect of device on the slope, and a third included both text and device on the slope term. The random effect of participants was kept on the intercept for all three models.

The investigation of these interactions regarding the change of empathy from time 0 to time 1 showed that the model fit did not improve when only the device was added on the slope term ( $\chi^2(6) = 12.12, p = .06$ ) compared to the model including both device and text on the linear slope term, which improved the model fit ( $\chi^2(8) = 35.46, p < .001$ ). This indicates that there was a statistically significant interaction when comparing the slopes of the audiobook and print devices in fiction and non-fiction conditions. In detail, it shows that the difference in the slopes of the audiobook and print devices when reading fiction was significantly different than the difference in these slopes when reading non-fiction ( $b = 4.87, SE = 1.46, p < .001$ ). This revealed that the slopes of the print and audiobook devices had a stronger difference when reading fiction in comparison to when reading non-fiction. Indeed, the print device led to a strong decrease in empathy while the audiobook device caused a very slight decrease when reading fiction (the print device decreased by a mean score of 2.88 while the audiobook device decreased by a mean of 0.12 points), while in the case of the non-fiction, the slopes of the print

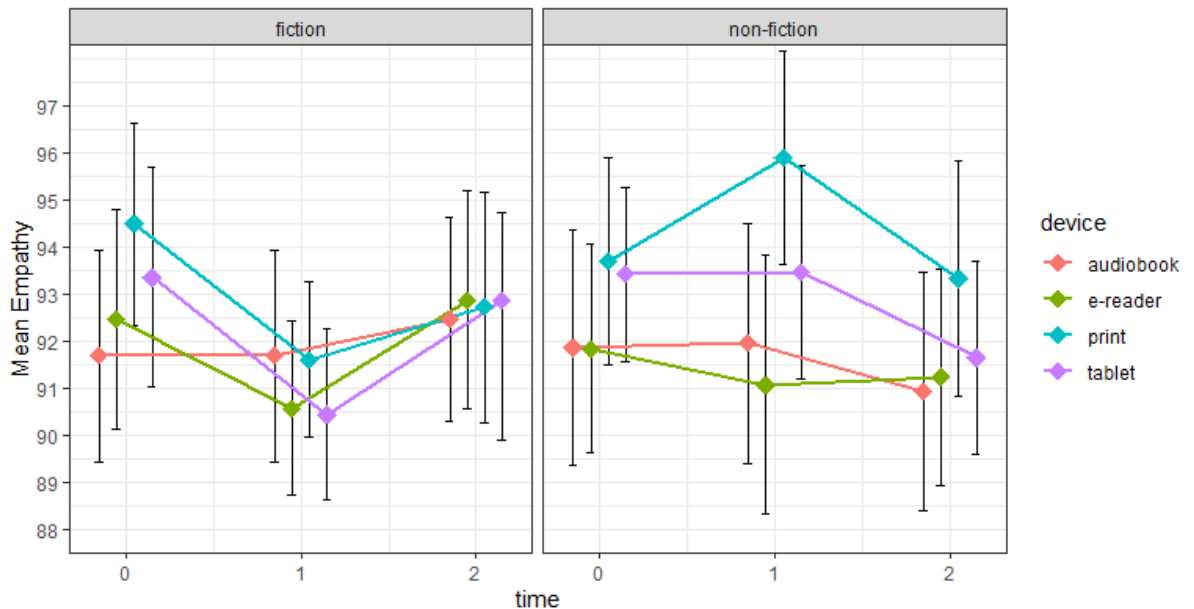
and audiobook devices had a smaller difference concerning the magnitude of the empathy increase (the print device had an increase of a mean of 2.2 points and the audiobook device an increase of a mean of 0.11 points). There was also a significant difference between the fiction and non-fiction text regarding the slopes of print and e-reader devices ( $b = -3.97$ ,  $SE = 1.46$ ,  $p = .01$ ), indicating that the slopes of the print and e-reader devices had a stronger difference in the non-fiction condition in comparison to the fiction condition. The print and e-reader devices had a similar trend in the fiction text with a decrease in empathy (the e-reader device showed a decrease of a mean of 1.9 points and the print device a decrease of a mean of 2.88 points), while the two devices followed a different trend in the non-fiction text, with the e-reader having a decrease (a mean decrease of 0.77 points) and the print an increase in empathy (mean increase of 2.2 points).

Regarding the change from time 1 to time 2, the model fit did not improve when only the device was added on the slope term ( $\chi^2(6) = 12.01$ ,  $p = .06$ ) in comparison to the model including both device and text on the slope term, which improved the model fit ( $\chi^2(8) = 40.3$ ,  $p < .001$ ). The investigation of this model however showed that there was no interaction between device and text, and the model was significant merely due to the difference of the slopes between fiction and non-fiction regardless of device used ( $b = -1.92$ ,  $SE = 0.97$ ,  $p = .048$ ). The detailed results of the estimates of the interactions are provided in Table 2.7.

**Table 2.8** Estimates comparing the differences of the devices in the fiction condition compared to their differences in the non-fiction condition. Fiction text is used arbitrarily as the baseline level. Significant effects are marked with \*.

Slopes	Slope Comparisons	Estimate	Standard Error	t value	p value
time 0 – time 1	audiobook – e-reader	0.91	1.46	0.62	.54
	audiobook – print	4.87	1.46	3.33	< .001*
	audiobook – tablet	2.73	1.46	1.87	.06
	print – e-reader	-3.97	1.46	-2.71	.01*
	print – tablet	-2.14	1.46	-1.46	.14
	e-reader – tablet	1.83	1.46	1.25	.21
time 1 – time 2	audiobook – e-reader	-0.21	1.37	-0.15	.88
	audiobook – print	-1.78	1.37	-1.30	.19
	audiobook – tablet	-1.77	1.37	-1.29	.20
	print – e-reader	1.57	1.37	1.15	.25
	print – tablet	0.01	1.37	0.01	.99
	e-reader – tablet	-1.56	1.37	-1.14	.26

Finally, concerning the change of empathy between time 0 and time 2, the model comparison showed that there was no significant interaction ( $\chi^2(6) = 9.65, p = .14$  when only device was added on the slope and  $\chi^2(8) = 8.41, p = .39$  when device and text were added on the slope term). These results are visualised in Figure 2.6 below.



**Figure 2.6** The effects of device and text: The change of empathy through time for print, e-reader, tablet, and audiobook devices when reading fiction and non-fiction. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

### 2.5.9 Affective and cognitive empathy

When examining the change of affective empathy in total, it decreased significantly from time 0 to time 1 ( $b = -0.67, SE = 0.15, p < .001$ ), regardless of text and device, while it had a statistically significant increase from time 1 to time 2 ( $b = 0.29, SE = 0.25, p = .049$ ). Lastly, regarding the empathy change from time 0 to time 2, affective empathy decreased significantly ( $b = -0.19, SE = 0.06, p = .001$ ). Cognitive empathy, on the other hand, did not have any significant change over time ( $b = -0.10, SE = 0.20, p = .61$  for the change from time 0 to time 1,  $b = -0.17, SE = 0.20, p = .37$  for the change from time 1 to time 2 and  $b = -0.13, SE = 0.08, p = .09$  for the change from time 0 to time 2).

Considering that the devices influenced the fiction and non-fiction readers differently, it was regarded valuable to investigate the effects of the devices on affective and cognitive empathy for the fiction and non-fiction texts separately.

### 2.5.9.1 Affective and cognitive empathy when reading fiction

When reading fiction, the readers experienced a significant decrease in their affective empathy from time 0 to time 1 regardless of device ( $b = -1.26$ ,  $SE = 0.23$ ,  $p < .001$ ). The model comparison showed that the model fit did not improve when the effect of device was added on the intercept ( $\chi^2(3) = 1.03$ ,  $p = .79$ ) as expected, but it improved when it was added on the slope term ( $\chi^2(3) = 8.32$ ,  $p = .04$ ), showing statistically significant differences between the audiobook and the e-reader and audiobook and print slopes ( $b = -1.70$ ,  $SE = 0.65$ ,  $p = .01$  and  $b = -1.57$ ,  $SE = 0.65$ ,  $p = .02$ , respectively). The slopes of tablet, e-reader and print device did not differ significantly. Table 2.8 shows the detailed estimates.

**Table 2.9** Detailed results of the pairwise comparisons showing the effect of device on the affective empathy slope (time 0 – time 1). Statistically significant values are marked with \*.

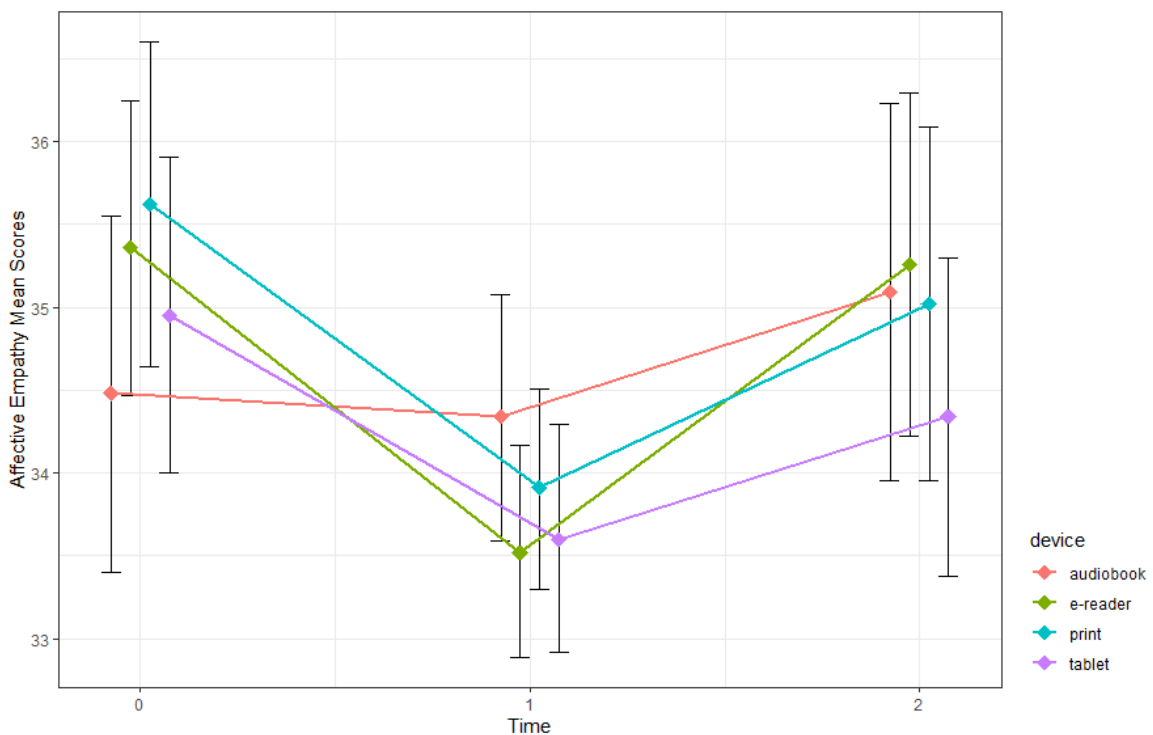
Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	-1.57	0.65	-2.40	.02*
audiobook – print	-1.70	0.65	-2.60	.01*
audiobook – tablet	-1.21	0.65	-1.85	.07
print – e-reader	-0.13	0.65	-0.20	.85
print – tablet	0.36	0.65	0.55	.58
e-reader – tablet	0.49	0.65	0.75	.46

As for the change of affective empathy from time 1 to time 2 when reading fiction, it increased significantly regardless of device ( $b = 1.08$ ,  $SE = 0.25$ ,  $p < .001$ ). The model comparison showed that the devices had no effect on this change ( $\chi^2(3) = 2.12$ ,  $p = .55$  when device was added on the intercept and  $\chi^2(3) = 2.72$ ,  $p = .44$  when it was added on the slope).

Affective empathy did not show a significant change from time 0 to time 2 when reading fiction, regardless of device ( $b = -0.09$ ,  $SE = 0.08$ ,  $p = .30$ ). When the device was added as a fixed effect on the slope, a significant effect was found ( $\chi^2(3) = 8.85$ ,  $p = .03$ ), indicating significant differences between the slopes of audiobook and print and audiobook and tablet devices ( $b = -0.60$ ,  $SE = 0.24$ ,  $p = .01$  and  $b = -0.62$ ,  $SE = 0.24$ ,  $p = .01$ , respectively). There were no significant differences between the slopes of e-reader, tablet, and print devices (Table 2.9). These results are visualised in Figure 2.7.

**Table 2.10** Detailed results of the pairwise comparisons showing the effect of device on the affective empathy slope (time 0 – time 2). Statistically significant values are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	-0.36	0.24	-1.53	.13
audiobook – print	-0.60	0.24	-2.56	.01*
audiobook – tablet	-0.62	0.24	-2.61	.01*
print – e-reader	0.24	0.24	1.03	.30
print – tablet	-0.01	0.24	-0.05	.96
e-reader – tablet	-0.26	0.24	-1.08	.28



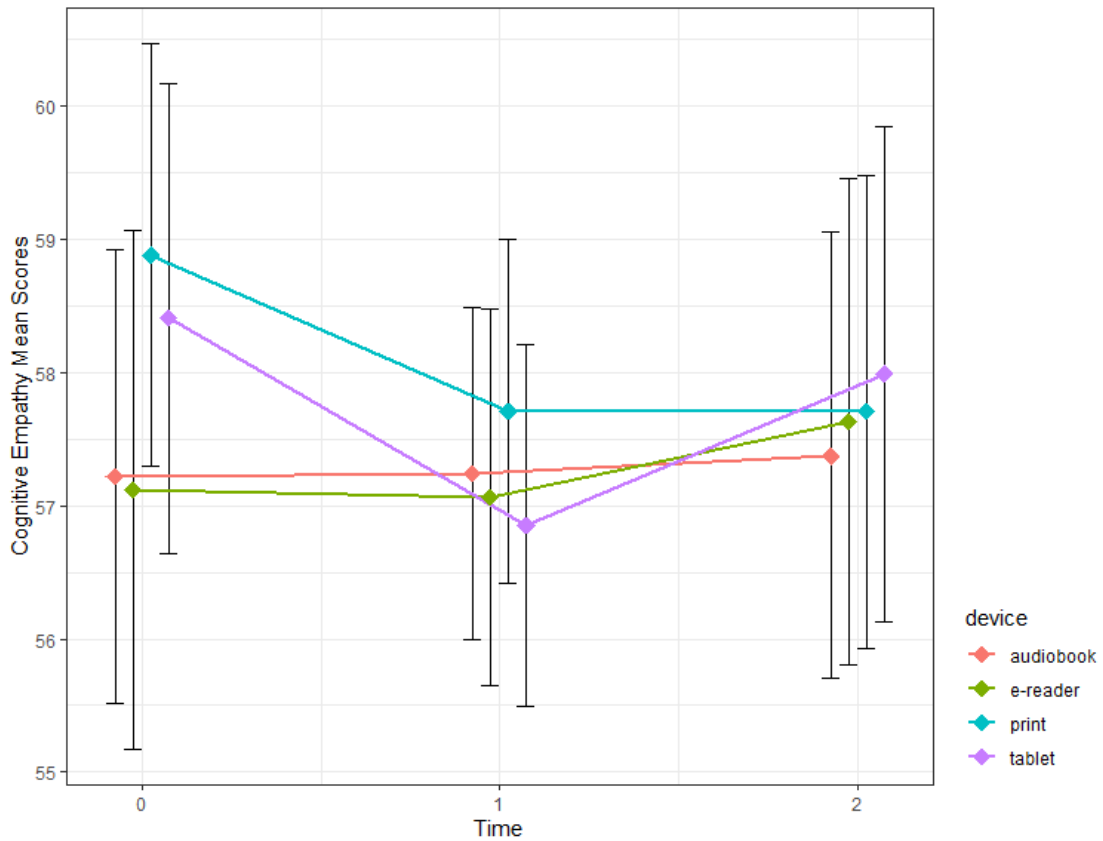
**Figure 2.7** The effect of device on affective empathy when reading fiction: The change of affective empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

Regarding cognitive empathy, it decreased significantly from time 0 to time 1 when reading fiction ( $b = -0.69$ ,  $SE = 0.28$ ,  $p = .001$ ), but it did not change significantly from time 1 to time 2 nor from time 0 to time 2 ( $b = -0.46$ ,  $SE = 0.28$ ,  $p = .10$  and  $b = -0.12$ ,  $SE = 0.13$ ,  $p = .35$ , respectively).

The model comparison showed that the devices had no effect on cognitive empathy, as can be seen in the model comparisons (Table 2.10). These results are visualised in Figure 2.8.

**Table 2.11** Model comparison results when adding the device parameter on the intercept and linear slope term for cognitive empathy when reading fiction.

Empathy type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
	time 0 – time 1		1.65	.65	6.27	.10
Cognitive empathy	time 1 – time 2	Device	0.18	.98	2.61	.46
	time 0 – time 2		1.16	.76	6.51	.09



**Figure 2.8** The effect of device on cognitive empathy when reading fiction: The change of cognitive empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

In summary, when comparing the effect of fiction reading on affective and cognitive empathy, it was evident that only affective empathy was affected by the reading device, while the devices did not affect cognitive empathy. Furthermore, although the decrease in empathy from time 0 to time 1 was apparent both in terms of the cognitive and affective component, the increase in empathy from time 1 to time 2 was only apparent when exploring affective empathy.



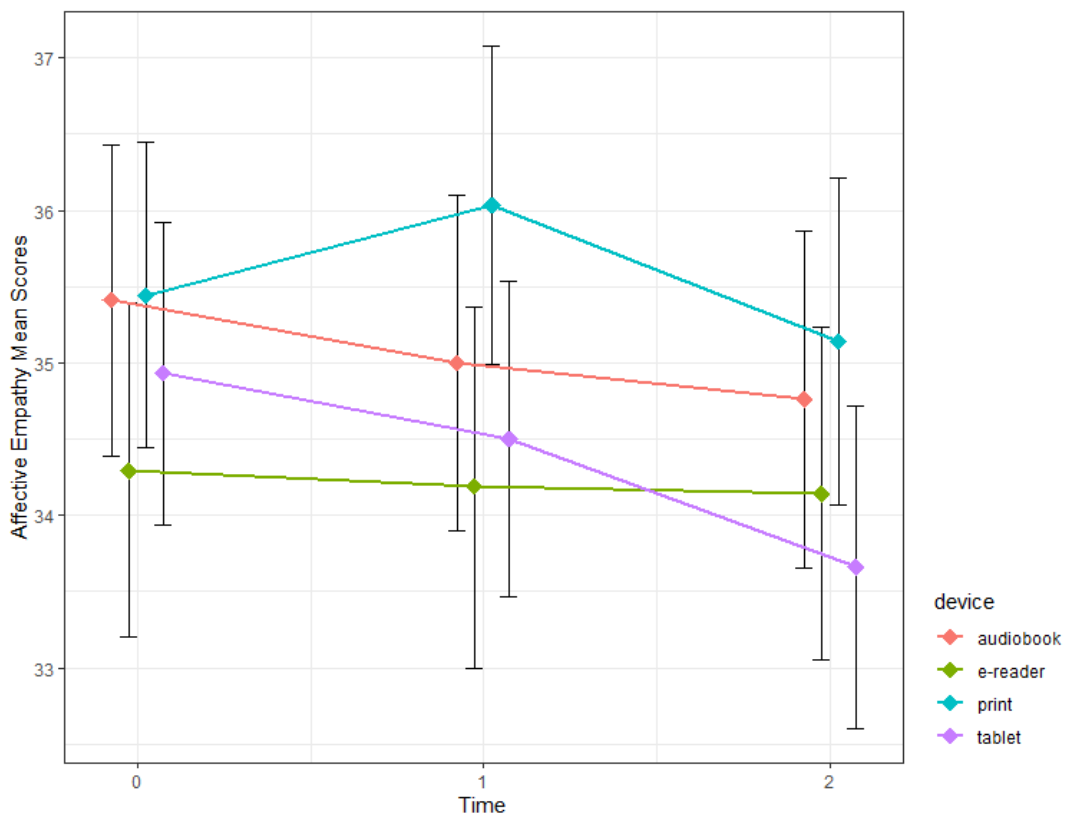
### 2.5.9.2 Affective and cognitive empathy when reading non-fiction

The investigation of the effects of non-fiction reading on affective and cognitive empathy separately showed that, first, affective empathy did not change significantly from time 0 to time 1 ( $b = -0.09, SE = 0.17, p = .61$ ), but it decreased significantly from time 1 to time 2 ( $b = -0.51, SE = 0.15, p < .001$ ). Lastly, affective empathy was shown to decrease significantly from time 0 to time 2 ( $b = -0.30, SE = 0.08, p < .001$ ).

The reading device did not have any effect on the change of affective empathy overall, as can be seen in the model comparisons in Table 2.11. These results are visualised in Figure 2.9.

**Table 2.12** Model comparison results when adding the device on the intercept and linear slope term of affective empathy when reading non-fiction.

Empathy type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Affective empathy	time 0 – time 1		4.89	.18	6.07	.11
	time 1 – time 2	Device	5.41	.14	6.10	.11
	time 0 – time 2		3.50	.32	7.19	.06



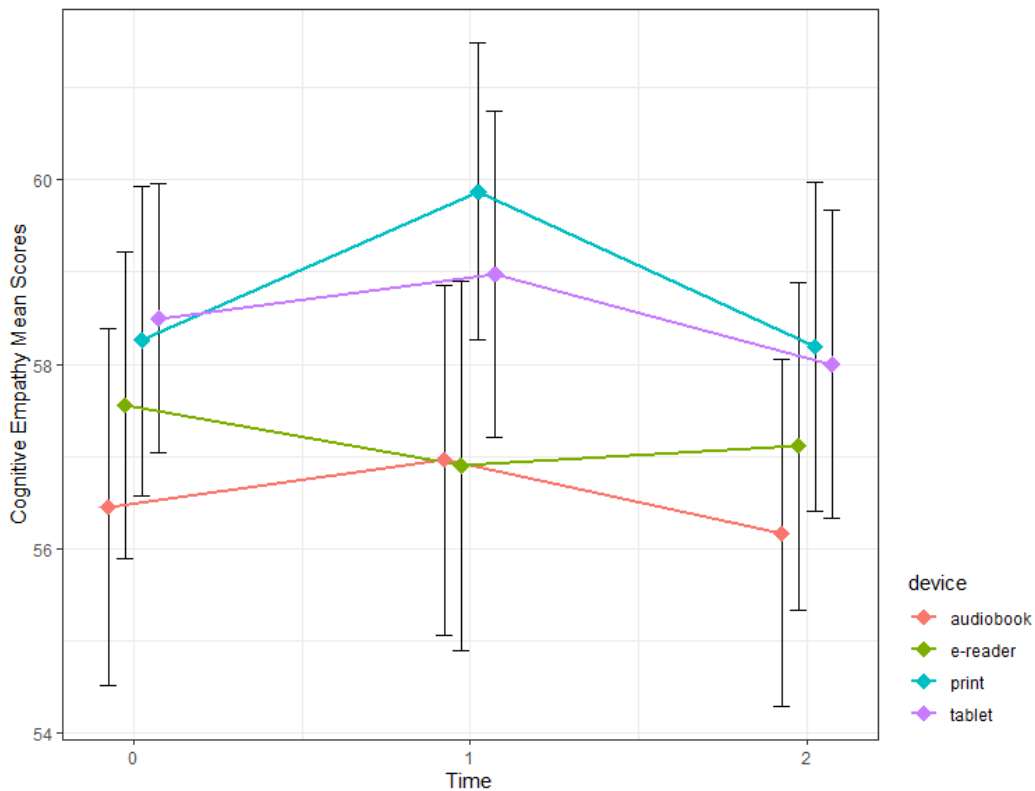
**Figure 2.9** The effect of device on affective empathy when reading non-fiction: The change of affective empathy through time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

As for cognitive empathy from time 0 to time 1 when reading non-fiction, it did not change significantly ( $b = 0.49, SE = 0.29, p = .09$ ). However, it decreased significantly from time 1 to time 2 ( $b = -0.81, SE = 0.27, p = .03$ ). As for the change of cognitive empathy from time 0 to time 2, there was no significant change ( $b = -0.16, SE = 0.11, p = .15$ ). Regarding the effect of device on the change of cognitive empathy from time 0 to time 1, adding the fixed effect of device on the intercept did not improve the model fit ( $\chi^2(3) = 5.62, p = .13$ ), but the inclusion of device on the slope improved the model fit ( $\chi^2(3) = 7.88, p = .05$ ). The investigation of the differences between devices showed that there is only one significant difference between the slopes of print and e-reader, with the print showing an increase, while the e-reader exhibited a decrease in cognitive empathy ( $b = -2.28, SE = 0.81, p = .01$ ). Detailed pairwise comparisons are provided in Table 2.12.

**Table 2.13** Detailed results of the pairwise comparisons showing the effect of device on cognitive empathy (time 0 – time 1) when reading non-fiction. Statistically significant values are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	-1.17	0.81	-1.45	.15
audiobook – print	1.10	0.81	1.37	.17
audiobook – tablet	-0.03	0.81	-0.04	.97
print – e-reader	-2.28	0.81	-2.80	.01*
print – tablet	-1.14	0.81	-1.41	.16
e-reader – tablet	1.14	0.81	1.41	.16

As for the change of cognitive empathy from time 1 to time 2 when reading non-fiction, the model fit did not improve when the fixed effect of device was added on the intercept nor when it was added on the slope ( $\chi^2(3) = 5.55, p = .14$  and  $\chi^2(3) = 6.28, p = .1$ , respectively), indicating that the device did not have any effect. The same was the case for the change of cognitive empathy from time 0 to time 2 ( $\chi^2(3) = 3.56, p = .31$  when device was added on the intercept and  $\chi^2(3) = 0.56, p = .91$  when it was added on the slope). These results are visualised in Figure 2.10.



**Figure 2.10** The effect of device on cognitive empathy when reading non-fiction: The change of cognitive empathy over time for print, e-reader, tablet, and audiobook devices. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

In conclusion, the reading device did not have any effect on affective empathy when reading non-fiction. However, affective empathy decreased significantly from time 1 to time 2 and from time 0 to time 2. In other words, although affective empathy did not change significantly immediately after reading, it decreased after two weeks, to a level lower than baseline empathy and empathy immediately after reading. As for cognitive empathy, the reading device had only one significant effect on the change from time 0 to time 1, showing that print brings an increase immediately after reading, while the e-reader a decrease. Regardless of device, cognitive empathy did not change significantly immediately after reading compared to baseline levels, but it decreased two weeks after reading to a level lower than immediately after reading, without, however, reaching significantly different levels in comparison to the baseline cognitive empathy.

### 2.5.9.3 Affective and cognitive empathy: the effect of text

To have a clearer picture of the differences between cognitive and affective empathy, the effect of text was also investigated without taking into account the devices used.

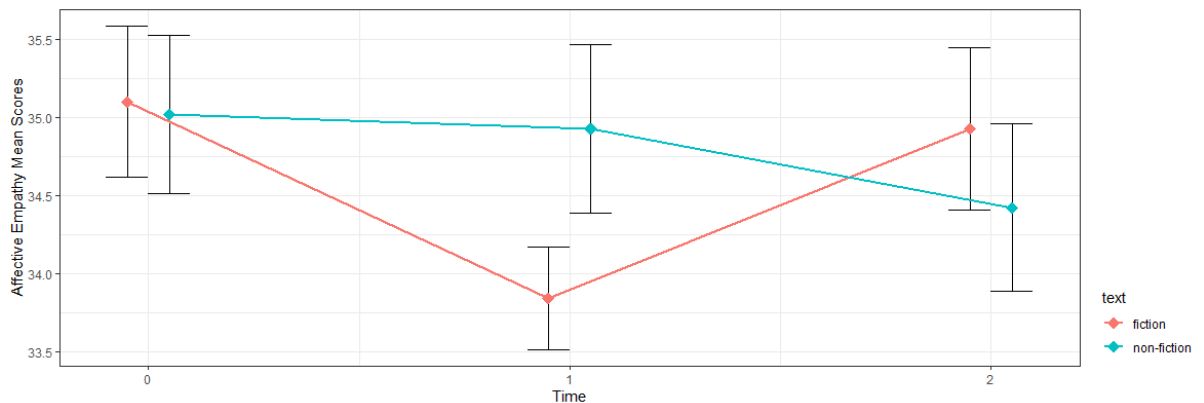
The fixed effect of text was added on the intercept and linear slope term and these models were compared to the baseline model, which included only the factor of time. First, concerning

affective empathy, the model comparisons are shown in Table 2.13 and the significant models are investigated below.

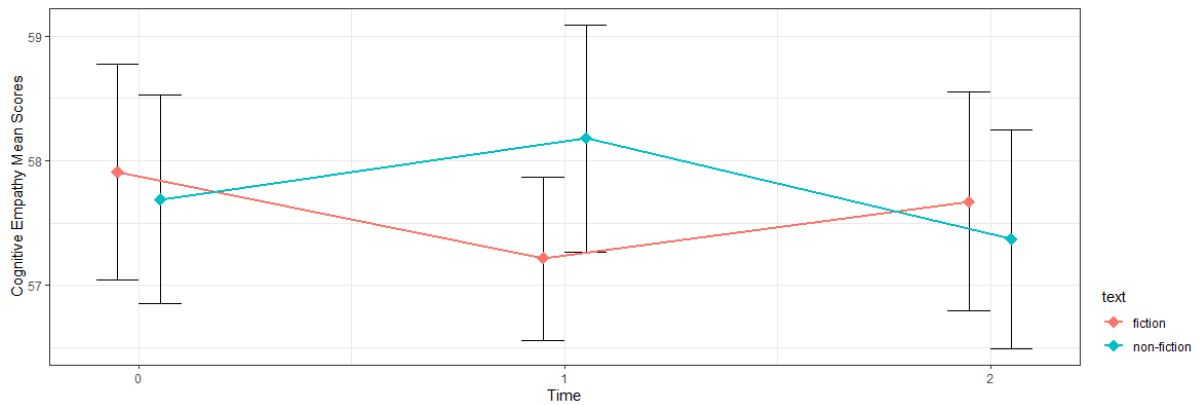
**Table 2.14** Model comparison results when adding the text parameter on the intercept and linear slope term for affective and cognitive empathy separately. Statistically significant models are marked with \*.

Empathy type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Affective empathy	time 0 – time 1	Type of text	2.65	.10	16.32	< .001*
	time 1 – time 2		0.83	.36	29.92	< .001*
	time 0 – time 2		0.71	.40	3.21	.07
Cognitive empathy	time 0 – time 1	text	0.45	.50	8.62	.003*
	time 1 – time 2		0.33	.56	10.55	.001*
	time 0 – time 2		0.19	.67	0.07	.79

Based on the significant models in Table 2.13, it was found that the non-fiction readers had a milder decrease in affective empathy compared to the fiction readers ( $b = 1.17$ ,  $SE = 0.29$ ,  $p < .001$ ) regarding the change from time 0 to time 1. As for the change of affective empathy from time 1 to time 2, the non-fiction text showed a small decrease in affective empathy, while the fiction text showed an increase ( $b = -1.59$ ,  $SE = 0.229$ ,  $p < .001$ ). As for cognitive empathy, from time 0 to time 1 non-fiction readers experienced a small increase in cognitive empathy, while fiction readers experienced a decrease ( $b = 1.18$ ,  $SE = 0.40$ ,  $p = .003$ ). For the change from time 1 to time 2, it was found that fiction readers experienced an increase, while non-fiction readers showed a decrease ( $b = -1.67$ ,  $SE = 0.39$ ,  $p = .001$ ). Lastly, the model comparison (Table 2.13) for the change of cognitive empathy from time 0 to time 2 revealed that the fictionality of the texts did not play any role in the change of cognitive empathy. These results are visualised in Figures 2.11 and 2.12.



**Figure 2.11** The effect of text on affective empathy: the change of affective empathy through time for fiction and non-fiction readers. The vertical lines represent the lower and upper bounds of the 95% confidence interval.



**Figure 2.12** The effect of text on cognitive empathy: the change of cognitive empathy over time for fiction and non-fiction readers. The vertical lines represent the lower and upper bounds of the 95% confidence interval.

## 2.5.10 Individual factors

### 2.5.10.1 Experience with literature

The model comparisons when adding the fixed effect of experience with literature (as measured with the Author Recognition Test – ART) on the intercept and slope term are provided in Table 2.14, showing that experience with literature did not have any effect on empathy change regardless of device and text. This was the case for both fiction and non-fiction readers when analysed separately as well (see Table 2.15).

**Table 2.15** Model comparison results when adding the parameter of experience with literature on the intercept and linear slope term.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Experience with literature	0.19	.66	0.14	.70
time 1 – time 2		0.53	.46	1.82	.18
time 0 – time 2		0.71	.40	1.05	.30

**Table 2.16** Model comparison results when adding the parameter of experience with literature on the intercept and linear slope term for fiction and non-fiction readers separately.

Text type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Fiction	time 0 – time 1	Experience with literature	0.08	.77	0.04	.85
	time 1 – time 2		0.10	.75	0.04	.93
	time 0 – time 2		0.05	.82	0.01	.91
	time 0 – time 1		0.12	.73	0.35	.55

<b>Non-fiction</b>	time 1 – time 2	Experience	0.48	.49	3.25	.07
	time 0 – time 2	with literature	0.90	.34	1.90	.17

### 2.5.10.2 Need for affect

The model comparisons when need for affect was added as a fixed effect on the intercept and slope term without including the effects of text type and device are provided in Table 2.16.

**Table 2.17** Model comparison results when adding the parameter of need for affect on the intercept and linear slope term. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Need for affect	136.44	< .001*	8.90	.003*
time 1 – time 2		125.22	< .001*	9.20	.002*
time 0 – time 2		145.60	< .001*	0.02	.88

The investigation of the models with the best fit showed that high need for affect predicted high baseline empathy ( $b = 0.44$ ,  $SE = 0.04$ ,  $p < .001$ ) and stronger decrease in empathy from time 0 to time 1 ( $b = -0.08$ ,  $SE = 0.03$ ,  $p = .003$ ). Moreover, it was found that high need for affect predicted a high level of empathy immediately after reading ( $b = 0.44$ ,  $SE = 0.04$ ,  $p < .001$ ) and the higher the need for affect, the stronger was the empathy increase from time 1 to time 2 ( $b = 0.08$ ,  $SE = 0.03$ ,  $p = .002$ ).

For fiction and non-fiction readers separately, the model comparisons are provided in Table 2.17.

**Table 2.18** Model comparison results when adding the parameter of need for affect on the intercept and linear slope term for fiction and non-fiction readers separately. Statistically significant models are marked with \*.

Text type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Fiction	time 0 – time 1	Need for affect	78.81	< .001*	29.59	< .001*
	time 1 – time 2		71.47	< .001*	27.02	< .001*
	time 0 – time 2		87.72	< .001*	0.21	.65
Non-fiction	time 0 – time 1		62.69	< .001*	0.94	.33
	time 1 – time 2		58.05	< .001*	0.76	.38
	time 0 – time 2		58.50	< .001*	0.05	.82

Based on the significant models of Table 2.17, it was found that for fiction readers, high need for affect predicted high baseline empathy ( $b = 0.42, SE = 0.05, p < .001$ ), and the higher the need for affect, the stronger was the empathy decrease from time 0 to time 1 ( $b = -0.19, SE = 0.03, p < .001$ ). Similarly, need for affect predicted empathy immediately after fiction reading ( $b = 0.41, SE = 0.05, p < .001$ ) and the higher the need for affect, the stronger was the rise in empathy from time 1 to time 2 ( $b = 0.17, SE = 0.03, p < .001$ ). Concerning non-fiction, there was no effect on the change of empathy, but there was again an effect on the intercepts, showing that high need for affect predicted high baseline empathy and empathy immediately after reading ( $b = 0.47, SE = 0.06, p < .001$  and  $b = 0.48, SE = 0.06, p < .001$ , respectively).

### 2.5.10.3 Personal experience

Regardless of text and device, the model comparisons when the fixed effect of personal experience with the subject matter was added on the intercept and slope terms are provided in Table 2.18. It is shown that personal experience did not have any effect on empathy, except for the change of empathy from time 0 to time 2: when readers had a strong personal experience, their empathy decreased more compared to the readers without personal experience relevant to the subject matter ( $b = -0.39, SE = 0.17, p = .02$ ).

**Table 2.19** Model comparison results when adding the parameter of personal experience on the intercept and linear slope term. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Personal experience	1.93	.17	0.07	.78
time 1 – time 2		0.44	.51	3.13	.08
time 0 – time 2		0.55	.46	5.06	.02*

When examining fiction and non-fiction readers separately, it was found that personal experience did not have any effect on empathy, as can be seen in the model comparisons (Table 2.19).

**Table 2.20** Model comparison results when adding the parameter of personal experience on the intercept and linear slope term for fiction and non-fiction readers separately.

Text type	Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Fiction	time 0 – time 1	Personal experience	0.60	.44	0.0001	.99
	time 1 – time 2		0.08	.78	2.19	.14
	time 0 – time 2		0.05	.81	1.94	.16
Non- fiction	time 0 – time 1		1.35	.25	0.17	.68
	time 1 – time 2		0.40	.53	1.13	.29
	time 0 – time 2		0.66	.42	3.25	.07

#### 2.5.10.4 Disruption rate

Many participants failed to rate the degree of their disruption. For this reason, the factor had only two levels of “Yes” and “No” to examine the differences between the participants who got disrupted during reading and those who were not disrupted. When examining the change of empathy regardless of text and device, disruption did not have any effect (see Table 2.20).

**Table 2.21** Model comparison results when adding the parameter of disruption on the intercept and linear slope term.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Disruption	0.55	.46	0.04	.83
time 1 – time 2		0.77	.38	0.08	.78
time 0 – time 2		0.62	.43	0.30	.58

Since there was no effect of disruption on empathy, there was no reason to control for this factor in the analysis of the effect of device on empathy.

#### 2.5.10.5 Breaks

As with the disruption rate, many participants did not note the range of their breaks, so the factor was treated as categorical with two levels of “Yes” and “No”. The model comparison showed that taking breaks did not have any effect on empathy change in general (Table 2.21).

**Table 2.22** Model comparison results when adding the parameter of breaks on the intercept and linear slope term.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Breaks	0.002	.97	0.92	.34
time 1 – time 2		0.002	.96	0.98	.32
time 0 – time 2		0.07	.79	0.43	.51



As with disruption, since there was no effect of breaks on empathy, there was no reason to control for this factor when analysing the effect of device on empathy.

#### 2.5.10.6 Interface Interference

Due to the low reliability of the Interface Interference, the three subscales of this scale, namely resistance to distraction, dislocation within the text, and awkwardness when handling the medium, were examined separately. Table 2.22 reports the complete results of the model comparisons when these three factors were added on the intercept and the slope term regardless of the effects of device and text.

**Table 2.23** Model comparison results when adding the interface interference subscales on the intercept and slope term. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Resistance to distraction	6.71	.01*	1.34	.25
time 1 – time 2		4.77	.03*	0.07	.79
time 0 – time 2		6.39	.01*	1.08	.30
time 0 – time 1	Dislocation	1.27	.26	1.15	.28
time 1 – time 2		0.63	.43	0.06	.81
time 0 – time 2		1.30	.26	.97	.33
time 0 – time 1	Awkwardness	.02	.88	1.45	.23
time 1 – time 2		.0002	.99	.60	.44
time 0 – time 2		0.16	.69	.30	.58

Based on these model comparisons, although participants with stronger baseline empathy also had stronger resistance to distraction ( $b = 0.21, SE = 0.08, p = .01$ ) as was the case for participants with higher empathy immediately after reading ( $b = 0.19, SE = 0.09, p = .03$ ), there was no effect on empathy change. As for the role of interface interference in the differences between reading devices, since there was no effect on the slope (i.e., on the change of empathy), no further analysis of the unique contribution of device on empathy change after controlling for interface interference was needed.

#### 2.5.10.7 Multitasking

This factor was measured only for audiobook readers, so its effect on empathy change was explored for only the audiobook device. Table 2.23 provides the model comparisons when multitasking was added on the intercept and linear slope term and it is evident that multitasking did not have any effect on empathy change in general.

**Table 2.24** Model comparison results evaluating the effect of multitasking.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		1.33	.25	0.76	.38
time 1 – time 2	Multitasking	0.98	.32	0.11	.74
time 0 – time 2		1.40	.24	0.35	.56

Since it was found that empathy change followed a different trajectory when reading fiction compared to the non-fiction condition, it was deemed important to explore the effect of multitasking for the fiction and non-fiction audiobook readers separately. The model comparisons concerning the fiction readers are provided in Table 2.24.

*Table 2.25 Model comparison results evaluating the effect of multitasking when reading fiction. Statistically significant models are marked with \*.*

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		1.96	.16	4.93	.03*
time 1 – time 2	Multitasking	0.95	.33	1.12	.29
time 0 – time 2		2.32	.13	1.98	.16

The model comparison indicated that, concerning the empathy change from time 0 to time 1, when audiobook readers multitasked, they experienced an empathy increase instead of a decrease as noted with participants who did not multitask ( $b = 2.84$ ,  $SE = 1.26$ ,  $p = .03$ ). As for the non-fiction readers, multitasking showed to have no effect on empathy change of audiobook readers (Table 2.25).

*Table 2.26 Model comparison results evaluating the effect of multitasking when reading non-fiction.*

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		0.14	.70	1.31	.25
time 1 – time 2	Multitasking	0.23	.65	0.56	.45
time 0 – time 2		0.05	.83	0.20	.65

#### 2.5.10.8 Experience with devices

Table 2.26 provides the model comparisons for each device separately. As noted in the data analysis (Section 2.4), the experience with each device was investigated for the corresponding device condition. The model comparison shows that the experience with the device participants used did not affect their empathy. Only an effect of experience with the print books on the

baseline empathy of print book readers was found, showing that people with high experience with print books also had high baseline empathy ( $b = 1.49, SE = 0.72, p = .04$ ).

*Table 2.27 Model comparison results when adding experience with device on model fit when investigating each device condition separately. Statistically significant models are marked with \*.*

Time points	Device	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Print book	4.27	.04*	3.67	.06
	E-reader	0.78	.38	3.55	.06
	Tablet	1.49	.22	2.53	.11
	Audiobook	0.11	.73	0.12	.73
time 1 – time 2	Print book	2.59	.11	1.43	.23
	E-reader	0.15	.70	0.57	.45
	Tablet	2.64	.10	0.01	.93
	Audiobook	0.14	.70	0.02	.88
time 0 – time 2	Print book	4.93	.03*	0.93	.33
	E-reader	1.35	.25	1.80	.18
	Tablet	1.30	.25	2.67	.10
	Audiobook	0.24	.63	0.37	.54

## 2.6 Summary of results

In short, the above results showed that the reading experience led to a decrease in empathy that was present even after two weeks. This effect was not present however when examining only the cognitive aspect of empathy, with only the affective empathy showing a decline. The fictionality of the text was shown to have a paramount role in the effect of reading on empathy. While this work of fiction led to a decrease in empathy immediately after reading, the non-fiction text did not have a significant change. Additionally, although fiction readers experienced an increase two weeks after the reading experience, non-fiction readers experienced a decrease with their empathy reaching levels lower than their baseline empathy.

Regarding the effect of the reading devices, the results showed that they did not play any role in the change of empathy, apart from the e-reader and print devices, which showed a different trajectory from immediately after reading to two weeks after reading, with the print having a decrease while the e-reader showing an increase. However, when investigating the effect of devices on empathy for the fiction and non-fiction readers separately, device showed to play a more crucial role for the fiction readers: the audiobook had a much weaker decrease in empathy compared to the print and tablet devices, and print showed to cause a more long-lasting decline in empathy in comparison to the e-reader and audiobook devices. When exploring the two

components of empathy separately, it was shown that the devices had no effect on cognitive empathy, as opposed to affective empathy. As for the role of reading devices when reading non-fiction, no effect was found, with the only exception of cognitive empathy, where print showed an increase immediately after reading, while e-reader had a decrease.

When investigating the role of individual differences in the effects of reading on empathy, it was surprising to find that experience with literature did not affect participants' empathy. Need for affect was found to be a predictor of baseline empathy, and it was also shown that participants with high need for affect experienced a stronger decrease in empathy immediately after reading and a stronger increase two weeks later, with this effect evident only when reading fiction. Personal experience with the subject matter was found to not have any effect on readers' empathy immediately after reading, but it was revealed that it caused a stronger decrease in empathy two weeks after reading compared to the readers' baseline levels.

Concerning the individual differences that were expected to be related to the use of reading devices, disruption, breaks, and interface interference did not have any effect on empathy. Regarding multitasking, it was revealed that it did not predict the empathic change of audiobook readers. However, when reading fiction, audiobook users who multitasked experienced an increase in empathy immediately after reading as opposed to participants who did not multitask. Lastly, it was found that participants' experience with the reading devices they used did not play any role in their empathy, with the only exception being the experience with print, which was a predictor of baseline empathy for the print users.

## 2.7 Discussion

### 2.7.1 The negative effects of reading on empathy: the case of fiction and non-fiction reading

In times when empathy is portrayed as a much sought-after skill for a successful personal and professional life (see, e.g., Miyashiro, 2011; Sergey et al., 2020), when reading is promoted as a vehicle for the development of empathy and the construction of a fair society, and when books are considered at risk of extinction and in need of saving, this study provides evidence opposing the majority of other empirical studies (for a meta-analysis of relevant studies, see Dodell-Feder & Tamir, 2018), showing that literary reading can reduce people's empathy. As a result, the findings of the present study led me to further investigate the available literature and new literature is added in this section to explain this negative effect on empathy.

As was reported earlier, although there seemed to be a general trend of an empathy decline after reading, the type of the text (fiction versus non-fiction) played a key role; the reading of

the fiction text caused an immediate decrease in empathy which then rose back again after two weeks, while the non-fiction text did not have any immediate effect but exhibited a decline in empathy after two weeks, suggesting that this work of fiction has an immediate negative effect on empathy while the non-fiction text has only long-term negative effects.

Concerning the short-term negative effect of the fiction text on empathy, these results may depend on the nature of this study and the measurements used: the Questionnaire of Cognitive and Affective Empathy (QCAE) that was used asks questions about empathising with an unidentifiable person or with people in general (i.e., “I sometimes find it difficult to see things from the other’s point of view” or “I like to look at everybody’s side of disagreement before I make a decision”) (Reniers et al., 2011). Considering that studies have suggested that people can identify with a particular, identifiable person but not with groups (Bal & Veltkamp, 2013; Slovic, 2007), it can be suggested that the readers may have empathised with a particular person but not with an unidentified and general group, as measured by the QCAE. For example, they may have reported higher scores if the questionnaire was asking whether they can identify with a friend, a neighbour and in general with an identifiable person they know, but they may have not been able to report high scores when asked if they can empathise with an unidentifiable person or a general other.

In fact, trying to empathise with a general mass could have been emotionally overwhelming, especially after reading the story and feeling for or/and with the story’s protagonist. In particular, empathising with the character of a book may reduce readers’ empathy toward the general “other”; the reader may drain their empathic repository to the identifiable book character leaving them with either no strength to get emotionally involved with others – especially unidentifiable others – or in a state where they need to suppress their empathic feelings to save themselves from being emotionally exhausted. In their review of modulatory factors of empathy, de Vignemont and Singer (2006) argued that even if, from a neuroscientific perspective, people automatically feel with others, from a phenomenological perspective, it is not possible to continuously feel empathy toward others. As they noted, “if we were to consciously feel what they feel all the time, we would be in permanent emotional turmoil, leaving no room for our own emotions” (de Vignemont & Singer, 2006, p. 436). Currie (2016) addressed similar concerns when he argued that fiction can make us less empathic, suggesting that “empathising with fictional characters eats into our empathy capital, leaving less empathic capacity for responding to real situations” (p. 58). The present study offers empirical evidence of this “waste of empathy” but also shows that it is something ephemeral, at least in this case of fiction reading: the readers’ empathic abilities were indeed negatively affected, but only

immediately after reading about a fictional person, with the results showing that the readers' empathy reached their baseline levels after two weeks.

Currie (2016) also provides the basis for an alternative interpretation of this decrease in empathy. He argued that literature cannot improve readers' empathy because empathising with a fictional character is easier than empathising with a real person. The texts provide additional information on the emotions and thoughts of the protagonists compared to the more limited knowledge one would have about a real person in the real world, and thus the empathy that readers may feel towards a fictional character is supported by these extra "authorial inputs"; since this information is missing in real life, empathy toward fictional characters does not train people to empathise with real people. This study can add to this argumentation that this additional input provided by the author is so rich compared to the usual way people engage with real people, that it can even result in a decrease in readers' empathy, due to the emotional distress they feel when overwhelmed with so many details of the problems and emotions of the fictional character.

However, fiction reading may not be the only experience to be blamed for this temporary diminishing of readers' empathy. As shown in the study by Nezlek et al. (2001), empathy fluctuates every day depending on different events and interactions. In particular, the authors measured participants' empathy daily, finding a covariation between the participants' daily empathy scores and their daily social events and affect. Interestingly, people had higher empathy following a positive event, rather than a negative event, giving again evidence that people may tend to avoid empathic distress, "a strong aversive and self-oriented response to the suffering of others, accompanied by the desire to withdraw from a situation to protect oneself from excessive negative feelings" (Singer & Klimecki, 2014, p. R875), or, in other words, to block their empathy to save themselves from overwhelming feelings. Who has not, for example, turned off their television or their radio because they could not bear listening to disturbing news? People may tend to do this not because they cannot bear feeling afraid of a situation or pitiful for someone or something, but because they cannot bear to keep on feeling what others feel at a distressing point in their life. As Breithaupt (2012) suggested in his theory of a 3-person model of empathy, people can get hyper-empathic, which is followed by a process of blocking and controlling their empathy. As he posits, human beings developed blocking mechanisms to regulate their emotional engagement with others and protect themselves. Therefore, people may consciously put in the effort and take the decision to regulate their empathy toward others after reading a distressing story and empathising strongly with the protagonist or, in general, after experiencing or witnessing a distressing event. In particular,

research has indicated that it is a common phenomenon in people's life to respond to disturbing or stressful experience with empathy avoidance (Zaki, 2014). For example, a study found that medical professionals develop a regulatory system to deal with the affective costs of empathising with their patients (Cheng et al., 2007).

Based on these theories and the results of this study, it can be claimed that, when a fiction story is distressing, readers may react with a short-lived numbness towards others immediately after reading because of their need to protect themselves from extra distress, and therefore report lower empathic levels. However, this reaction does not last long as indicated by the results of this study, where the empathic levels increased again two weeks after reading the story. In short, reading a fictional story, especially if it is a sad or disturbing story (as was the case in the present study), can indeed "eat into our empathy capital" (Currie, 2016) but this effect might depend on the choice of the text; a different, less distressing story might not have led to a negative effect on readers' empathy. Also, such an effect may arise due to other events or activities of our daily lives as well, based on the study by Nezlek et al. (2001), resulting in our empathic levels being influenced by many factors and events and fluctuating daily. Lastly, this observation can also be an indication that the empathic abilities of humans are not boundless. People may be able to feel empathy up to a certain point for a specific period of time. Concerning fiction reading, this point can be reached while reading a story, filling readers with empathy for the characters of the story and then leaving them with less empathic resources, at least for the very next immediate moment, until they restore their empathic capacities as suggested by the results of this study.

As for the effect of non-fiction reading on empathy compared to fiction reading, the present study sheds light on the different trajectories readers' empathy may follow when reading fiction and non-fiction texts since most of the available research prior to this study has not investigated the long-term effect of reading on empathy<sup>16</sup>. In particular, in contrast to the work of fiction, whose readers reacted with a decline in their empathy immediately after reading, the present non-fiction reading experience had a negative effect on empathy only after 14 days.

Regarding this constancy of non-fiction readers' empathy immediately after reading, as opposed to the fiction readers, the factuality of the protagonist may have a role to play. Following the effects of fiction reading on empathy, it could have been expected that people would have even stronger blocking mechanisms, and thus experience a decrease in their empathy after reading

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<sup>16</sup> Bal and Veltkamp's study (2013) is an exception. However, they explored the effects of reading after only one week, while the present study investigated the reading effects after two weeks.

about the vicissitudes of a real person instead of a fictional one. The “safe zone”, as Keen (2007, p. 4) calls the distance fiction provides for readers to empathise with characters without the need to take action, is not there when reading non-fiction; empathising with a real person can bring implications in one’s life when reading non-fiction, as feelings of empathy towards real people can be expected to be followed by some action, as opposed to fiction, where you can feel for a protagonist but stay in your comfort zone, without the need or even the possibility of taking action. For this reason, blocking mechanisms and, thus, reduced empathy could have been expected more in non-fiction rather than in fiction. However, the results showed that there was no significant change in readers’ empathy immediately after reading. This may be a result of the suspicion the non-fiction can generate, of the readers wondering if someone lied, tried to take advantage of them, or tried to provoke empathy within them for personal gain (Keen, 2003), to the point that fiction characters and their testimonies may be considered more trustworthy than non-fiction that are usually met with scepticism (Keen, 2007). Therefore, as opposed to fiction readers, non-fiction readers do not need to use blocking mechanisms to protect themselves from empathic distress, and so their empathy does not change because they are treating the non-fiction with suspicion which leads to less emotional involvement and more scrutiny.

Nevertheless, it remains a striking discovery of this research that the long-term effects of reading non-fiction differed from those of fiction reading. In the case of the fiction story, a short-lived negative effect on empathy was shown, but there were no long-term effects since the empathic levels reached the baseline levels after two weeks. Regarding the non-fiction story, on the other hand, empathy did not change significantly immediately after reading, but showed a decrease two weeks later. A possible explanation is that by receiving the questionnaire participants were reminded of the non-fiction story they read and might have been affected by this memory. Although immediately after reading they treated the text as non-fiction, and as such, they focused more on analysing information rather than getting emotionally involved, the source and the type of the text might have been forgotten after two weeks. As a result, they remembered more the subject and the plot of the non-fiction rather than the source, and as such, they reacted with a decrease in their empathy as it happened with the fiction text immediately after reading.

This argument is based on the theory of the absolute sleeping effect (Hovland et al., 1949), a strong, long-term persuasion effect that allows fiction to be as persuasive as non-fiction since the persuasion power of fiction narratives can increase over time. This happens because readers tend to forget the source of the text, but the memory of the content of the text remains strong.



Although this study is not addressing the effect of reading on persuasion, it can be suggested that it is not only possible for readers to forget that a text is fiction and thus treat it as non-fiction, but it is also plausible that they can forget that a text is non-fiction and thus engage with it as if it were fictional. In detail, it may be that the reader, at first, treats the non-fiction with scepticism and thus, not have an effect on empathy, but they forget that it is non-fiction after a while, they lose their scepticism and so they feel empathic distress. Moreover, it can be argued that this can happen especially with non-fiction texts like the one used in the current study, a text that is literary and narrative and it could easily be considered as a fiction story if the source and paratextual cues were forgotten.

It is crucial to note, however, that the empathy decrease immediately after reading the fiction text was much stronger than the empathy decline two weeks after reading the non-fiction text. This difference shows that fiction may have a stronger negative effect in comparison to the effect non-fiction can have two weeks after reading. Also, the question that arises is why the fiction readers did not respond with a decline in their empathy after two weeks through the remembrance of the text due to the completion of the questionnaire. The answer to this might be in the non-fiction reading process, and the way information is digested, compared to fiction. In particular, the fact that non-fiction readers needed more time to experience a decline in their empathy compared to fiction readers may mean that readers need more time to reflect on a non-fiction text, and this can be explained by the reading process and goals when dealing with a non-fiction text; as previous research has suggested, when exposed to non-fiction, readers are more sceptical, they scrutinise, analyse the information given and try to reach their own conclusions (Green et al., 2006; Hartung et al., 2017; Mar & Oatley, 2008; Zwaan et al., 1995). Subsequently, readers may need more time to process the information, to have a better grasp of the deeper meaning of the text, and thus regulate their emotional engagement and change their empathic levels to deal with empathic distress, overwhelming feelings, and discomfort later.

Following the previous argumentation about the distress the authorial input may bring to readers due to the richness of its information compared to what people usually receive about others in real life situations, it can be argued that this can happen not only with fiction but with non-fiction as well. In essence, the lack of fictionality does not imply a lack of rich authorial input about the character's thoughts and feelings. This is specifically prevalent in the non-fiction text that was used in this study, which can be described as a reflective essay, or else a personal narrative where the author/protagonist not only narrates what happened to them in the past, but also reflects on their past experiences with thoughts developed at a later point in their life.

For example, the author of the non-fiction text used in this study clearly reflects on his actions and emotions of a past instance of his life: “I do not know how long I waited and I rather wonder, until today, how I could possibly have looked like”. The narrative form coupled with the extra information provided by the author’s reflection makes it clear that the reader learns more about the author than they would about a person present in their daily life and the current environment. As a result, this additional information can make the reader feel overwhelmed once they forget the factual source of the text and cause a decrease in empathy to protect themselves from an upsetting experience. In this view, this is a phenomenon that could happen both in the fiction and the non-fiction reading condition, but in the case of non-fiction, it would take more time, as first, the readers would have to scrutinise the text treating it as a piece of real information that needs to be analysed and then, after their reservations would have subsided, they would get emotionally involved as they would with a fiction story, and then they would react with empathic distress.

Most importantly, this study used narratives both for the fiction and the non-fiction conditions, and as a consequence, the results are showing the effect of fictionality without the implications and potential confounding found in previous studies that used expository texts for the non-fiction condition (e.g., Black & Barnes, 2015; Djikic et al., 2013; Johnson et al., 2013). In detail, expository texts focus on informing or persuading (Koopman, 2015), or, as Bruner argues (1986), are paradigmatic: they provide information and explanations on how something works and exists. On the other hand, narratives communicate the intentions of agents, their interactions with others, and the vicissitudes they face to reach these intentions (Bruner, 1986) and are defined as stories or series of events with a beginning, middle, and end (Bruner, 1986; Fitzgerald & Green, 2017). Consequently, when previous studies compared factual expository texts with fictional narratives, the results they found might have been due to the fictionality of the texts they used, their narrativity, or both. The present study, however, made sure that the texts used were both narratives, making it easier to draw conclusions and argue with greater confidence that fictionality per se plays a role in investigating the readers’ empathy without the implications the text genre might bring.

Another explanation behind the immediate decrease in empathy when reading the fiction story and the delayed decline when reading the non-fiction story can be based on the theory of self-licencing, a situation in which people feel “licensed” to engage in less positive behaviours after having done something good (Currie, 2016); this increases their feeling of self-worth and therefore they feel less concerned about the implications a subsequent negative action may have (Sachdeva et al., 2009). For example, a well-known case was reported by Chiou et al.

(2011), who showed that people taking dietary supplements are more inclined to follow unhealthy lifestyles, as the use of the supplements can create a false sense of licensing. When it comes to reading and its effect on empathy, readers who empathise with the protagonist of a story may subconsciously feel so self-worthy that they feel they can worry less about other people, or else they feel “licensed” to not empathise with real people (Currie, 2016). This can also be the case for non-fiction: The reader may have felt licensed to not empathise with other people after having reflected on the experience of the protagonist and understood his point of view.

No matter whether a fictional or non-fictional text was used, one can argue that since reading can have this negative effect on empathy, the continuous exposure to literature may keep readers’ empathy low in the long term. This study, however, when using the measurements noted in the methodology of this chapter, showed that there is no correlation between people’s exposure to literature and their baseline empathy, as opposed to previous studies that reported a positive correlation (see Mumper & Gerrig, 2017 for a meta-analysis). This may be a sign that not every text, fictional or not, has a negative effect on empathy; some narratives may increase empathy, while some others, like the ones used in the present study, may decrease it. This can result in their empathy not being steadily low or high due to their regular consumption of fiction or non-fiction narratives.

Apart from this line of reasoning, other perspectives, e.g., cultural studies, may provide further interpretations. For instance, Edmundson’s book “Why read” (2005) provides some arguments that can give an additional explanation. Although his starting point is education and how marketable it has become, he argues that not only universities, but also culture in general, has become pleasure-oriented. This can imply that nowadays people of west-centric countries are merely consuming art without challenging themselves or igniting any personal expansion and critical thought, but they treat it as just an easily digested occupation. People watch one movie after the other, they binge-watch series, and even the bookstagrammers (i.e., people posting about books on social media) read a handful of books per week. This leads people, and readers in particular, to consume a piece of literature in a superficial way, with greed and ready for the next form of entertainment. As Edmundson continues, we “like to watch (and not to do)” (p. 10) and I can add that we like to consume books and not feel them. However, it is not the culture per se that led to this state. Edmundson explains that it is the World Wide Web, as it has given us the possibility to witness the lives of others but in a remote fashion and this overexposure made people less touched by what they are witnessing, leading to an “aristocratic expectation:

What have you to show me that I haven't yet seen?" (p. 10), which may be added, also came with a fear of being directly influenced by something, a fear of vulnerability.

In line with Edmundson's thought, Wolf (2018) argues that people no longer contemplate on what they read; the inundation of information and entertainment that has been made available in this digital era leaves no time for contemplation. Considering that empathy is not only an affective reaction, but also a cognitive process that is supported by appraisal (de Vignemont & Singer, 2006), the lack of contemplation after reading could really affect readers' empathy. This theory can explain why reading the fiction text did not have long-term effects on readers' empathy. Readers may have felt distressed and blocked their empathy immediately after reading, but once they went on with their day, they searched for the next source of stimulation, whether this was another story, a movie, a video game, etc., without pacing themselves, letting the story sink in, reflecting on it, bringing a change in themselves, and more specifically, affecting their empathy long-term. Based on this argument, non-fiction can promote contemplation more than fiction, but this takes a form of scrutinising a text before creating feelings since the community is filled with fake news, conspiracy theories, and photoshopped images.

Furthermore, considering how much literature has been praised for increasing people's empathy and how much empathy has been advertised as an emotion that people need to develop more, the results of this study can have many implications. However, the answer is not to read less or even to not read the specific texts used in the present study. On the contrary, the importance of empathy in human society needs to be reconsidered. In detail, being less empathic, whether this is a result of empathic distress after reading an emotional text or not, does not indicate a change in one's morality. As Bloom (2016) explains in depth, higher empathy does not necessarily imply being more moral. As an example, he uses the scenario of a child drowning. Saving the child does not depend on whether one feels what the child feels while drowning, and this lack of empathy does not stop someone from taking action and doing what is morally correct, to save the child (Bloom, 2016). Thus, Pinker's idea that literature has helped people to be "nicer" (2011), an argument also posed by Keen (2007), may hold true, even if this study shows that literature has decreased readers' empathy. This issue will be further discussed in the last chapter of this thesis.

Regarding the distinction between affective and cognitive empathy, affective empathy was shown to be affected more by the reading experience than cognitive empathy. Furthermore, it was only affective empathy that increased two weeks after reading back to the baseline levels in the case of fiction reading. This difference indicated that readers could restore their capacity

to feel with others, but the cognitive component of empathy still needed more time to be restored, or else reach the baseline level, with the ability to take someone else's perspective still being depleted. This trend can be explained by the theory of affective and cognitive empathy: affective empathy is usually considered a pre-reflective mechanism, while cognitive empathy refers to the ability to accurately understand someone else's feelings (Hatfield et al., 2009; Spinella, 2005). This can imply that affective empathy is the component that is easier to recover after an experience, as it depends on more automatic mechanisms, whereas cognitive empathy depends on an appraisal process that takes more time (Dahl, 2017; Zaki, 2014). The results regarding the non-fiction reading experience can also support this argument since cognitive empathy decreased after two weeks together with affective empathy. This can suggest that the reading goals induced by the non-fiction text prompted the readers to take more time to process the text and their empathy was affected through a more cognitive process compared to fiction reading.

### 2.7.2 The role of reading devices in readers' empathy

When investigating the role of reading devices, although initially it seemed they had a very limited effect on readers' empathy, the examination of fiction and non-fiction reading brought some interesting findings. First, reading fiction with an audiobook was shown to lessen the immediate negative effect on empathy compared to reading it on a tablet or on paper. Pertaining the results two weeks after reading, print showed to have a long-term negative effect on empathy compared to audiobooks and e-readers. As for non-fiction, it was shown that the reading devices did not have any effect.

Therefore, this study produced very different results from what was hypothesised: When reading fiction, not only did print books not increase empathy, but it was also revealed that they evoked a stronger decrease in empathy immediately after reading compared to audiobooks, showing that ear-reading and eye-reading affect readers' empathy differently when exposed to fiction. In particular, a surprising phenomenon was revealed: individuals who listened to the fiction text showed a slight increase in empathy immediately after reading, while individuals in the print book, e-reader, and tablet condition exhibited a strong decrease in empathy. This finding reveals that when ear-reading a story, the risk of squandering one's empathy is lower than when eye-reading it. The experience of the story with the ears may allow a distance between the reader and the story, a distance that is supported by the affordances of audiobooks, i.e., the fact that they allow the reader to simultaneously engage with other activities like commuting, household chores, etc. (Have & Pedersen, 2016) Audiobooks may also leave the eyes "free" to experience the real environment around them and thus let readers be

closer to the real world or at least they create an interconnection, where the real world and the story world are linked and can influence each other (Have & Pedersen, 2016). This interaction between the real world environment that the readers experience with their eyes and the story world environment that they experience with their ears may interfere with the readers' empathy. The stimuli received from the ears may be of lower intensity than the stimuli received from the eyes, and so it does not let the ear-reader reach a high level of empathic drainage. Additionally, according to the results, multitasking had "protected" readers' empathy since audiobook users who engaged in other activities while listening to the fiction story showed a stronger increase in empathy immediately after reading compared to audiobook users who did not multitask. This suggests that the more focused a reader is, the more possible it is for them to experience empathic distress, and an audiobook provides the optimal distance to not get overwhelmed, especially when exposed to a distressing story.

Additionally, it was found that this difference between eye- and ear- reading was apparent only when studying their effects on affective empathy as opposed to cognitive empathy. Thus, based on the definitions of cognitive and affective empathy (Reniers et al., 2011; Spinella, 2005), the reading devices cannot affect the reader's ability to mentally represent other people's thoughts and feelings, but they can make a difference in the emotional reaction towards others. Therefore, audiobooks "protected" readers from reacting emotionally towards others and perhaps becoming overwhelmed without making any change in their ability to understand others' mental processes.

In conclusion, although it was expected that audiobooks' affordances will hinder readers' empathy from increasing after reading fiction, it was proved that they functioned as a shield against the decline in empathy experienced by print and screen readers. The empathic repository of the readers was not drained (as opposed to the eye-readers due to the empathic distress they experienced) and hence the empathic levels were kept intact. Thus, the connection that an audiobook provides with the real environment and the ability to do other activities while listening to a fiction text may save the audiobook readers from getting overwhelmed. Therefore, it can be argued that audiobooks can save readers' empathy and can let them be ready to empathise with real people. The fact, however, that the empathy of audiobook readers remained stable without showing an increase two weeks after reading fiction shows that ear-reading did not somehow improve readers' empathy, suggesting that even when distress is not experienced, fiction ear-reading does not function as training for empathy.

For the case of non-fiction reading, the four devices did not differ in their effect on empathy. If the difference between audiobook and print when reading fiction is taken into consideration, it could be expected that a similar difference would have been found two weeks after reading the non-fiction text. However, this was not the case, suggesting that ear-reading can protect the reader from a decrease in empathy immediately after reading fiction, but it does not protect them when the empathic decline is caused by reflection towards a non-fiction text two weeks later. Furthermore, it was revealed that multitasking did not play a role in the empathic change of ear-readers when exposed to non-fiction as opposed to fiction, revealing that the effect of ear-reading on empathy is not affected by the readers' focus on the non-fiction narrative. These results show that audiobooks do not work the same in non-fiction as they do in fiction reading, with their affordances and practices not changing the way empathic distress comes forward two weeks after reading non-fiction. This may indicate that the factuality of a text and the reading goals it provokes – i.e., to gain information and to scrutinise them, to think critically about the text and analyse it – can change readers interaction with the reading device, and specifically with the audiobook. Fiction readers may have a stronger tendency to allow an interconnection of the real environment around them with the story world, but non-fiction readers, and the knowledge that the text they read is already part of the real world, may block or at least hinder the intervention of the real world in the reading experience and hence, have a similar reading experience and empathic change as the eye-readers. Lastly, exposure to a non-fiction text may drive ear-readers to be more careful and hence not allow other activities, i.e., multitasking, to take something away from their focus and tendency to collect and analyse information and so, to have a different experience than the fiction ear-readers.

As for the eye-reading devices, print books, e-readers, and tablets did not differ in their effect on empathy and all three devices caused a decrease in empathy immediately after reading for the case of the fiction narrative and a decrease two weeks after reading for the non-fiction readers, showing that reading from a print book, an LCD screen, or an e-ink screen brought the same empathic distress to the readers. An exception can be found in the comparison of print books and e-readers when reading fiction, indicating that the negative effect toward empathy may be more long-lasting when reading a print book in comparison to e-readers. This suggests that print books can have a stronger adverse effect on empathy when reading fiction, causing more distress than e-readers. This was also prevalent when exploring the effects of reading devices regardless of text, with the print showing a decrease on empathy compared to the e-reader two weeks after reading. Apart from this indication, the lack of differences between the conditions of the print book, e-reader, and tablet is in contrast to previous research (Guarisco

et al., 2017) that indicated that theory of mind scores increase after reading in print, but decline when using a tablet. This contradiction with previous research can be explained by the general decrease in empathy found in this study. In other words, although previous research suggests that print books may facilitate empathy to rise compared to screen devices (Guarisco et al., 2017; Mangen & Kuiken, 2014), no previous studies explored the differences between devices in the case of empathic decline. In short, it may be the case that print books are better than screen devices when the text facilitates empathic growth, but when the reading material causes a decrease in empathy, then the choice between screen and print devices is not a determinant of the empathic change. This becomes apparent if the materials used in the previous studies are explored in depth. In detail, the texts used by previous studies were not as distressing as the materials of the present study and could have avoided a negative effect on empathy. Guarisco et al.'s study (2017) used two positive, heart-warming stories that include a happy ending, featuring an adult giving advice to adolescents (Kwame's "The Crossover" and Palacio's "Wonder"), while Mangen and Kuiken's study (2014) used the short story "Murder in the Mall" by Sherwin B. Noland; although this is a sad story, including a mother witnessing the death of her daughter after being stabbed with a knife, the researchers chose to alter the story, replacing the mother with a homeless person to avoid extensive distress.

However, the methodology of the current study may also play a role in the lack of differences between the three eye-reading devices. In particular, and regarding the lack of differences between e-readers and tablets, both in the case of fiction and non-fiction reading, it is important to note that the participants used their own devices, which they personally purchased, they had at home and used in general, in contrast to the majority of relevant research (Haddock et al., 2020; Mangen & Kuiken, 2014, Mangen et al., 2019, Schwabe et al., 2021) where the devices were provided to the participants by the researchers. At the same time, participants who did not own a screen reading device used the print book or the audiobook edition. Hence, these participants were not accustomed to using a screen reading device, and so, if they were forced to use one for perhaps the first time during this experiment, they may have had different results in comparison to other participants. Therefore, the procedure of the present study may have produced weaker differences when comparing e-readers with tablets and print books due to the familiarity of the participants with the specific models and devices they used. It would be interesting to see if the results would be the same in a scenario where we provide devices that participants have not used before. However, the present study provides results that are more relevant to real-world scenarios. Each person decides to buy and use a specific reading device because it fits their lifestyle, their way of reading, their abilities, and their personality. For



example, some people may be more auditory than others, and thus prefer to use audiobooks; other people might reach a better engagement due to the dictionary provided in the tablets, etc. There are so many factors that can influence someone's choices that it is not possible to investigate them in one study. However, asking participants to use their own devices provided this study with ecological validity and allowed investigation of the effects of reading devices in real life and not in a supervised or controlled environment, revealing that screen – with LCD light or e-ink technology – and print can have similar effects on readers' empathy.

Lastly, Wolf (2018) posits that reading behaviours, readers' attention, the ability to reflect on what one reads and, most relevant to this study, the ability to empathise change with more people reading on screens and digital devices. She does not refer only to reading devices such as e-readers, but also to any type of digital reading, such as social media, video games, blogs, etc. She suggests that exposure to digital media has led people to adopt a new shallow reading strategy (as opposed to deep reading) that uses techniques of scanning and skimming the text, which does not allow emotional engagement and leads to lower empathic abilities. More importantly, she argues that this reading behaviour has bled over into print reading, and people are using the same shallow reading mechanism when reading print books due to them being accustomed to digital texts and environments. Therefore, although this study cannot provide evidence to Wolf's argument, it may be an added indication that people of western societies have become so accustomed to digital media that they treat print books as if they were screens, and so there is limited discrepancy between the effects on empathy whether they read from print or screen since they treat both devices in a similar fashion.

This study, however, does not have the appropriate evidence to support Wolf's position since the reason behind the lack of discrepancy between the eye-reading devices cannot be found in the current data. Furthermore, the reading experience was shown to affect empathy, and even though this effect was negative, it showed that reading, whether influenced by the digital era or not, affects empathy. This showed that reading is a powerful weapon that can influence people's emotions, albeit for a short-term period, and may not be as shallow as it is feared by Wolf. If the readers were only scanning the text, would they have felt emotional distress? Would they have needed to block their empathy? Would, in short, experience a decline in their empathy? Most probably not.

In conclusion, this study revealed that eye-reading devices, i.e., print books, e-readers, and tablets, have limited differences in the way they affect readers' empathy. This can be explained by the fact that the readers were using their own devices, devices that are accustomed to using,

and thus the lack of differences can reflect their familiarity with the reading device, as opposed to previous research. Secondly, the discrepancy of the present results with previous studies may indicate that eye-reading devices differ in their effects on empathy only when there is a general tendency of empathic growth after reading. If the reading experience causes a decrease in empathy, as presented here, then the eye-reading devices may not affect this trend of empathic distress. Lastly, although it could have been suggested that the lack of differences between the eye-reading devices show that reading practices of digital reading (e.g., shallow reading, skimming, lack of attention, lack of empathy) had bled over into print reading (Wolf, 2018), this holds only true if there was no effect on empathy in general. This study, however, gave evidence that there is an effect of reading on empathy (whether screen or print reading), and although it was negative and for a short-term period, it may suggest that digital media have not stolen the ability of deep reading from the readers. As for the audiobook reading experience, it seems that ear-reading protects readers' empathy from decreasing in the case of fiction reading, while this was not apparent when reading non-fiction, showing that there is a unique interaction between fiction texts and audiobooks that protects readers' empathy from decline. It is suggested that this result may be influenced by the interconnection between the real world perceived with the eyes and the factual world perceived with the ears as well as the affordances of the audiobook, namely the ability to engage in other activities while listening to a story.

### 2.7.3 The role of individual differences

Although the role of individual differences was not the main focus of this study and their analyses were conducted in an exploratory way, it is vital to note some of the issues that were revealed.

First, previous studies have found a correlation between people's experience with literature and empathy and, based on these findings, have suggested that reading literature facilitates people's empathy (see Mumper & Gerrig, 2017, for a meta-analysis). However, the present study did not find any relationship between experience with literature and empathy.

Secondly, previous studies have also proposed that personal experience with the subject matter can facilitate readers' empathy (Green, 2004). The present study, however, failed to find such a relationship. In fact, the readers who had personal experiences relevant to the stories experienced a stronger decrease in their empathy two weeks after reading compared to their baseline levels. This may suggest that, when the reading material can induce empathic distress, experience with the subject matter can increase readers' distress and provoke stronger blocking

mechanisms after reading. However, this was not apparent immediately after reading, which encumbers the effort to draw clear conclusions regarding this issue.

Thirdly, need for affect has been proven to be a strong predictor of empathy. According to Maio and Esses (2001), individuals high in need for affect actively search for emotional activities and conditions, and they then tend to strengthen their emotional experiences, allowing them to empathise with others. However, it was interesting to find that high need for affect caused a stronger and more long-lasting decrease in empathy, suggesting that even if individuals seek emotional experiences, they may have stronger blocking mechanisms when being under distress. Therefore, it would be interesting for future studies to investigate the role of need for affect when experiencing empathic distress after reading and this personality trait should be taken into consideration when investigating relevant effects.

Lastly, it was found that several other factors did not affect readers' empathy. In particular, disruption while reading, taking breaks, awkwardness when handling the reading medium, resistance to distraction and dislocation within the text did not affect the change of readers' empathy. This may suggest that the reading experience was so strong that such factors could not influence readers' empathic reactions. However, this study tried to examine these factors in an exploratory fashion and future studies could investigate not only the effect of reading devices on empathy, but also look in depth at the procedure of reading and reading behaviours with a more qualitative methodology, such as participant observation to explore how the everyday handling and use of the reading devices interfere with the people's empathic responses.

#### **2.7.4 Limitations**

This study tried to use texts that can be as comparable as possible, i.e., to deal with the same subject matter, to have a similar length, similar levels of literariness, to both be narratives. However, there is always a possibility that the differences in the effects of the fiction and the non-fiction texts on empathy are not only a product of fictionality since there are also other textual factors that might have played a role. For instance, the fiction story was in third person, while the non-fiction was in first person. Also, they had differences in the amount of dialogue and the number of flashbacks and flash-forwards (the non-fiction had a less chronological order compared to the fiction).

Furthermore, although the experiment chose lengthy texts of around 10000 words each, they still cannot be considered whole books. This could have some implications for the study, as the eyestrain that tablets might cause after reading for a long time may protect readers from getting distressed by the text and shield their empathy as did audiobooks. Contrarily, since the

participants used their personal devices they were already using for reading, they may be used to the LCD light of the tablets and hence not experience any eyestrain, leading again to an experience similar to e-readers and print books.

In addition, the fact that these texts provoked a decrease in empathy (either an immediate decrease as noted in the fiction reading or a delayed decrease as noted in the non-fiction) refers to the effects of the specific texts used and cannot be generalised to reading literature generally. Interestingly, previous studies have shown that fiction reading increases empathy (see Dodell-Feder & Tamir, 2018 for a meta-analysis). This inconsistency of the results substantiates the argument that literary works are very diverse in their ability to enhance or weaken empathy. In other words, it can be claimed that different stories bring different empathic outcomes and statements such as “fiction makes us more empathic” or “fiction can harm readers” need to be avoided. It is no surprise that the book industry uses different categories of literature, such as dark, reflective, feel-good, etc., suggesting that different pieces of literature have a different effect on readers. Therefore, it is of vital importance to also consider readers’ judgement; the choice a person makes about what to read could highly depend on the emotional needs of the reader. For example, a difficult or stressful period in one’s life can lead them to reread their favourite books. This may happen because, as Spacks suggests in her book “On Rereading” (2011), rereading offers some reassurance that no matter the changes in one’s life, some things remain the same, or as she puts it, “the stability of reread books helps to create a solid sense of self” (p. 4). It may also be the case that delving into a new book requires strength and courage to be exposed to new stories, to reflect on others’ experiences and even to be absorbed in an unknown story world, requirements that are difficult to cover when in a stressful situation. On the other hand, when in a relaxed period, people may show more penchant for challenging themselves and their ideas with new stories, and they may be ready to let the stories affect them and to reflect on what they read. Therefore, it is no surprise that schemes such as the “Books on Prescription scheme” came into existence, according to which, books are prescribed to people by a health authority to help them deal with issues of mental wellbeing (Brewster, 2008). This study, however, chose the materials for the readers without having any information about their emotional state, and it is also impossible to control – at least when following a quantitative method – all the factors that could intervene with participants’ empathy when reading a text since, as noted by Nezlek et al. (2001), different everyday events might play a role in the fluctuation of people’s empathy.

Another important factor that should be taken into account is the role of the author and their aims when writing a fiction or non-fiction narrative. It can be claimed that readers’ empathic

reaction to a text is not only a result of their ability to empathise or their tendency to use blocking mechanisms, but it is also a result of the authors' goal to provoke empathy or not. Depending on the authors' aims, they use styles and mechanisms to induce empathy or distress (see Keen, 2007 for examples of authors rendering empathy). Furthermore, the empathic effect of a text can be due to the influence of the emotions, memories, and experiences of the author (Hogan, 2018). The theory of expressivism studies the role of the author as an individual in the affective responses generated by their literary work. It focuses on the author's emotional experiences that can be communicated to the reader (Hogan, 2018; Robinson, 2005), and so, although this study does not provide any proofs and the role of the author is out of the scope of this thesis, it may be that the empathic effects of reading are a result of an intertwining of the reader's characteristics, the writer's individuality, and the text's characteristics.

Lastly, although the results of this study provide important insights into the effects of reading on empathy and the role of reading devices, future studies are needed to investigate the issue even further. For instance, more texts can be used to explore whether other factors might play a role, and qualitative methods might provide some answers regarding the way readers treat a text, the empathic process, and their blocking mechanisms. The fact that this research showed the opposite results of what was expected and what the majority of relevant research suggests, discovering a negative effect of reading on empathy shows that readers' empathic reactions cannot fit one mould and more focus on the "how" and "why" is needed.

## 2.8 Conclusion

This study showed that, contrary to what was hypothesised, literary reading can have a negative effect on readers' empathy. The fiction story that was used in this study brought an immediate negative effect that died out after two weeks, while the non-fiction text had a negative effect only after two weeks. This study is crucial because it studied the effect of fictionality per se, with the use of two narrative texts of similar subject matter, and so it avoided the potential confounding found in previous studies that used expository texts for the non-fiction condition.

To the author's knowledge, this is the first study comparing four different media, namely print book, tablet, e-reader, and audiobook. The three eye-reading devices differed very slightly in their effects on empathy, while it was shown that audiobooks may protect readers' empathy from decreasing when reading fiction. This result suggests that the combination of devices and texts can protect the reader from feeling empathic distress after reading an unsettling story.

However, this chapter has laid only the first stone in investigating the negative effects literary reading can have on empathy and the differences that reading devices can bring in this

experience. The next chapters will explore the role of fictionality and reading devices in absorption and comprehension to provide a clearer understanding of the cognitive and affective processes that occur during reading. Although some limitations were addressed, the quantitative nature of the following studies is necessary to investigate the direction and general trends of these effects.

### 3 Third Chapter: The effect of fictionality and reading devices on absorption and the role of absorption in empathy

#### 3.1 Introduction

The previous chapter showed that literary reading decreased readers' empathy. It revealed that fiction readers experienced an immediate negative effect, while non-fiction readers experienced a decrease in their empathy after two weeks. Regarding the role of the reading device, it showed that audiobook reading can protect readers' empathy from decreasing when exposed to fiction, while no substantial differences were found between print, tablet, and e-reader devices. Based on these results, more questions have emerged about the phenomenon of absorption, its role in readers' empathy and how it may, in turn, be affected by the fictionality status of the text and the reading device. Absorption has been conceptualised as a combination of four distinct elements, namely attention, transportation, emotional engagement, and mental imagery (Kuijpers et al., 2014).<sup>17</sup>

Previous research has suggested that absorption is a moderating factor, which can facilitate readers to become more empathic after fiction reading (e.g., Bal & Veltkamp, 2013; Mar et al., 2006; Oatley, 2002). For example, Johnson (2012) showed that people who read a fictional story and got absorbed in it exhibited higher affective empathy compared to those who did not. Considering, however, that the previous chapter of this thesis revealed that empathy can decrease after reading, the role of absorption in readers' empathy needs to be revisited.

Concerning the role of fictionality, there is limited research regarding absorption when reading non-fiction and its effects on empathy. Green and Brock (2000) found that participants got equally absorbed into a story whether this was labelled as fiction or non-fiction. Thus, they suggested that absorption occurs in a similar way whether a narrative is fictional or non-fictional. However, Bal and Veltkamp (2013) revealed that absorption influences readers' empathy when exposed to fiction as opposed to non-fiction. Also, considering that narrative empathy (i.e., the empathy readers feel for a story's protagonists – Keen, 2007) is an element of absorption (Kuijpers et al., 2014), and based on the theory of optimal aesthetic distance, which suggests that the distance from the reality provided by fictional stories makes them a safer space to feel compared to non-fiction (Cupchik, 2002; Scheff, 1979; see Chapter 1, p. 19 for a review), it may be expected that fiction can elicit more absorption than non-fiction.

As for the role of reading devices, the results of relevant studies have not been conclusive. For instance, Mangen et al. (2019) found that the medium (print versus e-reader) did not affect

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<sup>17</sup> For more details regarding the definition and the four elements of absorption, see Section 1.5.

absorption, while Haddock et al. (2020) found that when reading a traditional themed story, print facilitated absorption more than tablets as opposed to when reading a modern story.<sup>18</sup> Lastly, although there is a lack of empirical evidence on the difference audiobooks may bring in readers' absorbing experiences, it has been suggested that exposure to the external environment and other activities may compromise the ability to create mental imagery and thus, reduce readers' absorption compared to print reading (Have & Pedersen, 2016). However, this theory has not yet been examined empirically. Finally, tablets and e-readers have not been compared. As noted in the literature review, however, it can be argued that if tablets cause more eyestrain and less focus due to their multifunctionality, they may also bring less absorption compared to e-readers.

### 3.2 Research questions

1. Does absorption influence the effects fiction and non-fiction reading have on the change of readers' empathy, and how?
2. Does the fictionality status of a text (i.e., whether a text is fiction or non-fiction) affect readers' absorption?
3. Does the reading device (print, e-reader, tablet, and audiobook) affect readers' absorption?
4. If there is an effect of reading devices on absorption, is this effect present after controlling the effects of different individual factors while reading, i.e., disruption, breaks, resistance to distraction, dislocation within the text (the uncertainty a reader may feel about their location within the text while reading as defined by Mangan & Kuiken, 2014), awkwardness when handling the medium, multitasking, and experience with reading devices?<sup>19</sup>

### 3.3 Methodology

All participants were randomly assigned to one of four conditions in a 4 (reading device: print, e-reader, tablet, and audiobook) by 2 (fiction and non-fiction) between-subjects factorial design. There were in total 688 participants (344 per text and 172 per device, with 86 per device for each text separately). The study has been pre-registered on AsPredicted.org (<https://aspredicted.org/r8s4z.pdf> and <https://aspredicted.org/bc2i2.pdf>) and approved by the

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<sup>18</sup> By traditional themed story, the authors refer to a classical story by A. Chekhov, which includes references only to "traditional" ways of writing and reading (i.e., pen and paper). By modern themed story, they refer to a science-fiction story by R. Bradbury that has references to screen technologies. The two stories talk about print and screen reading, respectively, and have a common theme of family issues and raising children (Haddock et al., 2020).

<sup>19</sup> For details about these factors, see Chapter 2, pp. 65-66.



Lancaster University Faculty of Arts and Social Sciences ethics committee (reference FL19005 - see Appendix A). Details about the participants, the procedure, and the materials, as well as details about how empathy and individual differences were measured, can be found in the methodology of Chapter 2 (Sections 2.3.2, 2.3.3, and 2.3.4).

For the assessment of readers' absorption, I used the Story World Absorption Scale (SWAS) as developed by Kuijpers et al. (2014). This measurement asks participants to rate their level of agreement with 18 items on a 7-point Likert rating scale ranging from -3 (strongly disagree) to 3 (strongly agree). For the final absorption score, the scores of the 18 items are aggregated. Thus, the final score can take any value from -54 to 54. This scale consists of four subscales, namely attention, mental imagery, emotional engagement (feeling with the characters, including narrative empathy) and transportation. This way, the SWAS allows measuring absorption overall but also provides distinct values for the different elements that absorption consists of. Kuijpers et al. (2014) proved that this scale is highly correlated with previous scales for the assessment of absorption, namely the Transportation Scale developed by Green and Brock (2000) and the Narrative Engagement Scale by Busselle and Bilandzic (2009). However, the Narrative Engagement Scale was developed to measure absorption in audio-visual material instead of books, while the Transportation Scale is usually treated as a one-dimensional measurement, so it would be more difficult to study the effects of the devices on the different dimensions of absorption (see Bilandzic & Busselle, 2017 for a review). Therefore, the SWAS was chosen as the most appropriate measurement for this study. Regarding the time point at which absorption was measured, it was measured only once, immediately after reading the text.

### 3.4 Data analysis

The software R (version 4.0.3.; R Core Team, 2020) was used to perform the analyses. To address the first research question, namely the investigation of the role of absorption in the change of empathy, Linear Growth Curve Analysis (Mirman, 2014) was used to model empathy with the fixed effect of absorption and time (time 0: before reading, time 1: immediately after reading, time 2: two weeks after reading), while including the random effect of participants on the intercept. Random effects on the slope were not included since the text and device conditions were between units (Barr et al., 2013). A "minimal to maximal-that-improves-fit process" (Meteyard & Davies, 2020, p. 17) was followed. Specifically, first, the fixed effect of time was tested on its own, ignoring the predictor of absorption. Then the fixed effect of absorption was added on the intercept and then on the slope. The three models were then compared using Likelihood Ratio Tests (Field et al., 2009; Meteyard & Davies, 2020). The model with the best fit was then examined. The analysis was performed with the lme4 package (Bates

et al., 2014) and the ImerTest package (Kuznetsova et al., 2017). Following the same process as reported in Chapter 2, the empathy slope was modelled in three phases: first the empathy slope from the baseline level (time 0) to the immediately after reading level (time 1), then the empathy slope from the time 1 level to the two weeks after reading level (time 2) and then the empathy slope from time 0 to time 2.

To address the second research question, namely, to investigate the effects of fictionality on absorption, a t-test was performed with only one independent variable, the text (fiction versus non-fiction) and Pearson's correlation coefficient was calculated to determine the effect size.

To address the third research question, i.e., the effects of reading device on absorption, an analysis of variance was performed including one independent variable, device (the four devices). Two additional analyses of variance were also performed to investigate the effect of device when reading fiction and non-fiction separately. This was done because, following the results of the previous chapter regarding the effect of fictionality and reading medium on empathy, an interest arose in exploring the effects of device for fiction versus non-fiction, although a general effect irrespective of text type was also needed to be investigated. Before each analysis, a Levene's test was performed to examine whether the variance of the data is homogeneous (Levene, 1960). In case the variance of the data was proven to be heterogeneous, a Welch's ANOVA (Welch, 1951) was performed that adjusts F and the residual degrees of freedom (Field et al., 2009) followed by Games-Howell's nonparametric post-hoc test that does not assume equal variance (Games & Howell, 1976). The aov function of the psych package (Revelle, 2020) and the expr\_oneway\_anova function of the statsExpressions package (Patil, 2018) were used to perform ANOVAs and Welch ANOVAs. The effect size eta squared ( $\eta^2$ ) was computed using the lsr package (Navarro, 2015). Post-hoc tests were performed using the posthocTGH function of the userfriendlyscience package (Peters, 2018). For the t-tests, the t.test function of the car package (Fox & Weisberg, 2019) was used. These analyses were performed not only for absorption in total, but for each subscale of absorption as well, namely attention, transportation, narrative engagement and mental imagery, to investigate whether different aspects of absorption are affected differently by the texts' fictionality and the reading device.

Furthermore, in a more exploratory fashion, ANCOVAs were performed to examine the effect of the devices on absorption while controlling for the effects of selected individual factors, namely disruption while reading, taking breaks while reading, resistance to distraction, dislocation within the text and awkwardness when handling the medium (for details about these factors, see Chapter 2, p. 65). Concerning the factor of multitasking, it was measured only for the

individuals that were in the audiobook condition, and it was a categorical variable with two levels (yes and no). Thus, a t-test was performed and Pearson’s correlation coefficient was calculated. Lastly, for the factor of experience with the reading device, linear regressions were used to examine whether experience with a device can lead to stronger absorption when reading on that specific device. Linear regressions were performed with the lm function of the stats package (R Core Team, 2020).

### 3.5 Results

#### 3.5.1 Descriptive statistics

The descriptive statistics are provided in Table 3.1.

*Table 3.1 Descriptive statistics of the factor of absorption in total (across devices and texts) and for each condition separately. These values are based on the mean score per item rather than the sum score.*

<b>Absorption</b>		<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
<b>Total</b>		0.85	0.95	-3.00	2.94
<b>Fiction</b>		1.02	0.94	-2.67	2.94
<b>Non-fiction</b>		0.69	0.94	-3.00	2.56
<b>Print</b>		1.05	0.76	-1.44	2.94
<b>E-reader</b>		0.91	1.06	-3.00	2.89
<b>Tablet</b>		0.88	0.87	-1.72	2.61
<b>Audiobook</b>		0.58	1.04	-2.17	2.50
<b>Fiction</b>	<b>Print</b>	1.16	0.73	-1.44	2.94
	<b>E-reader</b>	1.14	1.01	-2.67	2.89
	<b>Tablet</b>	1.04	0.86	-1.44	2.61
	<b>Audiobook</b>	0.74	1.06	-2.17	2.50
<b>Non-fiction</b>	<b>Print</b>	0.95	0.79	-1.22	2.39
	<b>E-reader</b>	0.68	1.06	-3.00	2.39
	<b>Tablet</b>	0.71	0.85	-1.72	2.56
	<b>Audiobook</b>	0.42	0.99	-1.78	2.39

#### 3.5.2 The effect of fictionality

Regarding the investigation of the effect of fictionality on absorption, it was found that the variance of the data was homogeneous ( $F(1, 686) = 0.55, p = .46$ ) and a t-test showed that there is a significant difference in absorption between readers who read fiction and those who read non-fiction ( $t(686) = 4.62, p < .001$ ). Fiction readers experienced 5.95 points stronger absorption than non-fiction readers, 95% CI (3.42, 8.48). The calculation of Pearson’s  $r$  showed that this was a small to medium effect size ( $r = .17$ ). These results are visualised in Figure 3.1.

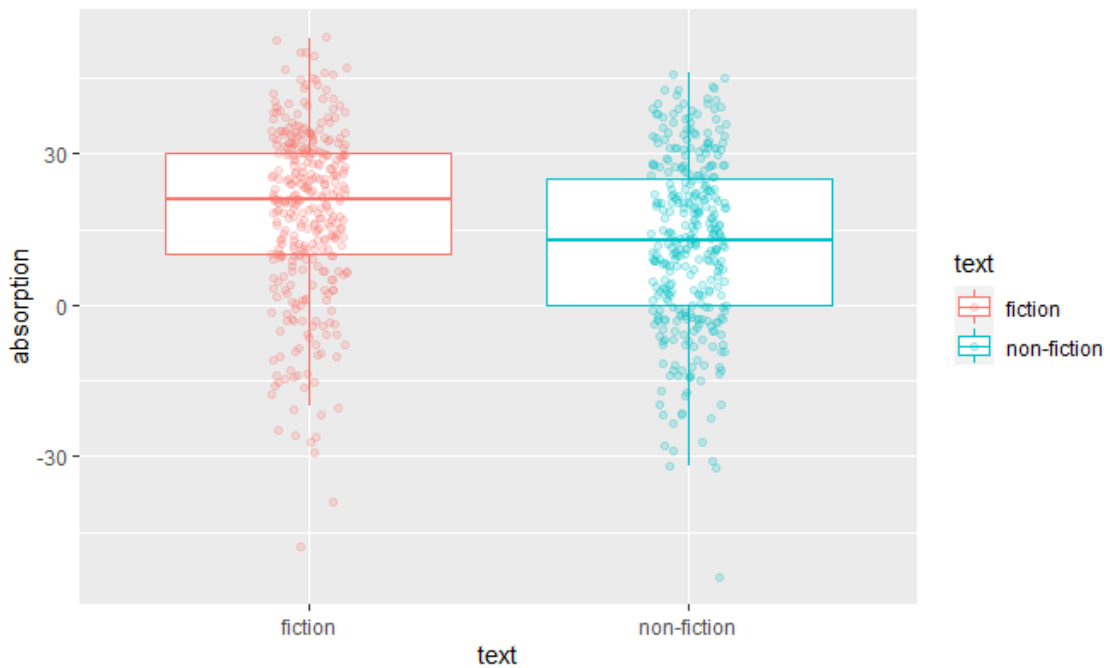


Figure 3.1 Absorption mean scores and standard deviations per text condition.

The effect of the text on the four subscales of absorption (attention, transportation, emotional engagement, mental imagery) was also investigated. First, in terms of attention, the variance of the data was homogeneous ( $F(1, 686) = 2.06, p = .15$ ). A t-test showed that there is a significant effect of text on attention ( $t(686) = 7.68, p < .001$ ), with a medium effect size ( $r = .28$ ), whereby the fiction text led to higher attention than the non-fiction text, 95% CI (3.42, 8.48).

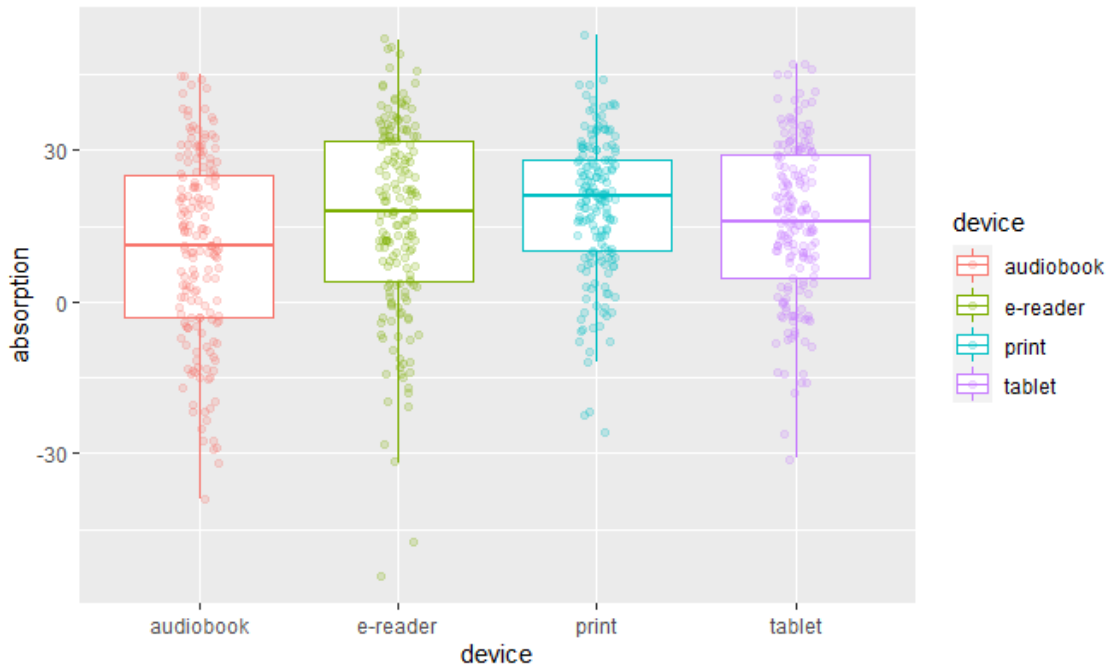
For both transportation and emotional engagement, there was homogeneity of variance ( $F_s(1, 686) < 2.97, ns$ ) but no significant effect of text ( $t(686) = 0.84, p = .40$ , and  $t(686) = 1.63, p = .10$ , respectively).

Lastly, regarding mental imagery, the variance was homogeneous ( $F(1, 686) = 1.28, p = .26$ ). The text had a significant effect on readers' mental imagery ( $t(686) = 5.18, p < .001, r = .19$ ), whereby the fiction text evoked stronger mental imagery than the non-fiction text, 95% CI (0.76, 1.68).

### 3.5.3 The effect of reading device

As for the effect of the reading device on absorption regardless of the text, it was shown that the data had heterogeneous variances ( $F(3, 684) = 8.70, p < .001$ ), so a Welch ANOVA was performed and revealed that the device had a significant effect on absorption ( $F(3, 376.88) = 7.79, p < .001, \eta^2 = 0.06$ ). Games-Howell's's post-hoc test showed that there was a significant difference between the audiobook condition and the other three conditions, revealing that audiobooks led to lower absorption compared to the other devices. However, there was no

significant difference between print, e-reader, and tablet devices. These results are visualised in Figure 3.2. Detailed results of the post-hoc test can be found in Table 3.2.



**Figure 3.2** Absorption mean scores and standard deviations per device condition.

**Table 3.2** Detailed results of Games-Howell’s post-hoc test for the effect of device on absorption. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	6.02	0.78	11.26	2.96	.02*
print – audiobook	8.53	3.97	13.09	4.83	<.001*
tablet – audiobook	5.37	0.58	10.17	2.89	.02*
print – e-reader	2.51	-2.11	7.13	1.40	.50
tablet – e-reader	-0.65	-5.50	4.21	0.34	.99
tablet – print	-3.16	-7.26	0.95	1.99	.20

Regarding the attention subscale, there was heterogeneity of variance ( $F(3, 684) = 10.1, p < .001$ ). A Welch ANOVA showed that the device had a significant effect on attention ( $F(3, 376.54) = 11.11, p < .001, \eta^2 = 0.08$ ). Games-Howell’s post-hoc test showed that audiobook readers had significantly lower attention compared to the other three devices, but there was no significant difference between print, e-reader and tablet. Detailed results of the post-hoc test can be found in Table 3.3.

**Table 3.3** Detailed results of Games-Howell's post-hoc test for the effect of device on attention. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	3.02	1.04	4.99	3.95	< .001*
print – audiobook	3.75	2.03	5.47	5.65	< .001*
tablet – audiobook	3.08	1.22	4.93	4.28	< .001*
print – e-reader	0.73	-1.00	2.46	1.10	.69
tablet – e-reader	0.06	-1.81	1.92	0.08	.99
tablet – print	-0.67	-2.26	0.92	1.10	.69

For transportation, the variance was not homogeneous ( $F(2, 684) = 2.82, p = .04$ ). A Welch ANOVA showed that the device had a significant effect on transportation ( $F(3, 379.31) = 2.87, p = .04, \eta^2 = 0.02$ ). Games-Howell's post-hoc test showed that only print and audiobook devices differed significantly, with the latter having lower scores. Detailed results are provided in Table 3.4.

**Table 3.4** Detailed results of Games-Howell's post-hoc test for the effect of device on transportation. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	1.55	-0.32	3.41	2.14	.14
print – audiobook	1.90	0.15	3.64	2.80	.03*
tablet – audiobook	0.95	-0.88	2.77	1.34	.54
print – e-reader	0.35	-1.38	2.08	0.52	.95
tablet – e-reader	-0.60	-2.41	1.21	0.86	.83
tablet – print	-0.95	-2.64	0.74	1.45	.47

Regarding emotional engagement, the variance of the data was homogeneous ( $F(3, 684) = 1.67, p = .19$ ) and the device had a significant effect on absorption ( $F(3, 684) = 3.93, p = .009, \eta^2 = 0.02$ ). Tukey's post-hoc showed that only print and audiobook differed significantly, with the latter showing lower emotional engagement. Detailed results are provided in Table 3.5.

**Table 3.5** Detailed results of Tukey's post-hoc test for the effect of device on emotional engagement. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	1.05	-0.33	2.44	1.96	.21
print – audiobook	1.83	0.45	3.22	3.40	.004*
tablet – audiobook	0.81	-0.57	2.20	1.51	.43
print – e-reader	0.78	-0.61	2.17	1.45	.47
tablet – e-reader	-0.24	-1.62	1.15	0.44	.97
tablet – print	-1.02	-2.40	0.37	1.89	.23

Lastly, for mental imagery, the variance was heterogeneous ( $F(3, 684) = 2.97, p = .03$ ). A Welch ANOVA revealed that the device had a significant effect on mental imagery ( $F(3, 378.01) = 3.19, p = .02, \eta^2 = 0.02$ ). Games-Howell's post-hoc test showed that print readers had significantly higher mental imagery than audiobooks. No other significant differences were found (see Table 3.6).

**Table 3.6** Detailed results of Games-Howell's post-hoc test for the effect of device on mental imagery. Statistically significant values are marked with \*.

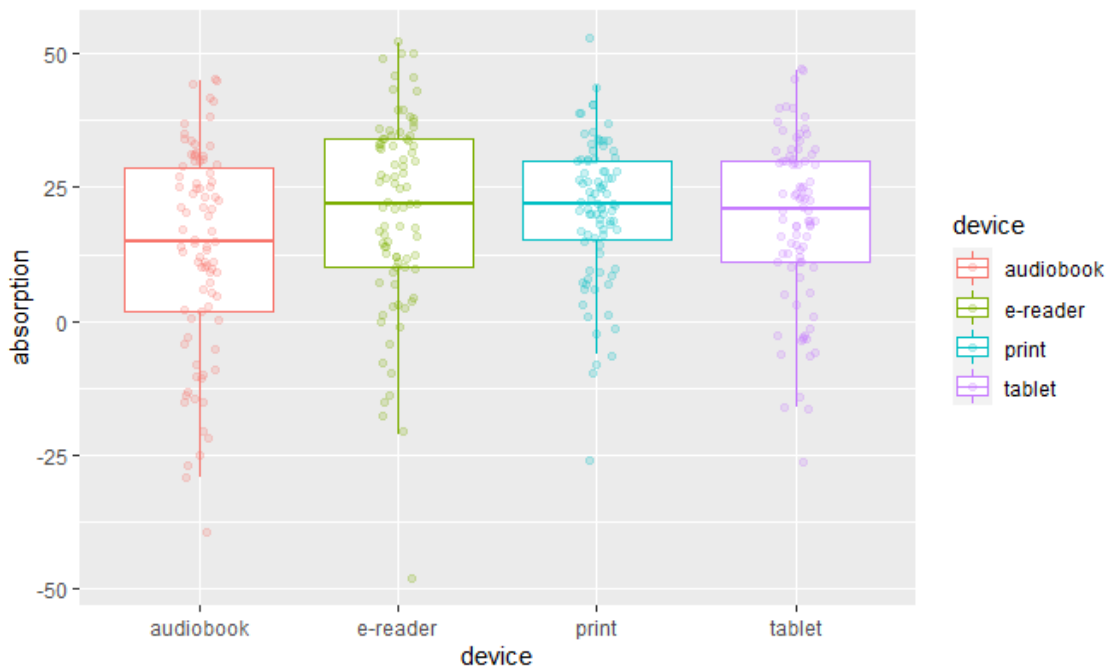
Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	0.40	-0.56	1.36	1.08	.70
print – audiobook	1.05	0.15	1.96	3.00	.02*
tablet – audiobook	0.53	-0.35	1.42	1.57	.40
print – e-reader	0.65	-0.21	1.51	1.95	.21
tablet – e-reader	0.13	-0.70	0.97	0.41	.98
tablet – print	-0.52	-1.30	0.26	1.72	.32

### 3.5.3.1 The effect of reading device: the case of fiction reading

When exploring the effect of device on absorption only for the fiction condition, Levene's test showed that there is heterogeneity of variance ( $F(3, 340) = 4.81, p = .003$ ). Therefore, a Welch ANOVA was performed and it showed that the device had a significant effect on absorption ( $F(3, 186.95) = 3.31, p = .02, \eta^2 = 0.05$ ). Games-Howell's post-hoc test showed a statistically significant difference only between print and audiobook devices, with the former scoring higher. No other significant differences were found. The detailed results can be found in Table 3.7 and viewed in Figure 3.3.

**Table 3.7** Detailed results of Games-Howell's post-hoc test for the effect of device on absorption when reading fiction. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	7.31	-0.07	14.69	2.57	.053
print – audiobook	7.52	1.03	14.02	3.01	.02*
tablet – audiobook	5.43	-1.47	12.33	2.04	.18
print – e-reader	0.21	-6.08	6.50	0.09	.99
tablet – e-reader	-1.88	-8.59	4.82	0.73	.89
tablet – print	-2.09	-7.80	3.61	0.96	.78



**Figure 3.3** Absorption mean scores and standard deviations per device condition when reading fiction.

As for the subscales of absorption separately, first, attention showed heterogeneity of variance ( $F(3, 340) = 6.66, p < .001$ ) and a Welch ANOVA showed that the device had a significant effect on attention ( $F(3, 185.73) = 7.98, p < .001, \eta^2 = 0.11$ ). Games-Howell's post-hoc test showed a significant difference between e-reader and audiobook, print and audiobook, and tablet and audiobook conditions, with the audiobook condition leading to significantly lower scores compared to the other three devices. There were no significant differences between print, e-reader, and tablet devices (see Table 3.8).



**Table 3.8** Detailed results of Games-Howell's post-hoc test for the effect of device on attention when reading fiction. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	4.15	1.43	6.86	3.97	< .001*
print – audiobook	4.00	1.67	6.33	4.46	< .001*
tablet – audiobook	4.12	1.64	6.59	4.32	< .001*
print – e-reader	-0.15	-2.37	2.07	0.18	.998
tablet – e-reader	-0.03	-2.41	2.34	0.04	.9998
tablet – print	0.12	-1.81	2.04	0.16	.9986

Transportation, emotional engagement, and mental imagery all had homogeneous variances ( $F_s(3, 340) < 2.03$ , *ns*), but no significant effect of the reading device was found ( $F_s(3, 340) < 1.69$ , *ns*).

### 3.5.3.2 The effect of reading device: the case of non-fiction reading

As for the effect of the reading device on absorption when reading non-fiction, the variance of the data was heterogeneous ( $F(3, 340) = 3.54$ ,  $p = .01$ ). Therefore, a Welch ANOVA was performed and showed that the device had a significant effect on absorption ( $F(3, 187.76) = 5.08$ ,  $p = .002$ ,  $\eta^2 = 0.08$ ). Games-Howell's post-hoc test revealed that only print and audiobook differed significantly, with print scoring higher. There were no significant differences between the other devices. Detailed results of the post-hoc test can be found in Table 3.9. The results are visualised in Figure 3.4.

**Table 3.9** Detailed results of Games-Howell's post-hoc test for the effect of device on absorption when reading non-fiction. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	4.72	-2.57	12.01	1.68	.34
print – audiobook	9.53	3.16	15.91	3.89	< .001*
tablet – audiobook	5.31	-1.26	11.88	2.10	.16
print – e-reader	4.81	-1.82	11.45	1.88	.24
tablet – e-reader	0.59	-6.23	7.42	0.26	.99
tablet – print	-4.22	-10.05	1.61	1.88	.24

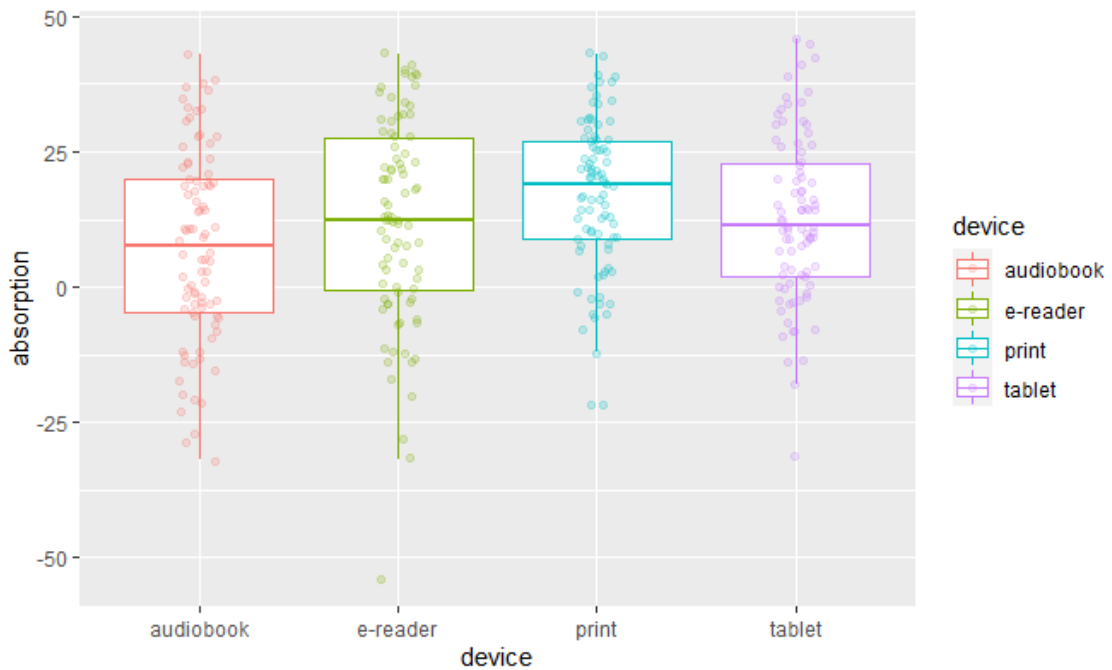


Figure 3.4 Absorption mean scores and standard deviations per device condition when reading non-fiction.

As for the subscales of absorption, first, attention had heterogeneous variance ( $F(3, 340) = 3.18, p = .02$ ) and a Welch ANOVA showed a significant effect of the device ( $F(3, 187.99) = 4.64, p = .004, \eta^2 = 0.07$ ). Games-Howell’s post-hoc test showed that only the print and audiobook devices differed significantly (Table 3.10), with print readers showing greater attention. No other significant differences were found (Table 3.10).

Table 3.10 Detailed results of Games-Howell’s post-hoc test for the effect of device on attention when reading non-fiction. Statistically significant values are marked with \*.

Comparisons	Difference	Lower bound	Upper bound	t value	p value
e-reader – audiobook	1.88	-0.82	4.59	1.81	.27
print – audiobook	3.50	1.06	5.94	3.73	.002*
tablet – audiobook	2.03	-0.57	4.64	2.03	.18
print – e-reader	1.62	-0.82	4.06	1.72	.32
tablet – e-reader	0.15	-2.45	2.76	0.15	.99
tablet – print	-1.47	-3.79	0.86	1.64	.36

Transportation had homogeneous variance  $F(3, 340) = 1.95, p = .42$ . No significant differences were found between the devices ( $F(3, 340) = 2.29, p = .08$ ). Emotional engagement had homogeneous variance ( $F(3, 340) = 1.91, p = .13$ ) and differed significantly between devices ( $F(3, 340) = 3.70, p = .01, \eta^2 = 0.03$ ). Tukey’s post-hoc test showed that only audiobook and print devices differed significantly, with print showing higher emotional engagement (Table 3.11). Lastly, mental imagery had homogeneous variance ( $F(3, 340) = 2.4, p = .07$ ) and differed

significantly among devices ( $F(3, 340) = 2.85, p = .04, \eta^2 = 0.02$ ). Tukey's post-hoc test showed that only print and audiobook devices differed, with print evoking higher transportation. Table 3.11 provides the results of the post-hoc tests.

**Table 3.11** Detailed results of Tukey's post-hoc test for the effect of device on emotional engagement and mental imagery when reading non-fiction. Statistically significant values are marked with \*.

	Comparisons	Difference	Lower bound	Upper bound	p value
emotional engagement	e-reader – audiobook	0.73	-1.10	2.57	.73
	print – audiobook	2.27	0.43	4.10	.008*
	tablet – audiobook	1.41	-0.43	3.24	.20
	print – e-reader	1.53	-0.30	3.37	.14
	tablet – e-reader	0.67	-1.16	2.51	.78
	tablet – print	-0.86	-2.69	0.97	.62
mental imagery	e-reader – audiobook	0.64	-0.59	1.87	.53
	print – audiobook	1.36	0.13	2.59	.02*
	tablet – audiobook	0.90	-0.33	2.12	.24
	print – e-reader	0.72	-0.51	1.95	.43
	tablet – e-reader	0.26	-0.97	1.48	.95
	tablet – print	-0.47	-1.69	0.76	.76

### 3.5.4 The effect of absorption on empathy

Regarding the investigation of whether absorption affected empathy, the model comparisons are provided in Table 3.12.

**Table 3.12** Model comparison results when adding the parameter of absorption on the intercept and slope term of empathy. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1	Absorption	50.38	< .001*	6.19	.01*
time 1 – time 2		55.88	< .001*	0.69	.41
time 0 – time 2		40.92	< .001*	3.85	.049*

Based on the models with the best fit (Table 3.12), regarding the empathy change from time 0 to time 1, it was revealed that an increase in absorption corresponded to an increase in baseline empathy ( $b = 0.15, SE = 0.02, p < .001$ ), but the explanatory strength of the model that included absorption on the slope was not as strong as the model that included absorption only on the intercept (Table 3.12). For the empathy change from time 1 to time 2, it was shown that an increase in absorption corresponded to an increase in empathy immediately after reading ( $b =$

0.16,  $SE = 0.02$ ,  $p < .001$ ), but absorption did not affect the empathy change. Regarding the change from time 0 to time 2, there was again no effect on slope since empathy was better explained when absorption was only included on the intercept, as can be seen in the model comparison (Table 3.12).

#### 3.5.4.1 *The effect of absorption on empathy: the case of fiction reading*

Following the results of the previous chapter that showed different trajectories of readers' empathy when reading fiction compared to non-fiction, it was considered important to also explore the role of absorption when reading fiction and non-fiction separately. First, regarding fiction reading, the model comparisons when absorption was included as a fixed effect on the intercept and linear slope term are shown in Table 3.13.

**Table 3.13** Model comparison results when adding the parameter of absorption on the intercept and slope term of empathy when reading fiction. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		31.25	< .001*	0.05	.83
time 1 – time 2	Absorption	37.89	< .001*	5.11	.02*
time 0 – time 2		30.71	< .001*	3.67	.06

According to Table 3.13, an increase in absorption was shown to correspond to an increase in baseline empathy ( $b = 0.16$ ,  $SE = 0.03$ ,  $p < .001$ ), as was the case for empathy immediately after reading ( $b = 0.18$ ,  $SE = 0.03$ ,  $p < .001$ ). Although the model that included absorption on the slope from time 1 to time 2 was significant, its ability to fit the data was not as strong as when absorption was included only on the intercept, as can be seen in Table 3.13.

#### 3.5.4.2 *The effect of absorption on empathy: the case of non-fiction reading*

As for non-fiction reading, the model comparisons when the fixed effect of absorption was added on the intercept and slope term are provided in Table 3.14.

**Table 3.14** Model comparison results when adding the parameter of absorption on the intercept and slope term of empathy when reading non-fiction. Statistically significant models are marked with \*.

Time points	Effect	Intercept: Chisq	p value	Slope: Chisq	p value
time 0 – time 1		25.05	< .001*	21.21	<.001*
time 1 – time 2	Absorption	24.51	< .001*	20.45	<.001*
time 0 – time 2		12.18	< .001*	0.35	.56

Based on the model comparisons, it can be seen that baseline empathy predicted absorption ( $b = 0.16$ ,  $SE = 0.03$ ,  $p < .001$ ). Although the model including absorption on the slope from time 0

to time 1 was also significant, its explanatory strength was not as strong as the model including absorption only on the intercept (Table 3.14), which was also the case for the slope from time 1 to time 2, showing that individuals with stronger absorption had stronger empathy at time 1 ( $b = 0.17, SE = 0.03, p < .001$ ), without however affecting the change of empathy.

### 3.5.5 Individual factors

#### 3.5.5.1 Disruption

Disruption while reading was significantly related to absorption ( $F(1, 683) = 9.38, p = .002, \eta_p^2 = 0.01$ ), indicating that participants who were disrupted experienced less absorption in the story ( $b = -3.94, SE = 1.29, p = .002$ ). There was a significant effect of the device on absorption after controlling for disruption ( $F(3, 683) = 7.12, p < .001, \eta_p^2 = 0.03$ ). Tukey's post-hoc test showed that the covariate adjusted means of the print, e-reader and tablet devices were significantly higher than that of the audiobook, but there was no significant difference between the other devices, as can be seen in Table 3.15.

*Table 3.15 Detailed results of Tukey's post-hoc test for the effect of device on absorption when controlling for disruption. Statistically significant values are marked with \*.*

Comparisons	Estimate	Standard Error	t value	p value
e-reader – audiobook	5.58	1.82	3.07	.01*
print – audiobook	8.21	1.82	4.52	<.001*
tablet – audiobook	4.96	1.82	2.73	.03*
print – e-reader	2.63	1.81	1.45	.47
tablet – e-reader	-0.62	1.81	-0.34	.99
tablet – print	-3.25	1.81	-1.79	.28

#### 3.5.5.2 Breaks

The covariate breaks was significantly related to absorption ( $F(1, 683) = 12.47, p < .001, \eta_p^2 = 0.02$ ), indicating that participants who took breaks while reading had lower absorption ( $b = -4.57, SE = 1.29, p < .001$ ). There was a significant effect of the device on absorption after controlling for breaks ( $F(3, 683) = 7.65, p < .001, \eta_p^2 = 0.03$ ). Tukey's post-hoc test revealed that the covariate adjusted means of the print, e-reader and tablet devices were significantly greater than that of the audiobook, but there was no significant difference between the rest of the devices as can be seen in Table 3.16.

**Table 3.16** Detailed results of Tukey's post-hoc test for the effect of device on absorption when controlling for breaks. Statistically significant values are marked with \*.

Comparisons	Estimate	Standard Error	t value	p value
e-reader – audiobook	5.83	1.81	3.22	.007*
print – audiobook	8.45	1.81	4.67	<.001*
tablet – audiobook	5.13	1.81	2.84	.02*
print – e-reader	2.62	1.81	1.45	.47
tablet – e-reader	-0.70	1.81	-0.39	.98
tablet – print	-3.32	1.81	-1.83	.26

### 3.5.5.3 Resistance to distraction

The covariate resistance to distraction was significantly related to absorption ( $F(1, 683) = 16.94$ ,  $p < .001$ ,  $\eta_p^2 = .02$ ), indicating that participants with higher resistance to distraction reported higher absorption ( $b = 0.62$ ,  $SE = 0.15$ ,  $p < .001$ ). There was a significant effect of the device on absorption after controlling for resistance to distraction ( $F(3, 683) = 8.13$ ,  $p < .001$ ,  $\eta_p^2 = 0.03$ ). Tukey's post-hoc test revealed that the covariate adjusted mean of the print device was significantly greater than that of the audiobook, but there was no significant difference between the rest of the devices, as can be seen in Table 3.17.

**Table 3.17** Detailed results of Tukey's post-hoc test for the effect of device on absorption when controlling for resistance to distraction. Statistically significant values are marked with \*.

Comparisons	Estimate	Standard Error	t value	p value
e-reader – audiobook	4.37	1.85	2.37	.08
print – audiobook	8.91	1.80	4.94	<.001*
tablet – audiobook	4.32	1.82	2.38	.08
print – e-reader	4.55	1.87	2.43	.07
tablet – e-reader	-0.05	1.81	-0.03	.99
tablet – print	-4.59	1.84	-2.50	.06

### 3.5.5.4 Dislocation

Dislocation was not related to absorption ( $F(1, 683) = 1.52$ ,  $p = .21$ ).

### 3.5.5.5 Awkwardness when handling the medium

Awkwardness was related to absorption ( $F(1, 683) = 4.17$ ,  $p = .04$ ,  $\eta_p^2 = 0.01$ ), showing that high awkwardness led to lower absorption ( $b = -0.61$ ,  $SE = 0.30$ ,  $p = .04$ ). Also, there was a significant effect of the device on absorption after controlling for awkwardness ( $F(3, 683) = 7.19$ ,  $p < .001$ ,  $\eta_p^2 = 0.03$ ). Tukey's post-hoc test showed that the covariate adjusted means of the print, e-

reader and tablet devices were significantly greater than that of the audiobook, but there was no significant difference between the rest of the devices, as can be seen in Table 3.18.

**Table 3.18** Detailed results of Tukey's post-hoc test for the effect of device on absorption when controlling for awkwardness. Statistically significant values are marked with \*.

Comparisons	Estimate	Standard Error	t value	p value
e-reader – audiobook	5.37	1.85	2.91	.02*
print – audiobook	8.31	1.82	4.56	<.001*
tablet – audiobook	5.28	1.82	2.90	.02*
print – e-reader	2.93	1.83	1.60	.38
tablet – e-reader	-0.10	1.84	-0.05	1.00
tablet – print	-3.03	1.82	-1.67	.34

### 3.5.5.6 Multitasking

The variance was homogeneous ( $F(1, 170) = 1.54, p = .22$ ) and a t-test showed that there is a significant difference in absorption between audiobook readers who multitasked and those who did not multitask ( $t(170) = 2.28, p = .02$ ) with a small to medium effect size ( $r = .17$ ). Readers who did not multitask experienced 6.59 points weaker absorption than readers who multitasked, 95% CI (0.89, 12.29).

### 3.5.5.7 Experience with reading devices

A linear regression showed that experience with audiobooks was significantly related to absorption when using an audiobook ( $F(1, 165) = 15.27, p < .001, \eta^2 = 0.08$ ), showing that participants with higher experience with audiobooks got more absorbed when using an audiobook ( $b = 5.49, SE = 1.41, p < .001$ ). Experience with print was not related to absorption when reading in print book ( $F(1, 170) = 2.74, p = .10$ ) and experience with e-readers was not related to absorption when reading on an e-reader either ( $F(1, 169) = 0.97, p = .33$ ). Experience with tablets was related to absorption when reading on a tablet ( $F(1, 169) = 11.14, p = .001, \eta^2 = 0.06$ ), revealing that individuals with higher experience with tablets experienced greater absorption when reading on a tablet ( $b = 4.44, SE = 1.33, p = .001$ ).

## 3.6 Discussion

### 3.6.1 The effect of fictionality on absorption

The results of this study showed that fiction can elicit more absorption than non-fiction when comparing texts that are both narrative and literary but differ in terms of their fictionality status. When the four components of absorption were investigated separately, however, it was found that the present fiction text brought only higher attention and mental imagery compared to the

non-fiction text used in this study, while there was no difference regarding the components of transportation and emotional engagement.

If the definitions of these components of absorption are revisited, it can be discerned that readers get transported into the story world in a similar way, regardless of whether this world is fictional or real. The experience of transportation describes the movement from the actual world to the story world as a subjective experience the readers have while reading (Kuijpers et al., 2014). Theories about transportation have focused on being transported into fictional worlds (Busselle & Bilandzic, 2009; Gerrig, 1993) since it is an exceptional experience to feel transferred to a world that does not really exist. However, based on the aforementioned results, it is suggested that this experience can emerge in a similar way when reading non-fiction as well. It may be that other factors play a role in this experience. For instance, transportation may be experienced more when exposed to narratives as opposed to expository texts since the former usually provide a place to be transported into, a world and a plot to be transferred to, while the latter can only provide information without the need to include a plot (Bruner, 1986). Furthermore, Kuijpers et al. (2014) argued that action-oriented stories elicit higher absorption than character-oriented stories. This might mean that sometimes it is the style of a story and not its fictionality that influences readers' transportation.

The other component, emotional engagement, expresses readers' ability to feel for or with the character, thus representing readers' sympathy and empathy towards the protagonists (Kuijpers et al., 2014). Following Keen's (2007) definition and to avoid confusion, readers' empathy towards a story's character is called narrative empathy as opposed to the general term empathy that is used to describe feeling with others in their real environment as measured in the previous chapter. Therefore, these results show that readers could feel with and for the real and fictional protagonists of the two texts in a similar way. It has been argued that narrative empathy is elicited more by fiction stories compared to non-fiction based on the theory of the optimal aesthetic distance (Cupchik, 2002; Scheff, 1979) as reviewed in Chapter 1 (p. 19). In short, this theory suggests that, in contrast to non-fiction, the distance of the fictional narratives from reality makes them a safe space for the readers to feel for and with the character since they know that their empathy will not result in demand for action (Keen, 2007). This study, however, shows that this is not the case, suggesting that a more nuanced examination is needed when investigating the effects of fiction and non-fiction reading on narrative empathy. For example, both texts of this study were portraying protagonists who lived almost a century ago. Therefore, even if one character was fictional and the other factual, they were both distanced from the readers' lives, and so the readers may have felt "safe" to empathise with either of them to a



similar degree. This argument may raise more questions about the research of narrative empathy. In detail, when does a reader feel “unsafe” to empathise with a protagonist? For example, will a reader empathise less if the protagonist is dead or of a different culture or continent?

Indeed, as Bloom (2016) argues, empathy could be parochial, that it might be that we can feel it only with people who are like us. For instance, Singer and Klimecki (2014) provided empirical evidence showing the human tendency to empathise more with the ingroup rather than the outgroup. They designed an experiment in which football supporters witnessed fans of their team (ingroup) experience electric shocks, which led to the activation of strong empathy. When, however, the victims of the electric shocks were fans of a rival team (outgroup), their empathy decreased. Thus, reading about an experience of an outgroup instead of an ingroup member – regardless of their fictionality status – may deteriorate the ability to identify, and hence to empathise with the protagonist (Keen, 2007). Notably, the texts used in this study were portraying the experiences of Black people while the vast majority of the participants (more than 90%) self-identified as White (only two participants identified themselves as Black in the fiction condition and three in the non-fiction condition). This may mean that the fictionality of the text did not play so much of a role in narrative empathy, since both the fiction and non-fiction protagonists were of a different race, culture, and period compared to the readers, and these factors may play a more detrimental role in narrative empathy compared to the role of fictionality.

However, the components of attention and mental imagery were shown to be affected by the fictionality of the text. Attention refers to the feeling of deep concentration readers have while being absorbed (Kuijpers et al. 2014) and based on the aforementioned results, this work of fiction incites more attention than the non-fiction work. As for mental imagery, it refers to the readers’ experience of mentally creating an image of the story world, supporting readers’ absorption into it. The finding that the fiction story led to stronger mental imagery than the non-fiction story indicates that it was easier for the readers to imagine a fictional world than a factual one. As the saying goes, sometimes truth is stranger than fiction; real events, such as the author’s experiences as described in the non-fiction text, may have been surprisingly strange to readers, and thus led to weaker mental imagery, whereas the simulated world provided in the fiction was easier to be depicted in readers’ mind. Additionally, as Walton (1990) argues, for a reader to interpret a fiction story, they need to imagine the fictional world. As a result, imagination is a mandatory element of fiction reading as opposed to non-fiction; non-fiction generates different reading goals: it is not about imagining a world but observing it and analysing

the information given, as it intends to bring beliefs about the real world (Friend, 2008). In a similar vein, based on the theory of the actor-observer effect (Jones & Nisbett, 1971), fiction readers experience the story world as actors themselves. On the contrary, it can be suggested that non-fiction readers act as outside observers to reach a different reading experience and objective, and so, their mental imagery is not that essential for the reading process.

On the whole and based on the texts used, this study suggests that fiction elicits more absorption than non-fiction as opposed to previous studies (Green & Brock, 2000). However, it showed that only the components of mental imagery and attention were influenced by the text's fictionality, while readers showed similar levels of emotional engagement and transportation regardless of the fictionality status.

### 3.6.2 The role of reading devices in readers' absorption

Concerning the effect of the reading medium on absorption, it was shown that audiobook reading led to less absorption than the eye-reading devices (print, e-reader, and tablet), showing that reading a story with one's ears keeps the reader distanced from the story world and does not let them get lost in it. It can be argued, thus, that the different affordances of audiobooks can negatively affect readers' absorption. The fact that audiobooks are experienced with our ears instead of our eyes, for instance, brings a different experience that can be less absorbing for a variety of reasons. First, it may be the moderating role of the performing narrator (Have & Pedersen, 2016). The readers do not hear the voice of themselves reading the story, but someone else's voice who can give a specific atmosphere to the narration. However, this atmosphere and style may be different from what the individual reader needs to feel absorbed in the story world. The performing narrator may also interrupt the reader's process of creating a cognitive map of the events of the story, which can also lead to a disruption of the process of developing a mental imagery (Have & Pedersen, 2016). Moreover, when listening to an audiobook, the eyes are not fixed and occupied by the text but free to focus on the surroundings, creating an interconnection between the real surroundings and the story world (Have & Pedersen, 2016); this not only can hinder readers' absorption, but the reader might not feel the appropriate distance from the reality to have a "safe zone" (Keen, 2007) to feel with the protagonists. Furthermore, when reading with the eyes, the eyes are not only fixed on the text, but the whole body is fixed in a position and focused on one activity, that of reading. On the contrary, audiobooks allow the body to move, the reader to engage in other activities and to multitask, which again can inhibit their absorption since their attention is not fully on the story. In fact, the results show that ear-readers who multitasked got less absorbed than the ear-readers who did not multitask, suggesting that it may not be the audiobook as a medium per se

that impedes absorption, but the possible ways the audiobook can be used. However, when a variety of other factors related to the individuals' reading practices were controlled, i.e., rate of disruption, taking breaks, resisting distraction, dislocation within the text, and awkwardness when handling the medium, the difference between audiobooks and the other devices was still present.

Notably, this effect was present when investigating the four components of absorption separately, with audiobook readers reporting lower attention compared to print, e-reader and tablet readers, and lower emotional engagement, transportation, and mental imagery compared to print readers alone. When examining the effects of the devices when reading fiction and non-fiction separately, similar effects were also revealed. However, in the case of fiction reading, it was interesting to find that audiobooks brought less absorption compared to the other devices only in terms of the component of attention, with no effect found concerning the other components. This may mean that when absorption in general is strong (as found in fiction reading compared to non-fiction reading), the audiobook does not have such intense negative effects on the aspects of transportation, mental imagery, and narrative engagement.

As for the eye-reading devices, print, e-reader, and tablet did not affect readers' absorption differently, nor any of its components. These results challenge previous theories that suggested that screen interfaces can hinder readers' absorption (Wolf, 2018). These theories were based on the premise that screen devices are associated and used for superficial and shallow reading based on reading practices of skimming and scanning (Baron, 2015; Wolf, 2018). These practices have been considered unsuitable for deep reading, which is described as a slow process that requires patience and cognitive effort to allow absorption to emerge (Wolf, 2018). Previous empirical studies were quite inconclusive, with some reporting that print reading can bring more narrative empathy and absorption than tablets (Guarisco et al., 2017; Mangen & Kuiken, 2014) while others showed no difference (Mangen et al., 2019; Schwabe et al., 2021). The present study provides further evidence that screen devices do not affect readers' absorption differently than print books, suggesting that, either screen devices are an appropriate medium to have a "deep reading" experience and become absorbed, or that the superficiality of the reading practices used with screen interfaces does not really affect readers' absorption. Furthermore, it was proved that there was no difference between the e-reader and the tablet device, and thus, it can be argued that the type of screen technology does not really affect absorption, nor does the multifunctionality of the tablet hinder absorbing experiences.

### 3.6.3 The effect of absorption on empathy

Although the present study found that there is a correlation between absorption and baseline empathy, absorption did not affect the change in readers' empathy, a finding that raises many questions about the mechanisms behind the effect of reading on empathy. Previous studies have found a positive correlation between empathy and absorption (Bal & Veltkamp, 2013; Johnson, 2012). However, these previous studies may not have provided strong evidence for this relationship. First, Johnson's study (2012) was correlational and thus could not test whether there is a causal relationship between absorption and empathy. Therefore, the results of Johnson (2012) are not very different from those of the present study, which also found a positive relationship between baseline empathy and absorption, as well as immediately after reading empathy and absorption. The present study, however, also provided evidence on the causal relationship, finding that absorption did not affect the change in empathy. Secondly, although Bal and Veltkamp (2013) had an experimental design similar to that of the present study (they measured empathy before reading, immediately after reading, and one week after reading), the measurement of empathy they used focused more on the feeling of sympathy and concern for others as measured by Davis (1983) rather than empathy, thus it is not clear whether there was an effect on empathy per se, when studied as a distinct psychological phenomenon. The present study, apart from using a measurement that focuses only on the feeling of empathy (Reniers et al., 2011), found, as seen in the previous chapter, that reading caused a decrease in empathy. Thus, even if Bal and Veltkamp's (2013) results are valid, they showed that absorption affects empathy when there is an increase in empathy after reading. This study can add, though, that when reading brings a decrease in empathy, this happens regardless of readers' absorption.

In an effort to explain this decline in empathy, the previous chapter suggested, following Currie's (2016) position, that readers may squander their empathy when empathising with the characters, draining their empathy, and ending up with less empathic abilities for real people. However, the results provided in this chapter show that absorption, which includes empathy towards the protagonists (narrative empathy), did not predict empathic decline. However, this does not mean that the readers did not waste some of their emotional and cognitive capacities when reading the texts. The stories had a negative effect, suggesting that the readers had become overwhelmed and proceeded to block their empathy to regulate their emotional engagement after reading, even if real-life empathy is not directly affected by narrative empathy. In fact, it may be suggested that empathy may depend on other affective responses toward the text, such as how reflective readers became toward the story or how moved they were, or in general what type of emotions the story evoked to them. For instance, Koopman

(2015) found that reflection towards a text was predicted by empathic distress while reading, a finding that may suggest that reflection may, in turn, bring an empathic decline. In general, this study did not explore the effects of aesthetic feelings, the feelings that are evoked by appreciating the form and style of a text, making readers reflect on the striking features (Kneepkens & Zwaan; 1994; Miall & Kuiken, 2002; Tan, 1996). These aesthetic feelings may interact with narrative feelings (i.e., narrative empathy, sympathy, absorption) and bring about self-reflection and self-modification (Miall & Kuiken, 2002). Thus, it may be argued that absorption on its own may not be the appropriate phenomenon when examining the effect of reading on empathy (at least when readers feel empathic distress) but other affective and cognitive processes may play a role. Thus, it is suggested that future studies should not only focus on the effects of absorption, but other affective and cognitive responses should be added to such experiments to identify the specific processes that may lead to empathic decline.

### 3.7 Limitations

Although I took a great deal of care in matching the materials of the experiment so that the texts differ only in terms of their fictionality, it was not possible to completely exclude other potential confounding factors that may have influenced readers' absorption. For instance, as noted in the previous chapter as well, the two texts were written from different points of view, with the fiction story being in third person and the non-fiction in first person. This difference might be important for the present study. In detail, some studies argued that the point of view can influence readers' engagement with the protagonists (Hartung et al., 2016), while others suggested that there is not such an effect (Keen, 2006; van Lissa et al., 2016). Although this seems to be a matter of ongoing debate, it might have some implications in the current study.

As for the effect of the reading device, this study included longer texts than previous studies (see Mumper & Gerrig, 2017 and Singer & Alexander, 2017 for an overview) and this brings in more ecological validity and makes the present study a step closer to the natural reading experience. However, it is not possible to know whether similar effects would be observed when even longer texts are read, perhaps whole books through a longer period of time, a situation quite common when thinking of the activity of leisure reading. Lastly, the Analyses of Covariance that were performed to control the influence of other factors related to the reading process and practice may have a more limited accuracy since the variance of the data was heterogeneous.

### 3.8 Conclusion

This chapter investigated the experience of absorption, focusing on the effects of fictionality and reading device. It was found that readers got more absorbed in the fiction story as opposed to the non-fiction text. However, it was revealed that two components of absorption, namely

transportation and emotional engagement, are not influenced by the text's fictionality, suggesting that non-fiction readers can feel with protagonists and "travel" to a story's world in a similar way as fiction readers. As for the role of the reading device, it was found that audiobook reading brings less absorption than print and screen devices, but it was shown that print, e-readers, and tablets let the readers get absorbed in a similar way. Finally, the relationship of absorption with empathy was explored and it was revealed that absorption did not affect readers' change of empathy; this suggests that, when a reading experience causes empathic distress, the empathic decline occurs regardless of the level of absorption the readers feel, calling for more research on other mechanisms and reading experiences which may influence empathic decline.

## 4 Fourth Chapter: The effect of fictionality and reading devices on comprehension and the role of comprehension in empathy and absorption

### 4.1 Introduction

Following the investigation of empathy and absorption, this last empirical chapter will focus on reading comprehension. Text comprehension has been considered critical for the reader to get absorbed and increase their empathy (Hogan, 2018 - as explained in depth in Chapter 1). For instance, research has found a correlation between empathy and text comprehension (Henschel & Roick, 2013) while Busselle and Bilandzic (2009) argued that absorption develops through comprehension. However, Chapter 2 showed that reading can decrease readers' empathy, while absorption was found to not influence this decline. Therefore, following these results, the interaction between comprehension, absorption and empathy needs to be revisited and re-evaluated.

As for the role of fictionality, studies have shown that non-fiction reading is more challenging than fiction (MacLean & Chapman, 1989; Topping et al., 2008), and this study is going to provide more evidence about these differences when comparing literary narratives that are either fiction or non-fiction to investigate the effect of fictionality per se.

Regarding the role of the reading device, as noted in Chapter 1, most research has found that print is superior to screen reading (Clinton, 2019; Delgado et al., 2018; Kong et al., 2018), but they have mainly used expository texts to draw comparisons, while comparisons between audiobooks and print or screen devices are very limited (for a review see Baron, 2021). For the above reasons, this study also aims to provide more evidence on the differences between the effects of print, e-reader, tablet, and audiobook on comprehension when exposed to fiction or non-fiction literary narratives.

Lastly, there is limited evidence on whether reading devices affect how well a text is remembered. Noyes and Garland (2003) suggested that print readers can remember a text more thoroughly than screen readers. They noted that print readers depend more on what they learned from a text when retrieving information, compared to computer screen readers who can only vaguely recall information with the help of contextual details, which is considered a weaker type of memory. However, Noyes and Garland (2003) used expository texts; the effect of reading devices on memory needs to be examined when reading fiction and non-fiction literary narratives as well.

## 4.2 Hypotheses and research questions

First, **(1)** based on the literature review, this study predicts that fiction readers will have better comprehension than non-fiction readers. It will focus on the effects of fiction and non-fiction without the potential confound of narrativity and literariness of the texts, using literary narrative texts that are either fiction or non-fiction. By narrativity, I refer to the qualities of a text that discern it from expository texts, the fact that a narrative is paradigmatic instead of informational or persuasive<sup>20</sup>. Also, literariness, or else the presence of literary features in a text, may influence readers' responses as well (for a review, see Chapter 1, Section 1.3.3) and for this reason, a comparison of texts of similar levels of literariness, such as the ones used in the present study, is also needed.

The current study also predicts that **(2)** print reading will lead to better comprehension followed by e-readers, tablets, and lastly audiobooks.

Furthermore, this study will test **(3)** whether there is an interaction between the text's genre (fiction versus non-fiction) and the reading medium when studying their effects on readers' comprehension; **(4)** whether comprehension affects readers' empathy and absorption when reading fiction and non-fiction; and **(5)** whether there are any effects of the reading devices and text's fictionality on readers' memory of the texts two weeks after reading. Lastly, this study will explore **(6)** whether different individual factors (i.e., disruption, breaks, resistance to distraction, dislocation within the text, awkwardness when handling the medium, multitasking, experience with reading devices) affect readers' comprehension and the role of reading devices.

## 4.3 Methodology

This study had a mixed design. The first independent variable, reading device, was between-participants, with four levels: print book, e-reader, tablet, and audiobook. The second independent variable, time, was used to measure the change in readers' memory and was within-participants, with two levels: immediately after reading and two weeks after reading. The third independent variable, text, was between-participants, with two levels: fiction and non-fiction. The dependent variable, comprehension, was measured twice, immediately after, and two weeks after reading.<sup>21</sup> For details about the measurements of empathy and absorption as

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<sup>20</sup> For a detailed definition of the term narrative, see p. 16. For more details regarding the distinction between narratives and expository texts, see p. 104.

<sup>21</sup> The same scale was used for both immediately and two weeks after reading. However, although the first time can be considered a measurement of comprehension, the second time inspects readers' memory.



well as the collection of other measures, see Sections 2.3 and 3.3. Details about the participants, the procedure and the materials can be found in Section 2.3.<sup>22</sup>

As for the measurement of comprehension, twelve comprehension questions were developed to assess participants' comprehension after reading the fiction story. The development of these questions was based on van Dijk and Kintsch's (1983) model of comprehension and Mangen et al. (2019) comprehension tasks. Although these studies offer some general guidelines for creating comprehension tasks, there is a lack of a systematic approach of developing comprehension questions for studies like the present. For the purposes of this study, however, the following questions were developed: The first 10 questions were multiple choice with 3 options and assessed both the textbase level of comprehension and the creation of a situation model, following van Dijk and Kintsch's (1983) model (see Chapter 1, p. 30). The textbase level was assessed with 6 multiple choice questions that addressed recall of explicit information given in the text (e.g., "How long was Bert away from the plantation?"; "Who were the "yard-niggers" according to the story?"). The situation model was assessed with deep comprehension questions, which require the responders to connect information given in the text with their prior knowledge, judgement, and experience. There were 4 questions assessing the situation model (e.g., "Why do you think Colonel Norwood didn't shoot Bert?"; "What do you think Bert was trying to achieve?"). The eleventh question also assessed the textbase level and asked participants to put the four names of the siblings portrayed in the story in the correct order based on their age.

The last comprehension question was a Plot Reconstruction Task (PRT) and was developed following Mangen et al.'s (2019) paradigm in order to assess the situation model and, specifically, readers' ability to locate events in the temporality of a story: 15 sentences of key events of the story were developed and presented in a random order (e.g., "Bert kills Colonel Norwood"; "Bert kills himself"; "Bert offers his hand to Colonel Norwood"). Participants were asked to sort them in the correct order in accordance with the plot, using a drag and drop technique.

Following Mangen et al.'s (2019) methodology, I used Kendall's tau rank distance (Kendall, 1962) to measure participants' scores in the Plot Reconstruction Task. This is a correlation measure that provides a calculation of the distance between two ranking lists, in this case between the correct order of the events in consonance with the plot and the order suggested by the

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<sup>22</sup> The study has been pre-registered at AsPredicted.org (<https://aspredicted.org/r8s4z.pdf> and <https://aspredicted.org/bc2i2.pdf>) and approved by the Lancaster University Faculty of Arts and Social Sciences ethics committee (reference FL19005 - see Appendix A).

participants. As a result, Kendall's tau distance ranked between 0, when the order was completely opposite to the correct one, and 1, for participants who put the events in identical order with the plot. The same analysis was carried out for the comprehension question that asked to put the siblings of the story in the correct order by connecting facts given in the text. Four values were obtained from this analysis. When the correct order was returned, the value 1 was assigned. When only one kid was in the wrong order, the value 0.7 was assigned. When two kids were in incorrect order, the value was 0.3 and when none of the children was in correct order, the value was 0. The value of these two tasks was added to the sum of the rest of the comprehension questions to have a total comprehension score for the fiction readers.

These 12 questions were tested to see whether they demonstrated good internal reliability. I used Cronbach's alpha (Cronbach, 1951) based on standardized items due to the different metrics used in the questions (the first 10 took a value of 0 for false answers or 1 for correct answers, while the last two used Kendall's tau distance that ranged from 0 to 1). The reliability of the comprehension scale was low ( $\alpha = .602$ ). After an investigation of the internal consistency of the scale, four items were removed and an increase in the reliability of the scale was witnessed ( $\alpha = .690$ ). Therefore, I used this shortened form of the comprehension scale for data analysis. As a result, the maximum possible score on comprehension was 8 (full list of the comprehension questions is provided in Appendix C). A review of the deleted comprehension items showed that they were too difficult or too easy for participants. For instance, more than half of the participants (53%) responded incorrectly to a deleted item ("Which place weren't the Black people allowed to use?"). The reason behind it may be that the question required to combine information from different parts of the story. In another case, the difficulty participants showed in finding the correct answer might have been because the information was in brackets and could be easily missed ("Who were the "yard-niggers" according to the story?"). On the other hand, the item "What do you think Bert was trying to achieve" may have decreased the reliability of the measurement because it was too easy, with only 13 per cent of the participants responding incorrectly.

Following these results regarding the reliability of the comprehension questions for the fiction text, it was decided to develop more questions for the non-fiction text. Eighteen questions were developed and they were again based on van Dijk and Kintsch's (1983) model of comprehension and Mangen et al.'s (2019) comprehension tasks. The first 17 questions were multiple choice with three options assessing both the textbase level and the situation model of comprehension (van Dijk & Kintsch, 1983). The textbase level was assessed with 11 multiple choice questions that required recalling specific and explicit information given in the text (e.g., "How many times

was the author fired when he was living in New Jersey?"; "What happened a few hours after the author's father died?"). The situation model was assessed with 6 questions (e.g., "Why was the whiteness of the teacher important for the author to go to the theatre?"; "What was the father's relationship with his kids?"). As for the last comprehension question, it was again a Plot Reconstruction Task (Mangen et al., 2019) to assess the situation model. Thirteen sentences of key events of the plot were developed and presented in random order (e.g., "The author visits his father at the hospital"; "The author goes to watch a movie with a friend"; "The funeral of the author's father takes place"), and the scores were again measured with Kendall's tau rank distance (Kendall, 1962). In total, for the non-fiction readers, participants' total score of comprehension could range from 0 to 18. The comprehension scale was shown to have low reliability (Cronbach's  $\alpha = .586$ ) and the deletion of any of the questions did not improve its reliability. However, it was considered satisfactory taking into account the fact that it examines different levels of comprehension, as explained earlier.

To have a comparable scoring system and to analyse the comprehension scores of the participants regardless of the text they read, the scores were transformed into percentages and thus ranged from 0 to 100. Apart from being part of the total comprehension score, the Plot Reconstruction Tasks were also examined separately, ranging from 0 to 1.

For the assessment of readers' memory, the same questions were administered two weeks after reading the text. As noted above, there is no systematic way of developing such questions and for the purposes of this study, it was deemed that the use of the same questions will be sufficient for the assessment of the change in readers' memory.

#### 4.4 Data analysis

Linear Growth Curve Analysis (Mirman, 2014) was used to model comprehension with fixed effects of device (print, e-reader, tablet, audiobook), text (fiction and non-fiction), and time (time 1: immediately after reading, time 2: two weeks after reading) and their interactions, while including the random effect of participants on the intercept. Random effects on the slope were not included since the text and device conditions were between units (Barr et al., 2013). The software R (version 4.0.3.; R Core Team, 2020) with lme4 package (Bates et al., 2014) was used, following a "minimal to maximal-that-improves-fit process" (Meteyard & Davies, 2020, p. 17). The lmerTest package (Kuznetsova et al., 2017) was also used to add parameter-specific p-values calculated with the Satterthwaite approximation for degrees of freedom (Mirman, 2014, p. 57). The fixed effects were added progressively, and every addition was tested separately to check if it improves the model fit. The comparison of the model fit was tested using Likelihood Ratio

Tests (Field et al., 2009; Meteyard & Davies, 2020). The model with the best fit was used to report the results of the analysis.

In detail, a baseline model was including only the effect of time, ignoring the predictors device and text, while including the random effect of participants (id) on the intercept (comprehension  $\sim$  time + (1|id)). After that, the fixed effect of the text was added to the model, while ignoring the effect of device. It was first added on the intercept to find the main effect of text and then on the slope to see the interaction between text and time and these two models were compared to the baseline model that included only the effect of time (comprehension  $\sim$  time + text + (1|id) for the intercept, comprehension  $\sim$  time \* text + (1|id) for the slope). The same procedure was used to investigate the effect of device while ignoring the effect of the text (comprehension  $\sim$  time + device + (1|id) for the intercept, comprehension  $\sim$  time \* device + (1|id) for the slope). Since the fixed effect of device included four categorical predictors, the model with the best fit was re-fitted using a different reference level each time following the instructions of Mirman (2014) in order to perform multiple comparisons of categorical predictors. As previously mentioned, fiction reading was expected to lead to better comprehension than non-fiction reading, and thus, it was considered necessary to also examine the fixed effect of device for each text condition separately. The database was separated into two (one fiction database and one non-fiction database) and the fixed effect of device on the intercept and slope term was fitted again for each database separately, and the models were again compared as previously. These analyses were also performed for the Plot Reconstruction Task (PRT) separately from the other comprehension questions. This was done because a previous study (Mangen et al., 2019) found that the reading device (print versus e-reader) did not affect reading comprehension, but affected the PRT scores, with screen readers not being as efficient as print readers to locate events in the temporality of a story.

To explore the interaction between time, device, and text, three models were compared: one including only the fixed effect of device on the slope, a second including the fixed effect of device on the slope and the fixed effect of text on the intercept, and a third included both text and device on the slope. The random effect of participants was again added on the intercept.

For the exploration of the effect of comprehension on empathy, comprehension was added as a fixed effect on the intercept and the slope of empathy, and these models were compared to a baseline model that included only the effect of time on empathy, while including the random effect of participants on the intercept. For the investigation of the empathy slope from time 0 (baseline empathy) to time 1 (empathy immediately after reading), readers' comprehension

immediately after reading was added. For the empathy slope from time 1 to time 2 (two weeks after reading), both the inclusion of comprehension immediately after reading and memory two weeks after reading were examined. The same was the case for the empathy change from time 0 to time 2. These analyses were also performed separately for the fiction and non-fiction readers. This decision was made due to the study by Henschel and Roick (2013) that found a stronger correlation of comprehension with empathy when reading fiction rather than when reading non-fiction and the differences found between fiction and non-fiction when investigating readers' empathy in Chapter 2 of the present thesis.

To examine the effect of comprehension on absorption, simple linear regression was used to test whether comprehension immediately after reading significantly predicted absorption using the `lm` function of the stats package (R Core Team, 2020). This was because there was only one value of absorption score for each participant.

Lastly, in a more exploratory fashion, the individual factors were added on the aforementioned models as fixed effects to measure their unique contributions: disruption while reading, taking breaks while reading, resistance to distraction, dislocation within the text (the uncertainty a reader may feel about their location within the text during the reading process as defined by Mangen & Kuiken, 2014), awkwardness when handling the medium, multitasking while listening to the audiobook, and experience with the reading device. Details about these variables are provided in Chapter 2 (pp. 65-66).

These factors were examined separately. Each of them was added on the intercept and slope term and these models were compared with the baseline model that included only the effect of time, following the same methodology as the factors of text and device. If there was an effect of these factors on readers' comprehension, then an additional analysis was performed to examine whether the device had a unique contribution to comprehension or whether some of the variance was instead explained by one of these factors. This analysis was performed based on Mirman (2014) and compared a model including both the effect of device and each individual factor with a model including only the effect of each individual factor. Based on this comparison, if the model including both the fixed effects of device and individual factor fitted the data better than the model including only the effect of the individual factor, this was an indication that the reading device had a unique contribution to comprehension.

In the case of the effect of multitasking, it was measured only for the audiobook condition and its potential effect was explored by the model comparison of three models: one baseline model including only the effect of time, one model including the fixed effect of multitasking on the

intercept and one model including it on the slope term. Regarding the factor experience with reading device, it was investigated whether adding the experience with each of the four devices on the intercept and slope term improved the model when including participants of the specific condition. For example, experience with audiobook was added as a fixed effect when exploring the audiobook condition only and so forth.

## 4.5 Results

### 4.5.1 Descriptive statistics

The descriptive statistics are provided in Table 4.1.

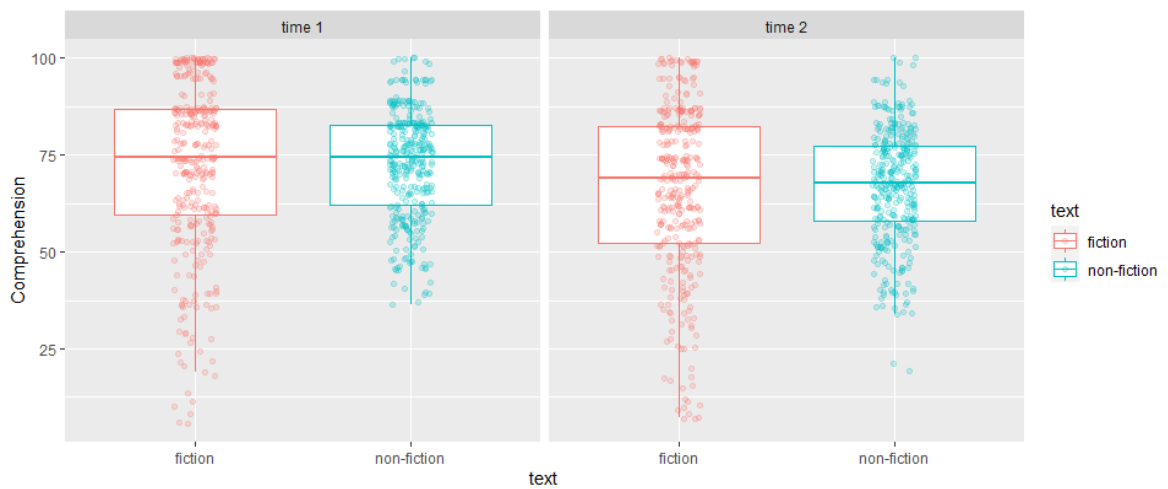
*Table 4.1* Descriptive statistics of comprehension in total and for each condition separately. Comprehension scores are expressed in percentages.

Comprehension	Time 1				Time 2				
	Mean	SD	Min	Max	Mean	SD	Min	Max	
<b>Total</b>	72.45	18.21	5.63	100.00	66.49	18.45	7.00	100.00	
<b>Fiction</b>	72.31	21.73	5.63	100.00	66.05	21.67	7.00	100.00	
<b>Non-fiction</b>	72.59	13.87	36.44	100.00	71.51	13.94	19.39	100.00	
<b>Print</b>	77.16	16.19	24.25	100.00	71.26	16.88	10.38	100.00	
<b>E-reader</b>	72.54	19.27	5.63	100.00	66.46	19.57	7.00	100.00	
<b>Tablet</b>	76.44	15.26	32.50	99.75	68.72	16.69	25.63	99.75	
<b>Audiobook</b>	63.65	18.72	10.13	100.00	59.54	18.59	7.00	94.88	
<b>Fiction</b>	<b>Print</b>	79.43	17.89	24.25	100.00	72.39	19.51	10.38	99.75
	<b>E-reader</b>	71.22	24.31	5.63	100.00	65.77	23.71	7.00	100.00
	<b>Tablet</b>	76.11	11.79	45.17	94.44	68.61	19.19	25.63	99.75
	<b>Audiobook</b>	61.82	21.92	10.13	100.00	57.43	21.46	7.00	94.88
<b>Non-fiction</b>	<b>Print</b>	74.88	14.03	36.44	100.00	70.13	13.78	36.06	100.00
	<b>E-reader</b>	73.87	12.35	46.00	99.28	67.14	14.40	19.39	100.00
	<b>Tablet</b>	76.11	11.79	45.17	94.44	68.82	13.86	34.50	98.83
	<b>Audiobook</b>	65.49	14.74	36.89	100.00	61.66	15.01	21.06	93.61

### 4.5.2 The effect of fictionality

When exploring the effect of fictionality regardless of reading device, the model fit did not improve when the type of the text was included on the intercept nor when it was included on the linear slope term ( $\chi^2(1) = 0.20, p = .66$  and  $\chi^2(1) = 0.43, p = .51$ , respectively), showing that

the text did not have any effect on reading comprehension and memory. These results are visualised in Figure 4.1.



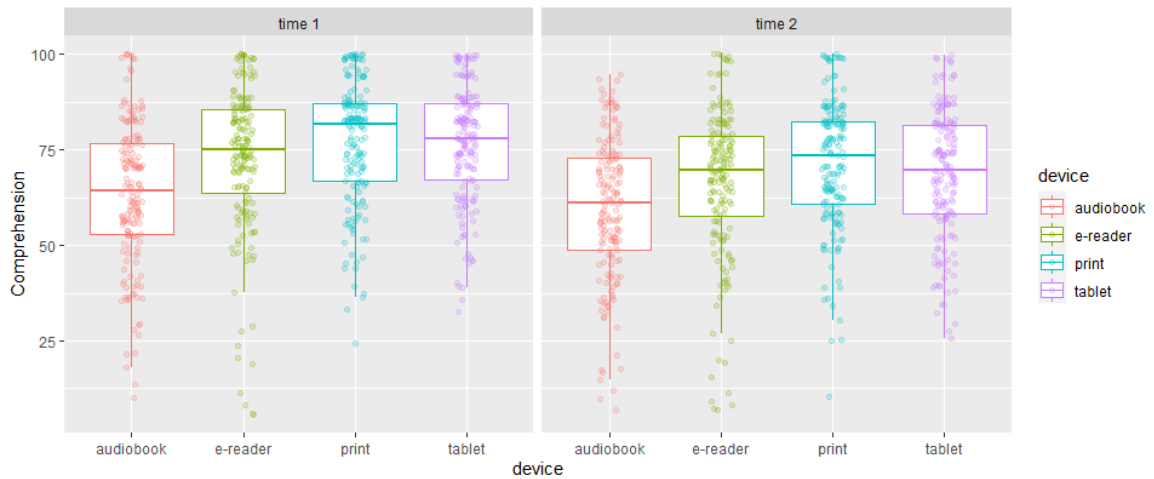
*Figure 4.1 Mean comprehension scores and standard deviations per text condition.*

#### 4.5.3 The effect of reading device

As for the effect of reading devices on comprehension regardless of text, the model fit improved when the device was added on the intercept but not when added on the slope term ( $\chi^2(3) = 56.50, p < .001$  and  $\chi^2(3) = 7.61, p = .06$ , respectively), showing that the reading device affected the readers' comprehension levels immediately after reading, but did not affect readers' memory after two weeks. In detail, it was revealed that participants in the audiobook condition performed worse in comprehension immediately after reading in comparison to the other three devices. Additionally, it was found that the e-reader device caused lower levels of comprehension compared to the print device. Detailed pairwise comparisons are provided in Table 4.2. These results are visualised in Figure 4.2.

*Table 4.2 Detailed results of pairwise comparisons showing the effect of device on comprehension. Statistically significant values are marked with \*.*

Intercept comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	7.90	1.79	4.42	< .001*
audiobook – print	12.61	1.79	7.05	< .001*
audiobook – tablet	10.98	1.79	6.14	< .001*
print – e-reader	-4.71	1.79	-2.63	.009*
print – tablet	-1.63	1.79	-0.91	.36
e-reader – tablet	3.10	1.79	1.722	.09



**Figure 4.2** Mean comprehension scores and standard deviations per device condition.

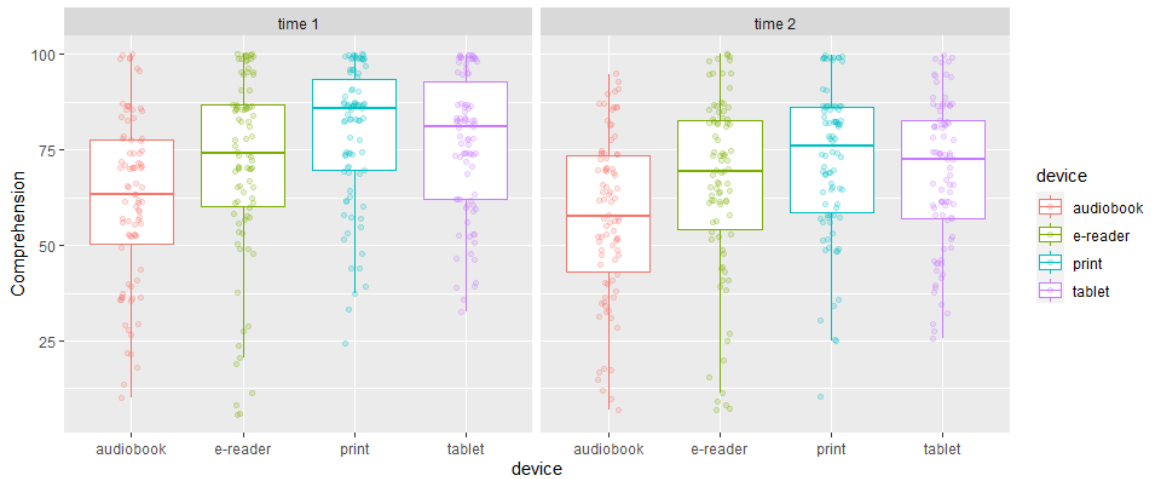
#### 4.5.4 The effect of reading device: the case of fiction reading

When reading fiction, the model fit improved when the fixed effect of device was added on the intercept, but it did not improve when it was added on the slope term ( $\chi^2(3) = 32.16, p < .001$  and  $\chi^2(3) = 3.56, p = .31$ , respectively) suggesting that the device did not have any effect on the way the text was remembered over time, but it did affect readers' comprehension immediately after reading. In detail, it was found that the audiobook device led to significantly lower comprehension than the other three devices. Additionally, e-readers had significantly lower comprehension compared to print. Detailed pairwise comparisons are provided in Table 4.3. These results are visualised in Figure 4.3.

**Table 4.3** Detailed results of pairwise comparisons showing the effect of device on comprehension when reading fiction. Statistically significant values are marked with \*.

Intercept comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	8.87	2.98	2.98	< .001*
audiobook – print	16.29	2.98	5.47	< .001*
audiobook – tablet	13.07	2.98	4.39	< .001*
print – e-reader	-7.42	2.98	-2.49	.01*
print – tablet	-3.22	2.98	-1.08	.28
e-reader – tablet	4.20	2.98	1.41	.16





**Figure 4.3** Mean comprehension scores and standard deviations per device condition when reading fiction.

#### 4.5.5 The effect of reading device: the case of non-fiction reading

Regarding non-fiction, the model comparison showed that the model fit improved when the device was added on the intercept but not when it was added on the slope term ( $\chi^2(3) = 26.98$ ,  $p < .001$  and  $\chi^2(3) = 7.33$ ,  $p = .06$ , respectively), showing that the device did not affect the way the text was remembered after two weeks, but it affected readers' comprehension immediately after reading. Pairwise comparisons revealed that reading comprehension when using audiobooks was significantly lower than when using print, e-readers, and tablets. Print, e-reader, and tablet devices did not differ significantly. The results of the pairwise comparisons can be found in Table 4.4 and are visualised in Figure 4.4.

**Table 4.4** Detailed results of pairwise comparisons showing the effect of device on comprehension when reading non-fiction. Statistically significant values are marked with \*.

Intercept comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	6.93	1.96	3.54	< .001*
audiobook – print	8.94	1.96	4.57	< .001*
audiobook – tablet	8.90	1.96	4.55	< .001*
print – e-reader	-2.00	1.96	-1.02	.31
print – tablet	-0.04	1.96	-0.02	.98
e-reader – tablet	1.96	1.96	1.00	.32

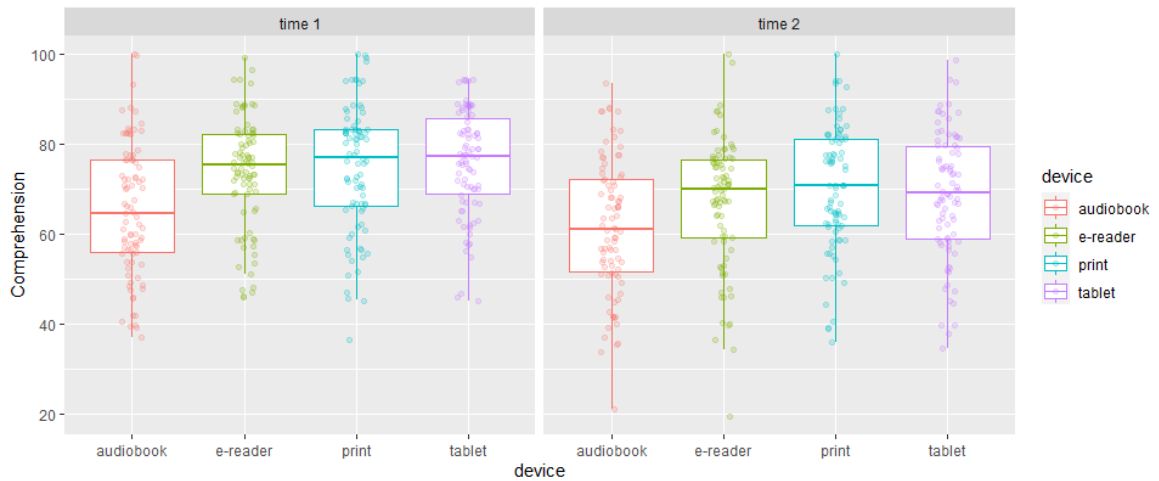


Figure 4.4 Mean comprehension scores and standard deviations per device condition when reading non-fiction.

#### 4.5.6 Interactions

The model comparison showed that the model fit did not improve when the text was added on the intercept (while also including the device on the slope), nor when both text and device were added on the slope ( $\chi^2(1) = 0.21, p = .64$  and  $\chi^2(7) = 7.02, p = .43$ , respectively), showing that there were no significant interactions between time, device, and text.

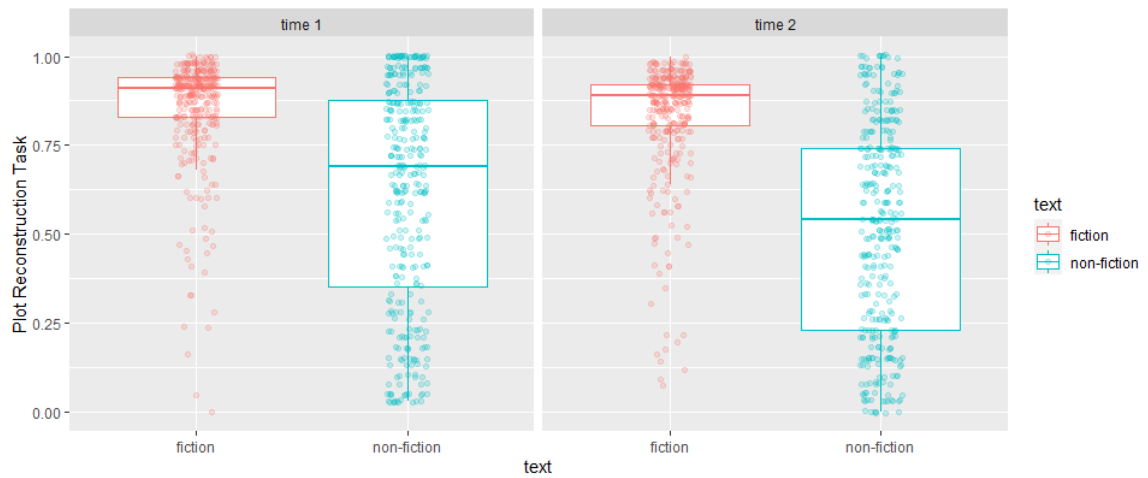
Since it was already found that text and device affected only the intercept (comprehension immediately after reading) rather than the slope, it was considered more appropriate to investigate the interaction between text and device only on the intercept. For this, three models were compared: one that included only the fixed effect of device on the intercept, a second that included only the fixed effect of text on the intercept, and a third that included both the fixed effects of device and text on the intercept. The model comparison showed that including both the text and the device did not improve the model fit ( $\chi^2(1) = 0.21, p = .64$ ) suggesting that the interaction of text and device did not have a significant effect on readers' comprehension.

#### 4.5.7 Plot Reconstruction Task

Readers' scores in PRT were also examined separately and the effects of fictionality and reading device were investigated.

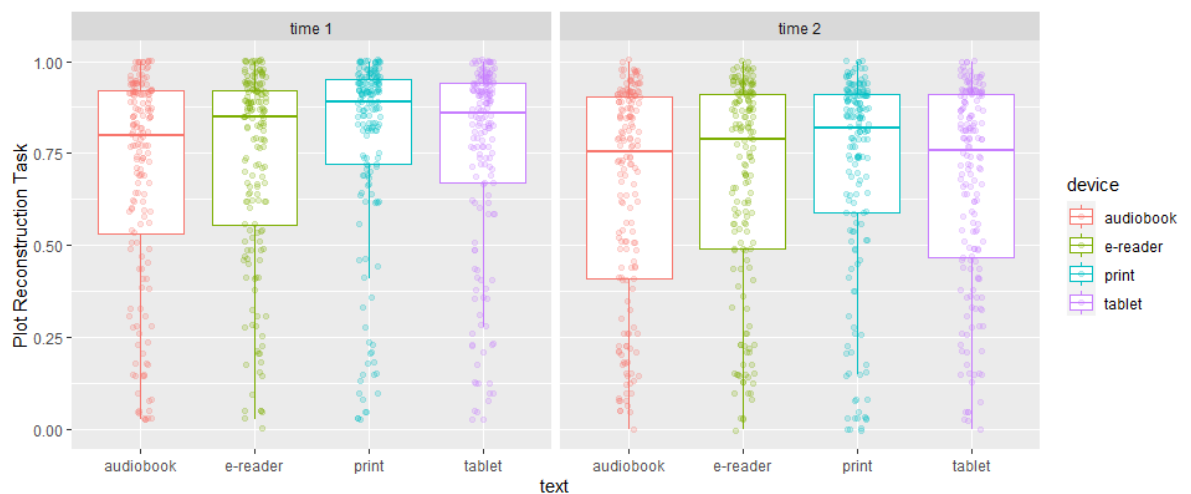
When investigating the effect of fictionality on PRT, the model fit improved when the fixed effect of text was included on the intercept ( $\chi^2(1) = 223.09, p < .001$ ). Although the model including the effect of text on the slope was also significant ( $\chi^2(1) = 26.29, p < .001$ ), its explanatory value was not as strong as when it was only added on the intercept, as can be seen from the  $\chi^2$  values, showing that PRT was better explained when text was included only on the intercept. In detail, it was revealed that the non-fiction readers had lower comprehension scores immediately after

reading compared to the fiction readers ( $b = -0.28, SE = 0.02, p < .001$ ). Also, the values revealed that there was a substantial difference in the variance of the scores of the fiction and non-fiction conditions, as can be seen in Figure 4.5.



**Figure 4.5** PRT mean scores and standard deviations per text condition.

As for the effect of the reading device on PRT regardless of the text used, it was found that the model fit did not improve when device was added on the intercept and slope term ( $\chi^2(3) = 7.36, p = .06$  and  $\chi^2(3) = 5.28, p = .15$ , respectively), revealing that the reading device did not affect readers' abilities to reconstruct the plot of the stories. This result is visualised in Figure 4.6. As can be seen in Figure 4.6, the variance of the print device was smaller than the variance of the other devices.



**Figure 4.6** PRT mean scores and standard deviations per device condition.

When exploring the effect of device on PRT for only fiction readers, the model fit improved both when the effect of device was added on the intercept and when added on the slope term ( $\chi^2(3)$

= 17.06,  $p < .001$  and  $\chi^2(3) = 14.65$ ,  $p = .002$ , respectively)<sup>23</sup>. The audiobook was found to have lower scores compared to the other three devices immediately after reading, without other differences between the devices observed (Table 4.5). As for the effect on the slope, it was revealed that audiobook, print, and tablet had a stronger decrease in PRT compared to the e-reader (Table 4.6).

**Table 4.5** Detailed results of pairwise comparisons showing the effect of device on PRT immediately after reading fiction. Statistically significant values are marked with \*.

Intercept comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	0.05	0.02	2.21	.03*
audiobook – print	0.09	0.02	3.99	< .001*
audiobook – tablet	0.07	0.02	3.07	.002*
print – e-reader	-0.04	0.02	-1.78	.08
print – tablet	-0.02	0.02	-0.92	.36
e-reader – tablet	0.02	0.02	0.86	.39

**Table 4.6** Detailed results of pairwise comparisons showing the effect of device on the change of PRT from immediately after reading to two weeks after reading fiction. Statistically significant values are marked with \*.

Slope comparisons	Estimate	Standard Error	t value	p value
audiobook – e-reader	0.04	0.01	3.16	.002*
audiobook – print	0.01	0.01	0.49	.63
audiobook – tablet	-0.004	0.01	-0.30	.77
print – e-reader	0.04	0.01	2.67	.01*
print – tablet	-0.01	0.01	-0.78	.43
e-reader – tablet	-0.05	0.01	-3.45	<.001*

As for the non-fiction readers, the model fit did not improve when the fixed effect of device was added on the intercept, nor when it was added on the slope term ( $\chi^2(3) = 2.45$ ,  $p = .48$  and  $\chi^2(3)$

<sup>23</sup> Although the model including the fixed effect of device only on the intercept seemed to fit the data better than the model including the device on the slope term if the values of  $\chi^2$  are observed, a more detailed comparison of the models showed that based on other metrics, the model including the device on the slope (m.1) was fitting the data better than the model including the device only on the intercept (m.0) as can be seen in the table below. For this reason, both models were considered significant and included in the results.

Model	AIC	BIC	LogLik	Chisq
m.0	-966.29	-934.56	490.15	17.06
m.1	-974.94	-929.61	497.47	14.65

= 4.96,  $p = .17$ , respectively), revealing that the reading device did not have any effect on the PRT when reading non-fiction.

#### 4.5.8 The effect of comprehension on empathy

The results of the model comparisons (Table 4.7) showed that comprehension did not have any effect on readers' change of empathy. There were only model improvements when comprehension was added on the intercept, showing that readers with better comprehension immediately after reading had stronger baseline empathy ( $b = 0.05$ ,  $SE = 0.02$ ,  $p = .01$ ) and readers with better memory two weeks after reading had stronger empathy immediately after reading ( $b = 0.05$ ,  $SE = 0.02$ ,  $p < .01$ )

**Table 4.7** Model comparison results when adding the parameter of comprehension and memory on the intercept and slope term of empathy. Statistically significant models are marked with \*.

Time points	Effect	Intercept:	p value	Slope:	p value
		Chisq		Chisq	
time 0 – time 1	comprehension immediately after reading	6.21	.01*	0.0008	.98
time 1 – time 2	comprehension immediately after reading	3.68	.06	2.28	.13
time 1 – time 2	memory two weeks after reading	6.08	.01*	0.001	.97
time 0 – time 2	comprehension immediately after reading	3.47	.06	2.60	.11
time 0 – time 2	memory two weeks after reading	8.34	.004*	2.51	.11

Similarly, when reading fiction, there was again no effect of comprehension on empathy change (Table 4.8). There was only a correlation between baseline empathy and comprehension and baseline empathy and memory two weeks after reading ( $b = 0.05$ ,  $SE = 0.02$ ,  $p = .02$  and  $b = 0.05$ ,  $SE = 0.02$ ,  $p = .03$ , respectively).

**Table 4.8** Model comparison results when adding the parameter of comprehension and memory on the intercept and slope term of empathy when reading fiction. Statistically significant models are marked with \*.

Time points	Effect	Intercept:	p value	Slope:	p value
		Chisq		Chisq	
time 0 – time 1	comprehension immediately after reading	5.57	.02*	0.64	.42
time 1 – time 2	comprehension immediately after reading	2.83	.09	1.12	.29
time 1 – time 2	memory two weeks after reading	3.14	.08	0.25	.62

time 0 – time 2	comprehension immediately after reading	3.05	.08	3.21	.07
time 0 – time 2	memory two weeks after reading	4.57	.03*	1.75	.19

When reading non-fiction, no effect of comprehension on empathy change was found either (Table 4.9), with the model comparison only indicating that participants with high baseline empathy also had strong text memory two weeks after reading ( $b = 0.08$ ,  $SE = 0.04$ ,  $p = .04$ ).

**Table 4.9** Model comparison results when adding the parameter of comprehension on the intercept and slope term of empathy when reading non-fiction. Statistically significant models are marked with \*.

Time points	Effect	Intercept:	p value	Slope:	p value
		Chisq		Chisq	
time 0 – time 1	comprehension immediately after reading	1.26	.26	1.07	.30
time 1 – time 2	comprehension immediately after reading	1.12	.29	1.38	.24
time 1 – time 2	memory two weeks after reading	3.35	.07	0.12	.73
time 0 – time 2	comprehension immediately after reading	0.54	.46	0.003	.96
time 0 – time 2	memory two weeks after reading	4.11	.04*	0.60	.44

#### 4.5.9 The effect of comprehension on absorption

Simple linear regression was used to test whether comprehension immediately after reading significantly predicted absorption. The overall regression was statistically significant ( $F(1, 686) = 38.71$ ,  $p < .001$ ,  $R^2 = .05$ ). The regression coefficient indicated that an increase in comprehension corresponded, on average, to an increase in the absorption score by 0.22 points.

#### 4.5.10 Individual factors

##### 4.5.10.1 Disruption

The model comparison when adding disruption on the intercept and the slope term showed that disruption affected only comprehension immediately after reading, with disrupted readers showing lower levels of comprehension ( $b = -6.50$ ,  $SE = 1.29$ ,  $p < .001$ ), but no effect on the slope was found, showing that disruption did not affect the change in the way the texts were remembered after two weeks (Table 4.10).

**Table 4.10** Model comparison results when adding the parameter of disruption on the intercept and linear slope term of comprehension. Statistically significant models are marked with \*.

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Disruption	24.82	<.001*	0.30	.58

Following these results, to evaluate whether reading device had a unique contribution to comprehension immediately after reading or whether some of the variance was instead explained by readers' disruption, a combined model that included the effects of both disruption and device on the intercept was built and it was compared to the previous model (the model including only the effect of disruption on the intercept). The results of this comparison showed that the effect of reading device still highly significantly improved model fit even when disruption was already included in the model ( $\chi^2(3) = 53.15, p < .001$ ). This comparison was made only regarding the effect on the intercept since it was already found that disruption did not affect the change of scores through time.

#### 4.5.10.2 Breaks

The model with the best fit was the one that included the fixed effect of breaks only on the intercept (the model that included it on the slope was also significant, but its explanatory strength was not as strong as the model that included it only on the intercept, as can be seen in Table 4.11). It was revealed that taking breaks led to lower comprehension immediately after reading ( $b = -6.15, SE = 1.31, p < .001$ ).

*Table 4.11 Model comparison results when adding the parameter of breaks on the intercept and linear slope term of comprehension. Statistically significant models are marked with \*.*

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Breaks	21.66	<.001*	6.91	.009*

When comparing a combined model that included both the effects of reading device and breaks on the intercept with a model including only the effect of device on the intercept it was found that the effect of device improved model fit even when breaks was already included in the model ( $\chi^2(3) = 56.50, p < .001$ ), showing that device made a unique contribution.

#### 4.5.10.3 Multitasking

Multitasking was measured only for the audiobook condition and it was found that it did not affect comprehension levels of the audiobook readers (Table 4.12).

*Table 4.12 Model comparison results when adding the parameter of multitasking on the intercept and linear slope term of comprehension of audiobook readers.*

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Multitasking	0.63	.43	2.91	.09

#### 4.5.10.4 Resistance to distraction

Regarding resistance to distraction, the model comparison showed that it affected only comprehension immediately after reading (Table 4.13), revealing that greater resistance predicted greater comprehension ( $b = 0.77$ ,  $SE = 0.15$ ,  $p < .001$ ).

*Table 4.13 Model comparison results when adding the parameter of resistance to distraction on the intercept and linear slope term of comprehension. Statistically significant models are marked with \*.*

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Resistance to distraction	27.48	<.001*	2.43	.12

When the model including only the effect of device on the intercept was compared with a model combining the effect of device and resistance to distraction on the intercept, it was found that the effect of device still significantly improved model fit, even when resistance to distraction was also included in the model ( $\chi^2(3) = 59.24$ ,  $p < .001$ ), indicating the unique contribution of device to comprehension levels.

#### 4.5.10.5 Dislocation

Regarding dislocation within the text, the model comparison showed that it had no effect on comprehension (Table 4.14).

*Table 4.14 Model comparison results when adding the parameter of dislocation on the intercept and linear slope term of comprehension.*

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Dislocation	2.19	.14	1.91	.17

#### 4.5.10.6 Awkwardness

The model fit improved when awkwardness was added on the intercept, but not when added on the slope (Table 4.15), showing that the more awkward readers felt with the medium, the lower their comprehension was immediately after reading ( $b = -1.75$ ,  $SE = 0.29$ ,  $p < .001$ ).

*Table 4.15 Model comparison results when adding the parameter of awkwardness on the intercept and linear slope term of comprehension. Statistically significant models are marked with \*.*

Effect	Intercept: Chisq	p value	Slope: Chisq	p value
Awkwardness	34.58	<.001*	0.10	.75

When comparing the model that included only the effect of device on the intercept with a combined model including both device and awkwardness on the intercept, it was found that



device still improved model fit, even when awkwardness was already included in the model ( $\chi^2(3) = 55.76, p < .001$ ).

#### 4.5.10.7 Experience with devices

Lastly, regarding the effect of experience with the reading device on comprehension, it was found that for audiobook, e-reader, and tablet readers, readers' experience with the corresponding device did not affect their comprehension (Table 4.16). However, the decline in scores over time was smaller when print readers were experienced with print books ( $b = 2.19, SE = 0.94, p = .02$ ).

**Table 4.16** Model comparison results evaluating effects of adding the parameter of experience with device on model fit when investigating each device factor separately. Statistically significant models are marked with \*.

Device	Intercept: Chisq	p value	Slope: Chisq	p value
Print book	1.41	.24	5.31	.02*
E-reader	1.04	.31	0.05	.82
Tablet	0.41	.52	0.05	.82
Audiobook	0.10	.75	0.04	.84

## 4.6 Summary of results

In short, the above results showed that the fictionality of the texts of this study did not affect readers' comprehension. However, when examining the Plot Reconstruction Task, it was found that the non-fiction readers were not as efficient as the fiction readers in finding events in the temporality of the non-fiction story.

Regarding the reading device, it was found that the audiobook device led to lower comprehension scores compared to the eye-reading devices (print, e-reader, and tablet). This was also apparent when investigating the effect of device when reading fiction and non-fiction separately. When reading fiction, another difference between the devices was also found: print book led to stronger comprehension compared to the e-reader device. When examining only the PRT, the devices did not differ significantly. This was not the case when exploring the PRT scores of the fiction readers separately, with the audiobook users scoring lower than the other three devices. It was also found that there was an effect on the slope, revealing that audiobook, print, and tablet led to a stronger decrease on PRT after two weeks compared to the e-reader device. When investigating the non-fiction readers, there was no effect of the device on PRT scores.

Regarding the effect of comprehension on empathy, it was revealed that comprehension did not affect reader's change of empathy after reading, with the results only showing that individuals

with high baseline empathy comprehended better. However, it was found that comprehension predicted absorption.

Dislocation within the text and multitasking did not affect reading comprehension. However, being disrupted, taking breaks, and feeling awkward when handling the medium led to a decrease in reading comprehension, while resistance to distraction led to higher comprehension scores. It was found, though, that the reading device had a unique contribution to reading comprehension even when the factors of disruption, breaks, awkwardness, and resistance to distraction were added to the model. Readers' experience with the device they used did not affect their comprehension, but readers' memory of the text decreased less after two weeks when print readers were experienced with print books.

## 4.7 Discussion

### 4.7.1 The role of fictionality in reading comprehension

The fact that comprehension was not affected by the texts' fictionality is at odds with previous relevant studies that showed that non-fiction is more challenging than fiction (MacLean & Chapman, 1989; Topping et al., 2008). However, it is crucial to note that these studies had focused on the comprehension levels of school children, while this study recruited only adults. Also, studies found that expository texts are more challenging than narratives (Kucer, 2010), but this does not necessarily translate to a difference between fiction and non-fiction. As Colman (2007) argued, fiction and non-fiction can have similar characteristics and this is apparent in the current study where both the fiction and non-fiction texts were narrative, which may result in them not differing concerning comprehension.

More substantial effects were found when investigating readers' scores in the Plot Reconstruction Task, showing that although fictionality did not play a role in readers' general comprehension, the fiction readers could better remember the sequence of the events of the story compared to the non-fiction readers. The goals of the reader may have played into this. As previous studies have suggested (van den Broek et al., 2001; van den Broek et al., 2005; Zwaan, 1994), readers develop specific reading goals depending on the text they are reading and they select different strategies for comprehension. Hence, readers' knowledge that a text is non-fiction might lead them to follow strategies that focus on obtaining information (van den Broek et al., 2001). On the other hand, fiction may be more connected with leisure reading, which may lead readers to focus on just enjoying the narrative (Mar & Oatley, 2008). Thus, it can be suggested that the reader's focus on enjoying the reading experience may lead them to remember the chronological order of events with greater precision, while non-fiction readers

focus more on the events per se and the information they provided. The role of readers' goals will be discussed further in the next chapter.

However, the characteristics of the specific texts used in this study might have contributed to this difference between fiction and non-fiction. In detail, the fiction story had a more linear plot compared to the non-fiction one, in which events were not always presented in a chronological order. For example, there was a flashback in the fiction story to describe some old events, but in the non-fiction story the plot was even less linear, starting with the day of the death of the author's father, going back in time to the author's childhood, and then, after adding some events from his adulthood, it went back to his father's death, making it perhaps more challenging for the readers to put the events in the correct chronological order. These observations of the plot of the texts used in this study might seem only small details, but when it comes to the Plot Reconstruction Task, these details may be detrimental to readers' performance and perhaps bring some difficulties when studying the recall of a text's plot.

Nevertheless, the fact that fiction readers remembered the central points of the text better than non-fiction readers but no difference was found regarding general comprehension indicates that the type of the text affected the construction of the situation model but not the textbase. Based on van Dijk and Kintsch's (1983) model of text comprehension, this means that fiction and non-fiction readers could both equally recall specific information given in the text. However, non-fiction readers had more difficulties in constructing the situation model, that is, the representation of what a text is about (van Dijk & Kintsch, 1983), and in particular to create a mental representation of the chronology of the story (Mangen et al., 2019). The Plot Reconstruction Task that was invented and first used by Mangen et al. (2019), shows that research, just like the present study, starts to realise the uniqueness of narratives and tries to pay more attention to the special characteristics of narrative comprehension as opposed to the comprehension of expository texts. This study goes a step further, capturing a difference between fiction and non-fiction in terms of recalling the event sequence even when both of them are narratives, suggesting that fictionality may play a role in narrative comprehension and calling for more research on the effects of fictionality on different aspects of narrative comprehension.

#### **4.7.2 The role of reading devices in comprehension**

Regarding the role of reading device, using an audiobook instead of a screen or paper had a negative effect on comprehension in both the case of fiction and non-fiction. Counterintuitively, participants' multitasking had no effect on the comprehension of audiobook readers. Therefore, it is evident that it is not this affordance of multitasking that is detrimental to comprehension,

but it may be the auditory nature of audiobooks that lessens readers' comprehension. Audiobook readers may have more difficulties in remembering details of the text since the option to reread, turn the page, and remember details of the content of the text is more limited when using an audiobook since the pace is controlled by the performing narrator and not the reader (Have & Pedersen, 2016). Although ear-readers can go backwards and replay part of the story, this action is more troublesome compared to the print and screen devices; ear-readers may not be able to find the exact point of the missing information since visual cues are missing. For example, when a reader wants to go back and double-check a piece of information while reading from a print book, they may remember on which side of the book the information was (the right or the left side) because they have connected it with other cues, such as their right and left hand. The cues are more limited when listening to an audiobook since there is only a bar showing to the reader at which minute and second of the length of the audiobook they are. This bar is most probably rarely noticed by the readers since the beauty and convenience of the audiobook is that the readers do not need to use their eyes and for sure do not want to spend the reading experience by noticing at which minute and second of the text they are located throughout the ear-reading experience.

Additionally, the phenomenon of mental fluency may explain some of these results. As Kuzmičová (2016) notes, the readers' sense of mental fluency is of paramount importance for the enjoyment of the reading experience (for a meta-analysis examining empirical studies on this topic see Reber et al., 2004). Readers prefer to experience fluency during the reading experience, and thus continue reading even if they missed a part of the narrative, instead of stopping and rereading the piece they missed. Although this is a reading behaviour that can be observed regardless of the medium used, it may be more apparent when using an audiobook. In the case of audiobooks, first, as noted earlier, it might be more troublesome to go back to a previous part of the text and so ear-readers may need to prioritise mental fluency more than eye-readers. Secondly, fluency seems to be of more importance when listening to a story. As Kuzmičová (2016) argues, the sense of fluency provided by the audiobooks has been considered by readers as one of the main reasons why they prefer audiobooks. Indeed, as Bull (2007) found in his survey, readers prefer audiobooks because they provide an uninterrupted experience due to the nature of the auditory stimulus of the medium. In fact, as Wittkower (2011) argues, audiobook listeners like the experience of a continuous "drifting in and out of attention" (p. 222). Therefore, it seems that mental fluency is more important for ear-readers than for eye-readers, as the audiobook creates the ideal environment to follow a story without the need to

be fully attentive to the details of the story. This may provide a pleasant experience for the reader, but it can be detrimental to reading comprehension.

Furthermore, the intervention of the real world environment with the eyes during the ear-reading experience may have played a role in reading comprehension. The world that readers perceived with their eyes while listening to the text may have intervened with the comprehension process, and that was the case regardless of the text's fictionality status. Additionally, it was revealed that audiobook readers had significantly lower scores on the Plot Reconstruction Task compared to screen and print readers when reading fiction. This showed that eye-reading is crucial for readers' cognitive map construction of a fiction story, that is, the ability to remember the structure and where any information is located in the text (Hu et al., 2017; Payne & Reader, 2006) and especially the creation of a mental representation of the chronology of the story as measured by the Plot Reconstruction Task (Mangen et al., 2019). The paratextual cues provided by the audiobook (i.e., the time bar showing at which moment of the audiobook they are), did not suffice for the readers to remember the order of the scenes of the plot. Moreover, the lack of tangible information during the reading process may have also interfered with the construction of the cognitive map, an important element for the construction of the situation model. The audiobook readers did not have a page to turn or any paragraph signalling to remember a scene of the fiction story, which could have diminished their ability to remember the order of the events of the story's plot. These factors, however, seemed to not intervene with non-fiction reading since no difference between the four devices was found regarding the Plot Reconstruction Task. This may be a result of the generally lower scores in the Plot Reconstruction Task of the non-fiction readers, suggesting that non-fiction may lead readers to not pay much attention to the plot, perhaps because their focus is on gaining information and scrutinising it, regardless of the device used.

As for the eye-reading devices, the present study indicated that print books facilitated comprehension more than e-readers when reading fiction, but no significant differences were noted between tablet and print devices, nor any difference between the eye-reading devices was found when reading non-fiction. These observations raise questions about the superiority of print compared to screen devices, showing that the results of the present study are not enough to suggest that print is better than screen reading in terms of text comprehension; in fact, this seems to depend on the specific screen technology used and the text readers are exposed to. As for the comparison between e-readers and tablets, based on previous studies, tablets were considered more challenging than e-readers regarding reading comprehension because they give access to more applications than e-readers do, and so readers are more prone

to be distracted by things like emails and social media (Hayler, 2011). In the present study, however, the results did not support this argument, showing that tablets and e-readers did not differ in terms of reading comprehension.

Regarding the role of individual factors, although the majority of them showed to affect comprehension levels (disruption, breaks and awkwardness when handling the medium had a negative effect on comprehension while resistance to distraction had a positive effect), the reading device had a unique contribution to comprehension even when these individual factors were present in the model, revealing that the aforementioned differences between the devices were present even when the individual differences are held constant.

It is, however, essential to note that the ecological validity of an empirical study can be limited; the participants were aware that they were participating in an experiment and that they had to read the texts. For this reason, they may have been more focused on the task given and, therefore, did not use other applications when using a tablet. Therefore, there is a possibility that the results would have been different if the participants did not have this knowledge. For instance, readers may feel “freer” to be distracted by social media or their emails and thus, show lower comprehension levels when using tablets compared to e-readers. This is also an indication that different methodologies may be helpful when investigating the effects of reading devices, as observing the individuals while reading may have provided more insight into their behaviour. Lastly, as noted in the case of the effect of devices on empathy (Chapter 2, pp. 110-111), the fact that participants used their own devices, which they use in their daily life and are used to, could have played a role in the lack of differences between the effects of tablets and e-readers.

Nonetheless, the results showed that the reading media affect comprehension immediately after reading, with limited long-term effects as there was no difference in the way readers’ memory of the texts decreased after two weeks. This shows that time is so detrimental to retrieval that, regardless of what kind of medium readers use and what text they read, their memory of the text will decrease in a similar way after two weeks. This, however, was not the case for the Plot Reconstruction Task when reading fiction, as e-readers demonstrated a smaller decrease after two weeks in comparison to the other devices, implying that the e-readers might have some affordances that may help with retaining details of the plot of a story, an issue that future studies can investigate further.

In conclusion, the reading device seems to play a substantial role in comprehension when reading fiction and non-fiction, suggesting that audiobooks can hinder reading comprehension compared to eye-reading devices. The results also revealed that relevant future studies should

focus not only on which device is “the best”, but also on which device works better for each text or genre and regarding specific aspects of comprehension. The results suggested, for instance, that it does not matter which device is used when reading non-fiction regarding readers’ ability to recall the order of the events narrated, but audiobooks can reduce this ability when reading fiction, showing that the fictionality and structure of texts should be taken into account when investigating aspects of narrative comprehension that go beyond the basic understanding of the meaning of the text.

#### 4.7.3 The effect of comprehension on absorption and empathy

The relationship between comprehension and absorption was made apparent in the present study since there was indeed a positive effect of comprehension on absorption as suggested by previous studies (e.g., Hogan, 2018, Kneepkens & Zwaan, 1994), providing empirical evidence for theories suggesting that the cognitive processing of a text determines and influences affective responses to it (Kneepkens & Zwaan, 1994). In fact, when developing a scale to measure absorption, Busselle and Bilandzic (2009) had put emphasis on the cognitive process needed to get absorbed in a text and they added a subscale called “narrative understanding”, noting that absorption is experienced through narrative comprehension, in accordance with the results of the present study.

However, it was revealed that comprehension did not affect the change of readers’ empathy, and that was the case for both the fiction and non-fiction story, results that are opposing Henschel and Roick’s study (2013), which suggested a link between empathy and comprehension. Admittedly, though, the empirical evidence for such a relationship is limited, and no previous study has addressed the link between empathy and comprehension when the reading experience causes an empathic decline as was found in the present thesis (for details, see Chapter 2). Therefore, although it may be true that comprehension is related to the development of readers’ empathy, this does not seem to be the case when there is an empathic decline. In other words, comprehension may be needed to bring about empathy, but empathic decline, what some researchers refer to as empathic distress (Singer & Klimecki, 2014), can happen regardless of reading comprehension. This may suggest that the empathic distress that readers felt after reading was so strong that they experienced it regardless of their comprehension. It may also mean that the inclination of people to use blocking mechanisms to control their empathic responses (Breithaupt, 2012; Zaki, 2014) may be so strong and pervasive that readers may block their empathy regardless of how deeply they understand a story, with just a general idea of the subject and meaning of a text to be enough for them to proceed to the regulation of their empathy. This finding is in accordance with the results provided in Chapter 3,

which showed that empathy was also not affected by absorption, showing that readers' empathy is independent of both cognitive and absorbing responses when experiencing distress. Therefore, this study suggests that the relationship between cognitive and empathic responses to literature is not always that obvious and straightforward and empathic distress can happen regardless of readers' comprehension and absorption.

Furthermore, the lack of effects of comprehension on empathy could be due to the limitations of the comprehension measurement of this study. Although the measurements that were developed focused not only on the textbase level but also on the situation model to study the understanding of central ideas and events' sequence of the stories, they did not address other aspects of comprehension that are fundamental to the reading experience of narratives. In particular, they failed to measure readers' assumptions and evaluations that are part of the process of narrative comprehension (Day & Park, 2005). These aspects depend on readers' personal experiences and knowledge and are difficult to measure or control using questionnaires and quantitative research methods. Thus, this study did not manage to measure readers' personal responses to the texts which, however, can direct and influence their comprehension (Kneepkens & Zwaan, 1994). Consequently, this study measured only some dimensions of narrative comprehension, while other dimensions may have played a more influential role in emotional responses and empathy in particular. As argued in Chapter 1 of the present thesis, emotional responses are such an essential part of narrative reading that comprehension cannot only be seen as a cognitive process, but a combination of cognitive and emotional responses. The methodology of the current study, however, and the scales used may have limited the researcher's ability to measure all aspects of comprehension, which, in turn, may have been detrimental to the examination of the effects of comprehension on empathy.

#### **4.8 Conclusion**

The present chapter investigated comprehension and focused on the effects of fictionality and reading devices. It was found that the fictionality of the stories used in this study has a limited effect on reading comprehension, but it was indicated that fictionality can play a role in specific aspects of comprehension, in particular in constructing aspects of the situation model, with this work of fiction facilitating the recall of the sequence of the events narrated. However, this difference may not be a result of the fictionality of the texts per se, but the specific way the stories used in this experiment were structured since writing techniques such as flashbacks and flashforwards may influence readers' ability to reconstruct the plot of a story.

Following the negative effects of audiobooks on absorption (as found in Chapter 3), this was also evident regarding comprehension, with audiobook readers performing worse than print and



screen readers. These results showed that the auditory experience and the affordances provided by audiobooks may hinder comprehension. However, the differences between print, e-readers, and tablets were more limited, suggesting that specific facets of comprehension may not be merely reduced by screen interfaces, but a combination of a specific text with a device may cause such negative effects, calling for more investigation of these subjects.

Furthermore, an effect of comprehension on absorption was found, providing empirical evidence on previous studies that have suggested the dependence of absorption on comprehension (see, e.g., Busselle & Bilandzic, 2009). Finally, it was found that readers' empathy changes regardless of their comprehension, showing that when empathic distress is caused by reading, this can happen regardless of comprehension, suggesting that readers' empathy can be independent of other cognitive processes. However, the present study tested only certain aspects of reading comprehension, which may have been detrimental to the exploration of the relationship between comprehension and empathy.

## 5 Fifth Chapter: General discussion and concluding remarks

The purpose of this thesis was to explore the effects of literary reading. A thorough literature review provided a theoretical framework for the term of empathy, reported the relationship between empathy and reading, focusing on the role of fictionality and literariness, and reviewed the phenomena of absorption and comprehension and their connection to empathy. The review of the literature also reported studies and theories on the effects of reading devices on affective and cognitive responses to literature, focusing on a comparison between print and screen reading, between e-ink and LCD screen technologies, and between the eye-reading and ear-reading experience. Having as a starting point the theories that suggest that fiction reading increases people's empathy, the first empirical study of this thesis tested the effects of fiction and non-fiction literary reading on empathy as well as the effects of the reading devices. The second study focused on the effects of fictionality and reading devices on absorption while testing whether there is a connection between readers' empathic change and absorption. The last study examined the effects of fictionality and reading device on comprehension, while it also tested the relationship of reading comprehension with empathy and absorption.

This chapter will first provide a summary of the main findings of the three empirical studies that were conducted and reported in Chapters 2, 3 and 4. It will then discuss the contribution of these findings and it will compare them with findings of previous relevant studies. A review of the main limitations of the studies of this thesis will be then provided and suggestions for future studies and directions will be given.

Lastly, the concluding remarks will provide insights on the importance of empathy in society, the reasons behind the connection between reading and empathy, and the way that the exploration of the effects of different reading devices may need to be treated in the future.

### 5.1 Summary of main findings

Chapter 2 provided evidence that literary reading can decrease readers' empathy. It was found that when reading fiction, there is an immediate decrease in readers' empathy, while non-fiction leads to an empathic decrease two weeks after reading. Chapter 2 has also provided evidence on the effect of reading devices on readers' empathy. The findings showed that when using an audiobook to listen to a fiction story, empathy is not affected by the reading experience as opposed to the eye-reading devices that can cause an empathic decline. This, however, was not found when exposed to non-fiction, with no differences found between the four devices. Regarding the eye-reading devices, very limited differences were found between print, e-reader, and tablet devices in terms of their effects on readers' empathy, with print readers experiencing an empathic decrease two weeks after reading compared to their baseline levels, while e-

readers showed an increase. As for the comparison between e-readers and tablets, no differences were found.

It is crucial, however, to note that need for affect – the tendency to engage with situations and activities that induce emotions (Maio & Esses, 2001) – can affect readers' empathy. In particular, it was found that need for affect can predict baseline empathy and leads to a stronger decrease in empathy immediately after reading fiction and a stronger increase two weeks later. Regarding the role of personal experience with the subject matter, it was found that this does not affect readers' empathy immediately after reading, but brings a stronger decrease in empathy two weeks after reading compared to baseline levels. Other factors, however, did not have any effect on readers' empathic change. Namely, readers' experience with literature and with the reading devices, the interference of the interface (that is, readers' resistance to distraction, their dislocation within the text and their awkwardness when handling the reading medium), disruptions and breaks while reading did not affect readers' empathy. The effect of multitasking was tested only for audiobook users and it was found that when readers multitasked, they experienced an empathy increase compared to those who did not multitask, but this effect was present only when they were exposed to fiction.

Chapter 3 explored the phenomenon of absorption. It first investigated the effect of fictionality on absorption, showing that fiction elicits more absorption than non-fiction. It was found, however, that only the components of attention and mental imagery were affected by the fictionality of a story, with emotional engagement and transportation not being influenced. As for the effect of reading media on absorption, the results were similar to the study of empathy, showing that ear-reading led to less absorption than eye-reading, with no differences found between print, e-reader, and tablet devices. Furthermore, this study showed that absorption did not affect readers' empathic change. It was also found that some individual factors affected absorption: disruption, taking breaks and awkwardness when handling the medium had a negative effect on absorption while resistance to distraction had a positive effect. Multitasking while using an audiobook had a negative effect on absorption as well. Lastly, experience with audiobooks and tablets led to stronger absorption for audiobook and tablet users, respectively.

Chapter 4 focused on reading comprehension, investigating the effects of fictionality and reading medium on reading comprehension. The fictionality of the text was found to not affect reading comprehension. However, it was shown that fiction readers can better remember the sequence of the events of the story's plot compared to non-fiction readers, suggesting that fictionality may facilitate the construction of the situation model. Regarding the role of reading

device, comprehension was weaker when reading audiobooks compared to the eye-reading devices (print, tablet, and e-reader). This, however, was observed only when reading fiction; in the case of non-fiction, audiobooks were not detrimental to readers' comprehension levels. Also, readers' memory was not affected by the reading device, with their scores decreasing similarly after two weeks regardless of the device they used. Regarding the comparison of the three eye-reading devices, no differences were found between the comprehension levels of print, e-reader, and tablet conditions, with the only exception being when reading fiction, where readers performed better when reading in print book compared to e-readers. It was also indicated that reading comprehension is not affected by the type of the screen technology, with e-reader and tablet devices providing similar comprehension levels.

However, some individual factors affected reading comprehension. In particular, disruptions and breaks while reading and awkwardness when handling the medium led to lower comprehension scores. On the other hand, resistance to distraction led to higher comprehension scores. However, the reading device had an effect on comprehension even when accounting for these factors. Dislocation and multitasking did not have any significant effect on comprehension.

Concerning the role of comprehension in absorption, this study confirmed previous research (e.g., Hogan, 2018; Kneepkens & Zwaan, 1994) providing evidence that text comprehension favours absorption in the story world. However, the investigation of the role of comprehension in the change of readers' empathy showed that comprehension does not affect empathic change after reading.

## 5.2 Contribution

This thesis provides a number of novel contributions to the exploration of affective and cognitive responses to literary reading. By literary reading, this thesis refers to the leisure reading of narratives with literary features.<sup>24</sup> This thesis focused specifically on the effects of fictionality and reading media. First, this thesis provided an in-depth exploration of the phenomenon of empathy and focused on discerning it from other similar psychological phenomena such as sympathy, compassion, and prosocial behaviour. This investigation allowed the exploration of the effect of literary reading on empathy, preventing the association of empathy with other related phenomena. The findings of Chapter 2 showed that reading literary narratives can have a negative effect on empathy. This is a novel finding since previous research indicated that reading increases empathy, arguing that reading stories allows readers to simulate social

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<sup>24</sup> For a review on the definition of literary texts, see Section 1.3.3.

interactions, providing a safe environment to practice their empathic abilities (Mar & Oatley, 2008; Oatley, 2016). However, the findings of this thesis indicate that some stories, like the ones used in this thesis, may be distressing to the readers, and therefore can lead them to use blocking mechanisms to avoid empathic drainage. This argumentation was based on psychological studies suggesting that people try to protect themselves from negative feelings when exposed to the suffering of others (Singer & Klimecki, 2014) and they develop blocking mechanisms to regulate their empathy towards others and save themselves from distress (Breithaupt, 2012). This phenomenon of empathy regulation may be, thus, a common occurrence since many readers show a preference for sad stories, what is known as the “drama paradox” (Koopman, 2016b; Oliver, 2008).

These results are also at odds with previous research that suggested that fiction promotes empathy more than non-fiction, as it was found that both fiction and non-fiction literary narratives can decrease empathy, with fiction having an immediate negative effect while non-fiction leading to empathic decline after two weeks. Previous theories (Keen 2003; 2007) suggested that non-fiction brings about suspicion and more in-depth examination to check the text’s trustworthiness compared to fiction stories. Thus, based on these theories, this thesis argued that attitudes such as suspicion towards the non-fiction text or detailed examination of the information given may delay the emotional distress readers may feel. Furthermore, the results of the present thesis on the exploration of the effect of fictionality on absorption showed that fiction evokes more absorption than non-fiction, which was also at odds with previous research (Green & Brock, 2000) that argued that fictionality does not play a role in readers’ absorption.

However, the results of this thesis showed that only two aspects of absorption, namely attention and mental imagery, were influenced by the fictionality status of the texts, and other aspects, namely emotional engagement and transportation, were not influenced. This is an important finding, as it contradicts the theory of optimal aesthetic distance (Cupchik, 2002; Scheff, 1979) which suggests that fictional narratives allow for a stronger emotional engagement with the protagonists. In particular, this theory posits that fiction stories’ distance from reality provides a safe space to feel with and for the characters since readers’ feelings do not have any real-life demands and implications (Keen, 2007). The present thesis, however, did not find that fiction promotes more emotional engagement than non-fiction, suggesting that other factors may play a more influential role, such as the cultural or temporal differences between readers and protagonists. The role of these differences was out of the scope of this project, but the awareness of these has arisen from the results of the studies conducted in this thesis.

As for the role of fictionality in comprehension, although previous research argued that non-fiction is more challenging than fiction (MacLean & Chapman, 1989; Topping et al., 2008) the findings of this thesis did not confirm this, showing that when the texts are literary and narrative, their fictionality does not affect reading comprehension. However, it was found that fiction readers performed better in the Plot Reconstruction Task, showing that when reading fiction, it is easier to remember the sequence of the events of the plot rather than when reading non-fiction. This finding indicates that empirical studies on text comprehension of literary narratives should treat comprehension as a multi-level process, including the examination of all the four levels (surface structure, textbase, situation level and pragmatic level) as identified by Kneepkens and Zwaan (1994).

A novel contribution to the investigation of these effects of fictionality is related to the choice of the materials used in the empirical studies of this thesis. In particular, the present studies used literary narratives both for the fiction and the non-fiction condition, and thus, the findings showed the effect of fictionality without the potential confound of other factors, i.e., narrativity and literariness. This is an important contribution because previous studies used expository texts for the non-fiction condition (e.g., Black & Barnes, 2015; Djikic et al., 2013; Johnson et al., 2013), which may have brought implications since expository texts promote different goals; they are written to inform or persuade the readers (Koopman, 2015), while narratives are written to present the intentions of agents, their interactions with others, and the vicissitudes they face (Bruner, 1986). As a result, when previous studies compared factual expository texts with fictional narratives, their findings may have been influenced not only by the fictionality of the texts but also by their narrativity. Because the two texts that were compared in this thesis were both literary narratives, any differences between them in terms of their effects on empathy, absorption, and comprehension can be attributed with more confidence to their fictionality status.

Additionally, this thesis tried to be as ecologically valid as possible. For this reason, real, original literary texts that are on the market were chosen, instead of creating stories ad hoc for the experiments or manipulating existing stories. This is an important contribution of this thesis since many relevant studies manipulated their materials. For example, Mangen and Kuiken (2014) altered the original text to not bring “excessive distress” to the readers, while Johnson (2012) had a short story created for the purposes of his study. The decision, however, to use original published stories for this thesis provided the advantage of higher ecological validity and allowed the investigation of the reactions of readers when exposed to real stories.

Another valuable contribution of this thesis was the comparison of four different reading media: print, e-reader, tablet, and audiobook. To my knowledge, these four devices have never been compared altogether, especially in terms of their effects on empathy and absorption. For the first time, empirical evidence on the differences between eye and ear-reading was provided, showing that audiobooks can protect readers' empathy from being depleted when exposed to fiction stories: they can provide distance from the story, suggesting that the affordances of the audiobook, such as the interaction with the real world environment and the chance to engage with other activities while listening, provide a secure space for the reader that does not allow for a strong engagement that may lead to empathic drainage. This finding is of paramount importance, showing that when reading fiction, audiobooks do not affect readers' empathy, while print and screen reading can bring empathic distress. This suggests that the use of audiobooks may be beneficiary when exposed to distressing stories like the ones used in the present thesis. However, this difference was not present when reading non-fiction, revealing that there is an interaction between the text's fictionality and the reading medium.

Furthermore, this thesis provided a novel contribution concerning the effects of reading media on absorption and text comprehension, showing that print and screen devices bring stronger absorption and better comprehension than audiobooks. Regarding absorption, the results of this thesis provide empirical evidence on theories suggesting that audiobooks can be less absorbing than eye-reading devices, arguing that the performing narrator of audiobooks may be a moderating factor (Have & Pedersen, 2016): having someone reading a story to a person may be a less absorbing experience than reading a story to one's own and listening to one's own voice during the reading process. Previous research has provided very limited findings on this issue. In particular, Gorichanaz (2016) compared readers' reviews found online for the print, audiobook, and e-book editions of two fiction novels and found that print readers claimed that they got more absorbed in the story compared to the e-book and audiobook readers. Although the present thesis followed a different methodology, the evidence found partially agrees with Gorichanaz's (2016) findings, showing that audiobooks are less absorbing than print, tablet, and e-reader devices. As for the effects on reading comprehension, for the first time, this thesis provided a comparison between ear and eye-reading of fictional texts, since previous studies had only focused on informational and educational materials (for a review, see Baron, 2021), while only one study used a non-fiction novel as reading material (Rogowsky et al., 2016). Thus, for the very first time this thesis provided evidence that print, e-readers, and tablets lead to better comprehension than audiobooks when reading fiction and non-fiction literary narratives. This result agrees with the majority of studies that focused on informational and educational

materials (for a review, see Baron, 2021) showing that eye-reading is superior to ear-reading regardless of the type of material, although it is at odds with the findings of Rogowsky et al. (2016), who argued that there is no difference between print and audiobook reading when exposed to non-fiction novels.

This thesis has also contributed to the investigation of the effects of screen reading, comparing print book, tablet, and e-reader devices regarding empathic change, absorption, and comprehension. Most of the results revealed that the experience of screen reading is not very different from that of print reading, suggesting that the different affordances provided by screen interfaces, such as the different haptic feedback, their virtuality, and the lack of kinaesthetic cues when handling them, is not decisive. These results contradict previous theories that suggested that print can bring about an experience of “deep reading” which results in more empathy, comprehension, and absorption than screen interfaces (Wolf, 2007, 2018). Furthermore, the present results are at odds with Mangen and Kuiken’s study (2014) which showed that tablets bring less absorption than print. The results of this thesis also challenge the results of Guarisco et al. (2017), which showed the superiority of the print device with respect to readers’ empathy. However, the results of this thesis agree with other studies that showed no difference between print books and e-readers (Mangen et al., 2019; Schwabe et al., 2021) or between print books and tablets (Haddock et al., 2020) regarding absorption. This thesis has also provided the very first evidence concerning the comparison of tablets and e-readers in terms of their effects on empathy and absorption, showing that these two devices produce a very similar experience.

As for comprehension, the comparison between print books, e-readers and tablets presented in this thesis has been pivotal, as a very limited number of studies focused on the comprehension of literary narratives, mostly investigating reading comprehension of informative texts. The current thesis showed no difference between print, e-reader, and tablet devices on text comprehension, apart from the case of fiction reading, where print provided better comprehension than e-readers. Therefore, the lack of differences in the non-fiction condition and the lack of differences between print and tablet more generally contrasts previous research which argued that print leads to better comprehension than screen interfaces (Clinton, 2019; Delgado et al., 2018; Kong et al., 2018). Moreover, the lack of differences between tablet and e-reader devices in comprehension was a novel contribution of this thesis, as it opposes previous research which posited that the e-ink technology facilitates cognitive processes compared to LCD light screens, i.e., the ones found in tablets (Baccino, 2004; Benedetto et al., 2013; Blehm et al., 2005; Garland & Noyes, 2004; Noyes & Garland, 2003). In the same vein, this lack of



differences is also at odds with previous research which argued that the “do-it-all” character of the tablets (Hayler, 2011), i.e., the fact that tablets provide access to other applications and are not dedicated to reading only, is detrimental to the reading experience.

Lastly, this thesis provided unique insights into the relationship between empathy, absorption, and comprehension. It showed that readers’ empathic change was not associated with absorption, suggesting that narrative empathy, which is defined as the empathy readers feel towards a story’s protagonist (Keen, 2007), is not related to the change of empathic levels after reading. In other words, it rejected the theory that fiction acts as a “simulator” and a training ground (Oatley, 2016) for readers to practice their empathic abilities through empathising with a story’s characters. This finding has also challenged previous empirical evidence that suggested a positive relationship between absorption and empathy (Bal & Veltkamp, 2013; Johnson, 2012). However, these previous studies found that reading increases empathy; therefore, it can be argued that when the reading experience causes a decrease in empathy, this occurs regardless of readers’ absorption. Similarly, the findings of Chapter 4 indicated that comprehension does not affect empathy, a finding that is at odds with Henschel and Roick’s study (2013). Therefore, it can be suggested that when there is an empathic reduction due to the reading experience, this happens regardless of comprehension and absorption levels, showing that empathic distress can happen no matter how well readers understand the text or how much they get absorbed in the story. Hence, it can be argued that empathic change can be a very distinct reading experience that is neither enacted by cognitive processes during reading nor by the absorbing experience of reading. To the contrary, it can be suggested that empathic decline after literary reading may be enacted due to the blocking mechanisms people use in general when feeling that a situation or experience might cause a distressing effect, in a similar way in which they react in real situations during their interaction with other people or while witnessing a distressing experience.

### 5.3 Limitations and future directions

Although the empirical studies of this thesis followed a quantitative approach, many participants felt the need to come in contact with me after completing the study and send me their personal reflections on the texts they read. These responses were not added to the results of the studies since they were not planned and analysed, but it is interesting to note that some participants had the need to talk about the reading experience. They sent me emails thanking me for bringing them in contact with the specific texts I asked them to read, telling me how emotional they got when reading the stories, that the stories “got under their skin”, or that they really “touched them” and made them “think”. These comments provided by some of the participants were not,

at first glance, in accordance with the results provided by the analysis. How can participants say they “felt” for the protagonists and on the other hand exhibit lower empathy, when their absorption in the stories does not influence their empathy?

The answer to this can be found in the definition given to the term empathy. As noted in the first part of the literature review in Chapter 1, and as portrayed by the measurement used in the experiments (Questionnaire of Cognitive and Affective Empathy, as developed by Reniers et al., 2011), empathy was treated as a psychological phenomenon that is distinct from other feelings, such as sympathy and compassion, and measured as the ability to understand and feel what others feel. In short, empathy was treated as a concrete, measurable feeling, a demonstratable process that takes place in readers’ minds and can be quantified. This approach, however, does not ask questions about how a person experienced the stories, what feelings emerged while reading, how these feelings were cultivated and what change they may or may not have caused to the reader. Also, this approach did not allow the investigation of the effects of reading, reading devices and texts’ fictionality on other related phenomena, such as compassion and sympathy, which can be equally or even more important than empathy for the society and the creation of positive connections between its members. In fact, it was noted that the importance of empathy in human society needs to be reconsidered. According to Bloom (2016), empathy does not make one more moral – one does not need to feel what the other person feels to do what is considered morally right. Also, empathy faces an important limitation: it can be parochial, or else it can only be expressed for people similar to us (Bloom, 2016; Singer & Klimecki, 2014). Therefore, to create positive relationships between members of a society, empathy may not be as important as the ability to show compassion, feel sorry for another person, and try to help them.

In order, however, to explore how and which feelings are cultivated by reading, more research is needed. In-depth interviews may provide more answers on the way readers react emotionally to the fiction and non-fiction stories they read, how they act on these emotions, and how, in turn, these emotions affect their life. In short, the negative effect of reading on empathy as found in this study does not mean that reading may make people less moral, bad in social relationships, or weak communicators. The experience of empathy was rather treated and measured as a very concrete emotion, without giving evidence about the effects of reading on behavioural change or other psychological phenomena such as sympathy and compassion.

The results regarding the role of fictionality in readers’ empathy, absorption, and comprehension warrant further investigation as well. This thesis showed that fiction can cause

a decrease in readers' empathy only immediately after reading, while non-fiction caused a decrease only two weeks after reading. It was also found that fiction can facilitate absorption more than non-fiction and that it facilitates the recall of the plot of the text. It may not be wise, however, to further generalise based on these observations, as the studies of this thesis used only two specific narratives. Other narratives – fiction and non-fiction – may have brought different effects on readers' absorption, empathy, and comprehension. Most importantly, different effects may have been observed if the stories used had a “happy ending” or were not as distressing as the ones used in the studies of this thesis. In detail, both of the stories used were dealing with issues of racism, exposing the reader to scenes of abuse, murder, and suffering. Although these stories were selected in order to have a common theme for both the fiction and non-fiction condition and thus, to draw comparisons, it is crucial to note that not all stories expose the readers to negative emotions and events, suggesting that different, positive and feel-good stories may lead to different affective and cognitive responses.

Additionally, although this thesis tried to use stories that can be as comparable as possible, the differences that were found concerning their effects may have been due to a variety of other factors. It was not examined, for instance, whether the stories had the same level of readability or literariness. Furthermore, the studies of the present thesis were of a quantitative nature, providing measurable differences in the readers' affective and cognitive responses, but failing to examine some elements of comprehension. For example, as noted in the previous chapter, only specific aspects of narrative comprehension were measured, while other elements that are especially important to narrative comprehension could not be measured with the use of questionnaires, such as the interaction of readers' personal experiences, memories, and knowledge with the comprehension process. These aspects could be investigated in future studies using a more qualitative approach, such as interviews with the readers, while including a variety of different fiction and non-fiction texts as reading materials.

In addition, the explanations and argumentation that were presented and elaborated regarding the effects of fictionality assumed the readers' goals without, however, being able to provide any evidence. For instance, it was suggested that the negative effect of non-fiction on empathy was apparent only after two weeks because readers treated it with scepticism which delayed their emotional response. Similarly, it was suggested that non-fiction readers focus more on obtaining information than getting absorbed in the story or remembering the exact order of the events in the story's plot. Although this argumentation can find support from previous research that posited that the type of text influences reading goals and strategies (van den Broek et al.,

2001; van den Broek et al., 2005; Zwaan, 1994), further research into this is required to rule out the effects of readers' goals and motivations when they read fiction and non-fiction texts.

Similarly, an important factor that this thesis did not take into consideration is the role of the author in the effects of the reading experience. This thesis assumed that any effects on empathy, comprehension, and absorption are a result of readers' reactions to the texts without considering the relationship the author tries to develop with the readers. For example, the author of a non-fiction text may not put so much effort into creating an absorbing experience for the reader as much as providing a story that will induce reflection to the readers. Similarly, the non-fiction author may put less emphasis on the plot of their work and more emphasis on the message to be shared based on the events they are narrating. On the other hand, the author of a fiction story may want to communicate thoughts and messages to the readers, but only through their narration of the events and not their personal voice and point of view, so more emphasis is put on techniques that will bring an absorbing experience and on the construction and sharing of the plot. These assumptions need to be tested in future research and a new focus needs to be put on the act of writing, the way authors' goals and techniques influence readers' responses, and the interactions that are developed between authors' goals and readers' reactions to them. However, it is important to note that any approach in the investigation of the effects of literary reading may be faced with limitations; there is such a profusion of stories, genres, literary devices and authors that any study will face the limitation of investigating only specific texts or specific authors.

Regarding the effect of reading devices, this study is more ecologically valid than previous research since the participants used their own devices; however, some limitations were also faced. In particular, although there were very limited differences between print, e-reader, and tablet devices, if empathy, comprehension, and absorption were investigated following methodologies used from different disciplines, such as a phenomenological research and qualitative analyses, more information may have arisen considering the difference a screen interface may bring to the reading experience. Such a direction would be equally powerful to follow and may provide more explorations about reading behaviours and responses different media can evoke. For instance, a crucial issue that has not been investigated in the current thesis is the role of readers' motivations when choosing to read on a screen device or to use an audiobook. Previous studies have provided insightful findings on this. For example, Have and Pedersen (2016) investigated readers' motivations when they opt for an audiobook instead of an eye-reading device, suggesting that audiobooks provide a more intimate experience, while providing more satisfaction to everyday experiences and routines, such as exercising and

commuting. Similarly, future research may provide more insights into the role of readers' motivations in the effects of reading media. For example, is it possible for a reader to opt for an audiobook to protect their empathy when preparing to read a distressing story? Can the choice of medium be influenced by the readers' willingness to get absorbed in a story? Can a reader choose a print or screen device when they want to focus more on the plot of a story?

Lastly, although the empirical studies of this thesis tried to examine or control the effect of a variety of individual factors (i.e., experience with literature, need for affect, personal experience with the subject matter, experience with reading devices, disruption, taking breaks, multitasking, interface interference), these analyses were exploratory and were not as statistically robust as the main analyses on the effects of fictionality and reading devices. Further research specifically designed to investigate the effects of individual differences is warranted and more analyses need to be carried out to examine their relationship with the use of different reading devices.

#### 5.4 Concluding remarks

Although the studies in the present thesis faced limitations and treated complex phenomena such as empathy, narrative comprehension, and absorption as concrete and measurable processes, their contribution is of utmost importance for the investigation of the role of leisure reading, its genres, and reading media in people's emotions and cognitive processes.

Regarding the effect of literary reading on empathy, the conflicting findings of Chapter 2 raise questions about the reasons why research has approached the issue of the effects of reading on empathy in the first place. Why do researchers try to find some concrete, either positive or negative relationship between literature and empathy? Why has empathy become part of our everyday vocabulary, and why do we try to find benefits in literature instead of just enjoying it? These next paragraphs will try to provide some answers to these questions.

A search on a search engine for the word empathy will give millions of results on "how-tos". How to practice empathy in your daily life, how to practice empathy at work, how to be an empathic leader, how to show empathy in a conversation, and the list goes on and on. But why do people show such an interest in being empathic nowadays? This may be part of the general focus on personal growth in Western societies. Lasch (1978), referring to the American society of the 1970s, argued that people lost their faith in politics and therefore focused on themselves to find self-improvement. Cederstrom and Spicer (2015) have brought this argument back to the surface, suggesting that the focus on the individual's self-improvement is the only thing left when social solutions are no longer available. Simultaneously, self-tracking apps and widgets

had reinforced this trend, with people tracking themselves, trying to improve their productivity, stamina, mood, health and, in general, to reach the “best version” of themselves. Thus, the focus on empathy may be just an aspect of this trend of self-improvement, with “being more empathic” being translated to “becoming better” in general. This, however, results in a focus on oneself, instead of focusing on the other. People may care more about how they can become more empathic rather than transforming their empathy into compassion or prosocial behaviour toward others. In fact, this attention to the self may even lead to competitiveness; the focus may eventually be directed from how to treat people better through empathy to how one can be more empathic than the other and wear the title of “a highly empathic person” as a badge of honour.

As for the search for tangible benefits of literature, this thesis, as well as a lot of research in the last decades, tried to find benefits of leisure reading, whether this is less stress, higher empathy, or enhancement of imagination and creativity. It seems that research, including the present work, tries to defend something they so strongly believe needs their protection: literary reading. As noted in Chapter 1, the search for a utilitarian explanation of literature emerged in the 1980s in a movement of protectiveness towards literature (Menand, 2010). The discussion about the death of the novel and the demise of humanities, together with the emergence of digital technologies and the subsequent fetishisation of the print book (Ballatore & Natale, 2016), reinforced these fears and made the search for beneficial outcomes of literary reading even more urgent.

The incentive behind the engagement with the present project was influenced and driven by these movements: on the one hand, the need to defend literary reading and promote leisure reading was considered of essential value; on the other hand, empathy was considered of high importance, something that individuals need to practice and develop in an era of constant need for self-improvement. These realisations, however, do not mean that the present research was not of significance, nor that it was biased. Its results were of high importance: It showed that literary reading is such a complicated experience that its effects on empathy are not always straightforward; although the present study showed that reading led to an empathic decline, that was not the case in previous studies, suggesting that different stories can bring different effects and a universal trend cannot be claimed. It also showed that absorption and comprehension do not predict empathy, suggesting that other reading processes and responses may play a role in readers’ change of empathy; for instance, aesthetic feelings may play a role, while how disturbing or sad a story may be should also be considered. Therefore, the present results questioned the position that engaging with protagonists’ emotions works as a simulation

device for readers' real life empathic abilities, while it also showed that comprehension (at least at the textbase and situation model level) did not affect readers' empathic change when exposed to the pieces of literature used in the studies of this thesis. However, as noted above, the comprehension measurements used in this thesis faced important limitations, and better comprehension measures need to be developed to have a clearer picture of the interaction between comprehension and empathetic levels.

The theoretical background of this thesis was based chiefly on psychological studies suggesting that digital technologies may have taken something away from the experience of leisure reading, such as the ability to read deeply, to engage emotionally with a text, or to deeply understand it. The findings of this thesis, however, painted a different picture and provided strong evidence to de-demonise screen interfaces and audiobooks. The reading experience is not endangered by the different reading devices, with screen reading being very similar to print reading. In addition, the experience of audiobook reading may provide a different experience to the reader – not a less impactful or “shallower” experience, but just different – which may even prove beneficial when readers' emotional state is threatened by the distress stories may bring, an experience that has its own uniqueness and its place in people's reading habits. In conclusion, it seems that the exploration of the effects of literary reading should be made only when fear-mongering statements about the death of literary reading are disregarded, as well as narratives about the danger digital devices pose to readers, and the importance of fiction in society as opposed to non-fiction. The effects of literary reading need to be studied as a multidimensional experience, which may or may not affect readers' empathy, without this having such an importance to the readers' value as members of society, nor to the literature's value in society, while the reading media should be freed from “bad - good” comparisons and characterisations and rather be viewed as different mechanisms to experience literature.

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# Appendices

## Appendix A: Ethics Approval

05/09/2022, 20:39

Email - Alexandri, Nikoletta (Postgraduate Researcher) - Outlook

**Ethics approval (reference FL19005) please quote this reference in all correspondence about this project**

FASS and LUMS Research Ethics <fass.lumsethics@lancaster.ac.uk>

Fri 04/10/2019 17:11

To: Alexandri, Nikoletta (Postgraduate Researcher) <n.alexandri@lancaster.ac.uk>

Cc: Fulop, Erika <e.fulop@lancaster.ac.uk>; Citron, Francesca <f.citron@lancaster.ac.uk>; Harper, Richard <r.harper@lancaster.ac.uk>

Dear Nikoletta

Thank you for submitting your application and additional information for *Literature in megabytes: the effect of new reading technologies on the emotional and cognitive responses to reading literature*. The information you provided has been reviewed by members of the Faculty of Arts and Social Sciences and Lancaster Management School Research Ethics Committee and I can confirm that approval has been granted for this project.

As principal investigator your responsibilities include:

- ensuring that (where applicable) all the necessary legal and regulatory requirements in order to conduct the research are met, and the necessary licenses and approvals have been obtained;
- reporting any ethics-related issues that occur during the course of the research or arising from the research (e.g. unforeseen ethical issues, complaints about the conduct of the research, adverse reactions such as extreme distress) to the Research Ethics Officer;
- submitting details of proposed substantive amendments to the protocol to the Research Ethics Officer for approval.

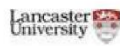
Please do not hesitate to contact me if you require further information about this.

Kind regards,

*Debbie*

**Debbie Knight**

Secretary, FASS-LUMS Research Ethics Committee [fass.lumsethics@lancaster.ac.uk](mailto:fass.lumsethics@lancaster.ac.uk) | Phone (01524) 592605 | A04 Bailrigg House, Lancaster University, LA1 4YT | Web: [FASS & LUMS Research Ethics Guidance & Application form](#)



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<https://outlook.office.com/mail/id/AAQkADJKYWZiYjM5LWFiYWUtnGE3OS1hNDQ4LTiMTBjY2RjY2ZhZQAQAKp93zgw60CSrWqc6QojsaE%3D> 1/1

## **Appendix B: Examples of participant information sheet, consent form and debrief sheets**

The below example of participant information sheet is for participants who read the fiction story in print. The only difference from the one used for participants who read non-fiction in print is that instead of “short stories”, the term “nonfiction essays” was used, and the title of the book and the author’s name were changed. The only difference between the information sheets given for the other device conditions is in the procedure section where different instructions are given (i.e., “I will send you a Kindle book via email, and for this reason, you will need to use the Kindle app in your device to access it (if you don’t have the app yet, you can download it for free following this link: <https://www.amazon.com/b?ie=UTF8&node=16571048011>). The book’s title is “Notes of a Native Son”, by James Baldwin. I will ask you to read only ONE of the essays contained in the book, titled “Notes of a Native Son” (pp. 87-118)” for the e-reader and tablet conditions, and “I will send you via email an mp3 file containing the audiobook” for the audiobook condition.

### **Participant Information Sheet**

I am a PhD student at Lancaster University and I would like to invite you to take part in a research study about the experience of reading short stories.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

#### **What is the study about?**

This study aims to investigate the experience of reading short stories. In particular, it aims to gain an understanding of people’s familiarity with short stories, their reactions to them, their comprehension levels and their overall attitudes.

#### **Why have I been invited?**

I have approached you because I am interested in studying the effects of reading short stories on the reading experience and attitudes of people of all ages, genders and backgrounds. I would be very grateful if you would agree to take part in this study.

#### **What will I be asked to do if I take part?**

If you decide to take part, this will involve the following: First, you will be asked to complete a questionnaire with general questions about your attitudes, your familiarity with literature and digital technologies. I will also ask you some personal questions such as your experiences, gender, age and ethnicity. After that, I will send you a book via post and for this reason only, I

will also need your home address. The book's title is "The Ways of White Folks", by Langston Hughes. I will ask you to read only the last story contained in the book, titled "Father and Son" (pp 207-254). Please read the story during your leisure time in a relaxed mode. You will not have to worry about reading fast or slow nor about searching for a specific meaning or deeply comprehending the text, just read it as you would read any other text during your leisure time. Don't worry if you get distracted or feel like having a break while reading if you want. Our aim is to reproduce your natural leisure reading process as much as possible. After reading the text, you will be asked to complete a second questionnaire, measuring a variety of attitudes and comprehension levels. Please do not go back to the text to search for the answers to the questions. Lastly, I will ask you to complete another questionnaire two weeks later. Again, you are asked to not go back to the story and reread it or search for the answers. All these activities will take about an hour and a half in total. After the end of the study, you will be free to keep the book.

**What are the possible benefits from taking part?**

Taking part in this study will allow you to have an interesting experience of reading an emotionally impactful short story about common societal problems. Also, if you take part in this study, your insights will contribute to our understanding of people's reading procedure and experience when being exposed to short stories.

**Do I have to take part?**

No. It's completely up to you to decide whether you will take part or not. Your participation is voluntary. In case you are a student, please bear in mind that this study will not affect your studies and the way you are assessed on your courses.

**What if I change my mind?**

If you change your mind, you are free to withdraw at any time before or during your participation in this study. If you want to withdraw, please let me know, and I will extract any information you contributed to the study and destroy them. However, you will not be able to withdraw your contribution two weeks after submitting the questionnaires because the data that can identify you will be deleted.

**What are the possible disadvantages and risks of taking part?**

Taking part in this study means that you will need to invest around 1.5 hours to read the text and answer the questions. Additionally, there is a small risk of getting emotional while reading

the text, as it deals with sensitive topics. The story might have points of view different from yours and/or offensive language and we don't necessarily agree with them or support them. If you feel you don't want to continue reading the short story, please feel free to withdraw from the study. If you feel the need of emotional support, you can refer to "The Samaritans" during or after the completion of the study. You can call "The Samaritans" for free at 116 123. Their call centre is available at any time. You can also send them an e-mail at [jo@samaritans.org](mailto:jo@samaritans.org).

**Will my data be identifiable?**

I will keep all personal information about you (e.g., your name and other information about you that can identify you) confidential, that is I will not share it with others. The data that can identify the participants will be deleted after the completion of the data analysis. Following the University guidelines, I will keep the anonymised data securely for a minimum of ten years.

**How will we use the information you have shared with us and what will happen to the results of the research study?**

I will use the information you have shared with me only in the following ways:

I will use it for research purposes only. This will include my PhD thesis and other publications, for example journal articles, book chapters or conference papers. My results will also be used to inform industries and/or institutes related to the subject of the research. Additionally, they might be disseminated with the funders of this study, namely the North West Consortium Doctoral Training Partnership and The Navigator Company, S.A. Lastly, I will share the findings via a data archive where other researchers, upon request, can have access to this data. Any results presented, published or shared will not lead to the identification of any participant.

**How will my data be stored?**

Your data will be stored in encrypted files (that is no-one other than me, the researcher, will be able to access them) and on password-protected computers. I will store hard copies of any data securely in locked cabinets in my office. I will keep data that can identify you separately from non-personal information (e.g., your views on a specific topic). Following the University guidelines, I will keep the data securely for a minimum of ten years.

**What if I have a question or concern?**

If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself: Nikoletta Alexandri. E-mail: [n.alexandri@lancaster.ac.uk](mailto:n.alexandri@lancaster.ac.uk). Address: Lancaster University, Languages and Cultures, Confucius

Institute, LA1 4YW, Lancaster University or my main supervisor: Erika Fülöp, Tel: 01524 594068. E-mail: e.fulop@lancaster.ac.uk. Address: Lancaster University, Languages and Cultures, County Main, LA1 4YW, Lancaster. If you have any concerns or complaints that you wish to discuss with a person who is not involved in the research, you can also contact: Derek Hird, Tel: 01524 594684, E-mail: d.hird@lancaster.ac.uk. Address: Lancaster University, County Main, Office: B138. LA1 4YF, Lancaster.

This study has been reviewed and approved by the Faculty of Arts and Social Sciences and Lancaster Management School's Research Ethics Committee.

Thank you for considering your participation in this project.

## Consent form

Please click all the boxes below to continue

- I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
- I understand that my participation is voluntary and that I am free to withdraw without giving any reason within two weeks after submitting the questionnaires. In that case, my data will be removed.
- I understand that any information given by me may be used in future reports, academic articles, publications or presentations by the researcher/s, but my personal information will not be included and I will not be identifiable.
- I understand that data will be protected on encrypted devices and kept secure.
- I understand that the personal data will be destroyed after the completion of the data analysis. I also understand that the anonymised data will be for a minimum of 10 years after the end of the study, following the University guidelines.
- I agree to take part in the above study.

## **Study debriefing sheet**

I would like to thank you for your participation in this study. Your contribution has been invaluable for the realisation of my research.

This study is concerned with the effects of digital media on empathic reactions when reading literary texts. In particular, it compares print books, e-readers, tablets and audiobooks. Furthermore, it takes into consideration the feeling of immersion into the story, comprehension, personality traits and personal experiences, to explore in depth these effects. Previous research found that reading literature increases people's empathy and this is stronger when the readers are getting immersed in the story (Mangen & van der Weel, 2016 for a review). Until now though, there has not been any research that compares the aforementioned four devices and this is the main goal of this study.

### **How was this tested?**

In this study, you were asked to complete 3 questionnaires. The first one measures your trait empathy, i.e., how empathic person you are in general and other factors that might influence the effects of media. Then you were asked to read/ listen to one story. In the meantime, other participants read/listened to the story using other media. This way, I can compare the effects of the media on empathy between the participants.

The second questionnaire measures again your empathy, to compare your level of empathy before and after your exposure to the text. It also measures your level of immersion into the story-world and it checks if other factors influenced the effects of media, such as distraction and comprehension. Lastly, I want to investigate whether these potential effects are long-lasting. Thus, you were asked two weeks after reading/ listening to the text to complete the empathy scale again as well as your comprehension.

### **Why is this important to study?**

The feeling of being immersed in a story is one of the main reasons we enjoy reading for leisure. Nowadays, many question whether the new reading technologies might influence the reading experience due to their different ergonomics, the level of distraction they might bring or the eye-strain they might cause. These questions are still very much open and empirical studies should be carried out.

### **What if I want to know more?**

You can check the relevant literature below:

Mangen, A. & van der Weel, A. (2016) The evolution of reading in the age of digitization: an integrative framework for reading research. *Literacy*, 50(3), 116-124. Doi: 10.1111/lit.12086.

Mangen, A., & Kuiken, D. (2014). Lost in an iPad. Narrative engagement on paper and tablet. *Scientific Study of Literature*, 4:2, 150-177. Doi: 10.1075/ssol.4.2.02man.

If you want to know more or you have any concerns, you can contact me at [n.alexandri@lancaster.ac.uk](mailto:n.alexandri@lancaster.ac.uk). If you want to discuss any concern with a person who is not involved in the research, you can also contact: Derek Hird, Tel: 01524 594684, E-mail: [d.hird@lancaster.ac.uk](mailto:d.hird@lancaster.ac.uk).

**Thank you again for your participation.**



## Appendix C: Comprehension questions

### I. Comprehension questions used for the fiction condition:

(questions 5, 7,8 and 10 were deleted from the analysis)

1. Why did Colonel Norwood send Cora's kids to college?
  - Because he believed that they should get education in order to have a better future
  - Because they were a reminder of his relationship with Cora
  - Because the kids asked him to
2. How long was Bert away from the plantation?
  - 4 years
  - 5 years
  - 6 years
3. How old was Bert when he came back?
  - 18
  - 20
  - 22
4. Why was Willie killed?
  - Because the White people believed that he helped his brother with their father's murder
  - Because he fled from the plantation
  - Because they wanted to lynch someone alive
5. What do you think Bert was trying to achieve?
  - To be recognised as Norwood's son
  - To own the plantation
  - To free the Black people
6. When did Willie understand that "trouble is coming"?

- When Colonel Norwood didn't shake Bert's hand
  - When Bert denied working in the plantation
  - When he drove Bert back home
7. How many times did the author note that Cora was "washing plums"?
- 1
  - 2
  - 3
8. Who were the "yard-niggers" according to the story?
- Black women's children that were fathered by a White planter
  - Black servants that were not allowed to enter the house
  - Lazy Black servants who were not working efficiently
9. Why do you think Colonel Norwood didn't shoot Bert?
- Because he needed Bert to work in the plantation
  - Because he felt a bond with Bert
  - Because he was afraid of the repercussions
10. Which place weren't the Black people allowed to use?
- The front door
  - The library
  - Both
11. Put Cora's children in the correct order based on their age (1 for the oldest, 4 for the youngest)
- Willie
  - Sallie
  - Bert
  - Bertha

12. Put the events that took place in the story into the correct order (the oldest at the top)

- Colonel Norwood meets Bert coming back from the river
- The doctor and the undertakers take Colonel's body away
- Bert kills himself
- Bert goes to buy stamps
- Colonel Norwood and Bert meet in the house parlour
- Bert offers his hand to Colonel Norwood
- Bert arrives at the plantation from the railway station
- Willie is hung
- Cora prepared a hiding place for Bert
- Sallie goes back to school
- Willie is sent to the railway station
- The undertakers meet Cora
- Bert is hung
- Bert kills Colonel Norwood
- Colonel Norwood asks Cora to fetch Bert home from Willie's cabin.

II. Comprehension questions used for the non-fiction condition:

1. What happened a few hours after the author's father died?
  - His last child was born
  - A race riot broke out in New Jersey
  - A race riot broke out in Detroit
2. Who was of the first generation of free men?
  - The author's father
  - The author
  - The author's grandmother
3. Why did the author's father move out from New Orleans?
  - Because it was a wicked city
  - Because he was humiliated for his blackness
  - Because he couldn't establish contact with other people in the city
4. What was the father's relationship with his kids?
  - He had never tried to bond with them
  - He had tried to be a caring father but without success
  - He was indifferent towards his kids
5. How many siblings did the author have?
  - Nine
  - Eight
  - Seven
6. How did the author's father treat the white people visiting their house?
  - With uncharitable asperity
  - With vindictive politeness
  - With paranoid accusations

7. How old was the author when he went to the theatre with his teacher?
- Around nine or ten
  - Around thirteen or fourteen
  - Around six or seven
8. Why was the whiteness of the teacher important for the author to go to the theatre?
- Because the author did not discourage her as he would have done if she had been Black
  - Because the teacher would pay for the trip to the theatre
  - Because the author wouldn't be attacked on the way to the theatre
9. How many times was the author fired when he was living in New Jersey?
- Three times
  - Two times
  - Four times
10. What was the profession of the author's father?
- Musician
  - Politician
  - Minister
11. in which year did the author's father die?
- 1943
  - 1944
  - 1945
12. What was the sex of the author's youngest sibling?
- Female
  - Male
  - Not mentioned

13. Where was the author's father born?
- New Orleans
  - New York
  - New Jersey
14. How was the author reacting when there was an argument with his father?
- Aggression
  - Silence
  - Violence
15. What mental issue did the author's father have?
- Bipolar disorder
  - Paranoia
  - Depression
16. Why did the author feel that his life was in danger?
- Because he was chased by the police
  - Because of the hatred he carried
  - Because he was afraid he will be murdered
17. What other event shared the same date as the funeral of the author's father?
- The author's nineteenth birthday
  - The author's eighteenth birthday
  - The author's twentieth birthday
18. Put the events in the correct chronological order based on the author's life events (the oldest at the top)
- The author visits his father at the hospital
  - The author goes to a glamorous restaurant
  - The author goes back home for his father's imminent death

- A Black soldier and a White policeman get into a fight
- The author's father dies
- The author goes to the theatre with his teacher
- A race riot breaks out in Harlem
- The author is fired from his job
- The author's youngest sibling is born
- The author goes to see a movie with a friend
- The author throws a glass towards a waitress
- The funeral of the author's father takes place
- The author and his friend go to a diner called "American Diner"

## Appendix D: Examples of R Syntax for GCA

### I. The effect of text on empathy:

```
#effect of text on empathy change from baseline level to immediately
after reading:
library(lme4)
library(lmerTest)

data_t0_t1<-read.csv("all_data_t0_t1.csv")

#all the models allow individual participants
#to vary randomly on the intercept (random effect on intercept):

#base model including only the effect of time:

m.base_t0_t1<- lmer(empathy~time +(1|id), data= data_all_t0_t1,
REML=F)

#I then add the fixed effect of text on the intercept:

m.0_t0_t1<-lmer(empathy~time+text+(1|id), data=data_all_t0_t1, REML=F)

#Lastly, I add the fixed effect of text on the linear slope term:

m.1_t0_t1<-lmer(empathy~time*text + (1|id), data= data_all_t0_t1,
REML=F)

#compare these 3 models:
anova(m.base_t0_t1, m.0_t0_t1, m.1_t0_t1)
## Data: data_all_t0_t1
## Models:
## m.base_t0_t1: empathy ~ time + (1 | id)
## m.0_t0_t1: empathy ~ time + text + (1 | id)
## m.1_t0_t1: empathy ~ time * text + (1 | id)
##          npar    AIC    BIC logLik deviance  Chisq Df
Pr(>Chisq)
## m.base_t0_t1    4 9702.2 9723.1 -4847.1   9694.2
## m.0_t0_t1      5 9702.8 9729.0 -4846.4   9692.8  1.4189  1
0.2336
## m.1_t0_t1      6 9685.0 9716.4 -4836.5   9673.0 19.8181  1
8.517e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#the model with best fit included the effect of text on the slope:
# When text on slope:  $\chi^2 = 19.82$ ,  $p < .001$ 

summary(m.1_t0_t1)
## Linear mixed model fit by maximum likelihood . t-tests use
Satterthwaite's method [
## lmerModLmerTest]
## Formula: empathy ~ time * text + (1 | id)
##   Data: data_all_t0_t1
##
##          AIC          BIC    logLik deviance df.resid
##   9685.0    9716.4  -4836.5   9673.0     1370
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -5.9451 -0.4092  0.0126  0.4143  5.2950
##
```



```

## Random effects:
## Groups Name Variance Std.Dev.
## id (Intercept) 80.92 8.995
## Residual 23.60 4.858
## Number of obs: 1376, groups: id, 688
##
## Fixed effects:
## Estimate Std. Error df t value Pr(>|t|)
## (Intercept) 93.0087 0.5512 860.3182 168.739 < 2e-16
***
## time -1.9506 0.3704 688.0000 -5.266 1.87e-07
***
## textnon-fiction -0.2994 0.7795 860.3182 -0.384 0.701
## time:textnon-fiction 2.3488 0.5238 688.0000 4.484 8.58e-06
***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr) time txtnn-
## time -0.336
## textnn-fctn -0.707 0.238
## tm:txtnn-fc 0.238 -0.707 -0.336
#While fiction decreased, non-fiction increased (b = 2.35, p < .001)

```

## II. The effect of device on empathy when reading fiction:

```
library(lme4)
library(lmerTest)
fdata_t0_t1<-read.csv("fdata_t0_t1.csv")
#create a base model with the fixed effect of time (t0 - t1), without
including the fixed effect of device. It allows individual
participants
#to vary randomly on the intercept (random effect on intercept)

m.base_t0_t1<- lmer(empathy~time +(1|id), data= fdata_t0_t1, REML=F)

#I then add the fixed effect of device on the intercept:

m.0_t0_t1<-lmer(empathy~time+device+(1|id), data=fdata_t0_t1, REML=F)

#Lastly, I add the fixed effect of device on the linear slope term:

m.1_t0_t1<-lmer(empathy~time*device + (1|id), data= fdata_t0_t1,
REML=F)

# I compare these 3 models:
anova(m.base_t0_t1, m.0_t0_t1, m.1_t0_t1)
## Data: fdata_t0_t1
## Models:
## m.base_t0_t1: empathy ~ time + (1 | id)
## m.0_t0_t1: empathy ~ time + device + (1 | id)
## m.1_t0_t1: empathy ~ time * device + (1 | id)
##          npar    AIC    BIC logLik deviance   Chisq Df
Pr(>Chisq)
## m.base_t0_t1      4 4725.0 4743.1 -2358.5   4717.0
## m.0_t0_t1         7 4729.4 4761.1 -2357.7   4715.4  1.5957  3
0.660370
## m.1_t0_t1        10 4723.8 4769.1 -2351.9   4703.8 11.6203  3
0.008804 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#The results indicate that adding a fixed effect of device on the
intercept did not improve model fit
#( $\chi^2(3) = 1.59$ ,  $p = .66$ ) and adding a fixed effect on device on the
slope
#did improve model fit ( $\chi^2(3) = 11.62$ ,  $p = .008$ ). In other words, the
four devices
#did not differ significantly at baseline empathy but they did differ
in the change of empathy (slope).

#detailed summary of m.1_t0_t1 model with parameter estimates and
standard errors:
summary(m.1_t0_t1)
## Linear mixed model fit by maximum likelihood . t-tests use
Satterthwaite's method [
## lmerModLmerTest]
## Formula: empathy ~ time * device + (1 | id)
##   Data: fdata_t0_t1
##
##          AIC          BIC    logLik deviance df.resid
##   4723.8    4769.1  -2351.9   4703.8      678
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.13801 -0.44120 -0.00621  0.45609  2.89084
##
```

```

## Random effects:
## Groups Name Variance Std.Dev.
## id (Intercept) 69.97 8.365
## Residual 18.75 4.330
## Number of obs: 688, groups: id, 344
##
## Fixed effects:
## Estimate Std. Error df t value Pr(>|t|)
## (Intercept) 91.6977 1.0157 424.1686 90.283 < 2e-16
***
## time -0.1163 0.6603 344.0000 -0.176 0.86032
## devicee-reader 0.7791 1.4364 424.1686 0.542 0.58784
## deviceprint 2.8023 1.4364 424.1686 1.951 0.05172 .
## devicetablet 1.6628 1.4364 424.1686 1.158 0.24766 .
## time:devicee-reader -1.7791 0.9338 344.0000 -1.905 0.05759 .
## time:deviceprint -2.7674 0.9338 344.0000 -2.964 0.00325
**
## time:devicetablet -2.7907 0.9338 344.0000 -2.988 0.00301
**
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr) time dvc-rd dvcprn dvctbl tm:dv- tm:dvcP
## time -0.325
## devicee-rdr -0.707 0.230
## deviceprint -0.707 0.230 0.500
## devicetablet -0.707 0.230 0.500 0.500
## tim:dvc-rdr 0.230 -0.707 -0.325 -0.163 -0.163
## tim:dvcprnt 0.230 -0.707 -0.163 -0.325 -0.163 0.500
## tim:dvctblt 0.230 -0.707 -0.163 -0.163 -0.325 0.500 0.500
#The intercept refers to audiobook intercept. Time refers to audiobook slope.
#time:deviceE-reader parameter refers to the e-reader slope relative to the audiobook slope (1.78 points stronger decrease)
#Time:devicePRINT parameter refers to the print book slope relative to the audiobook slope (-2.77 points stronger decrease)
#Time:deviceTABLET parameter refers to the tablet slope relative to the audiobook slope (-2.79 points stronger decrease)

#However, this summary does not give all the comparisons. For this reason, I am going to change the reference level and re-fit the model:
fdata_t0_t1$device <- as.factor(fdata_t0_t1$device)
fdata_t0_t1$deviceP<- relevel(fdata_t0_t1$device, "print")
m.1_t0_t1P<- lmer(empathy~time*deviceP + (1|id), data= fdata_t0_t1, REML=F)
summary(m.1_t0_t1P)
## Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: empathy ~ time * deviceP + (1 | id)
## Data: fdata_t0_t1
##
## AIC BIC logLik deviance df.resid
## 4723.8 4769.1 -2351.9 4703.8 678
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -3.13801 -0.44120 -0.00621 0.45609 2.89084
##
## Random effects:

```

```

## Groups Name Variance Std.Dev.
## id (Intercept) 69.97 8.365
## Residual 18.75 4.330
## Number of obs: 688, groups: id, 344
##
## Fixed effects:
## Estimate Std. Error df t value
Pr(>|t|)
## (Intercept) 94.50000 1.01567 424.16864 93.042 < 2e-
16 ***
## time -2.88372 0.66031 344.00001 -4.367 1.67e-
05 ***
## devicePaudiobook -2.80233 1.43637 424.16864 -1.951
0.05172 .
## devicePe-reader -2.02326 1.43637 424.16864 -1.409
0.15969
## devicePtablet -1.13953 1.43637 424.16864 -0.793
0.42802
## time:devicePaudiobook 2.76744 0.93382 344.00001 2.964
0.00325 **
## time:devicePe-reader 0.98837 0.93382 344.00001 1.058
0.29061
## time:devicePtablet -0.02326 0.93382 344.00001 -0.025
0.98015
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
## (Intr) time dvcPdb dvcP-r dvcPtb tm:dvcPd tm:dP-
## time -0.325
## devicePadbk -0.707 0.230
## deviceP-rdr -0.707 0.230 0.500
## devicePtblt -0.707 0.230 0.500 0.500
## tm:dvcPdbk 0.230 -0.707 -0.325 -0.163 -0.163
## tm:dvcP-rdr 0.230 -0.707 -0.163 -0.325 -0.163 0.500
## tm:dvcPtblt 0.230 -0.707 -0.163 -0.163 -0.325 0.500 0.500

fdata_t0_t1$deviceER<- relevel(fdata_t0_t1$device, "e-reader")
m.1_t0_t1ER<- lmer(empathy~time*deviceER + (1|id), data= fdata_t0_t1,
REML=F)
summary(m.1_t0_t1ER)
## Linear mixed model fit by maximum likelihood . t-tests use
Satterthwaite's method [
## lmerModLmerTest]
## Formula: empathy ~ time * deviceER + (1 | id)
## Data: fdata_t0_t1
##
## AIC BIC logLik deviance df.resid
## 4723.8 4769.1 -2351.9 4703.8 678
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -3.13801 -0.44120 -0.00621 0.45609 2.89084
##
## Random effects:
## Groups Name Variance Std.Dev.
## id (Intercept) 69.97 8.365
## Residual 18.75 4.330
## Number of obs: 688, groups: id, 344
##
## Fixed effects:

```

```

##                                Estimate Std. Error      df t value
Pr(>|t|)
## (Intercept)                    92.4767      1.0157 424.1686  91.050 < 2e-
16 ***
## time                          -1.8953      0.6603 344.0000  -2.870
0.00435 **
## deviceERaudiobook             -0.7791      1.4364 424.1686  -0.542
0.58784
## deviceERprnt                   2.0233      1.4364 424.1686   1.409
0.15969
## deviceERtablet                 0.8837      1.4364 424.1686   0.615
0.53872
## time:deviceERaudiobook         1.7791      0.9338 344.0000   1.905
0.05759 .
## time:deviceERprnt              -0.9884      0.9338 344.0000  -1.058
0.29061
## time:deviceERtablet            -1.0116      0.9338 344.0000  -1.083
0.27943
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) time   dvcERd dvcERp dvcERT tm:dvcERd tm:dvcERp
## time          -0.325
## deviceERdbk   -0.707  0.230
## deviceERprnt -0.707  0.230  0.500
## deviceERtblt -0.707  0.230  0.500  0.500
## tm:dvcERdbk   0.230 -0.707 -0.325 -0.163 -0.163
## tm:dvcERprn  0.230 -0.707 -0.163 -0.325 -0.163  0.500
## tm:dvcERTbl  0.230 -0.707 -0.163 -0.163 -0.325  0.500      0.500

fdata_t0_t1$deviceT<- relevel(fdata_t0_t1$device, "tablet")
m.1_t0_t1T<- lmer(empathy~time*deviceT + (1|id), data= fdata_t0_t1,
REML=F)
summary(m.1_t0_t1T)
## Linear mixed model fit by maximum likelihood . t-tests use
Satterthwaite's method [
## lmerModLmerTest]
## Formula: empathy ~ time * deviceT + (1 | id)
## Data: fdata_t0_t1
##
##          AIC          BIC    logLik deviance df.resid
##    4723.8    4769.1  -2351.9   4703.8     678
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.13801 -0.44120 -0.00621  0.45609  2.89084
##
## Random effects:
## Groups   Name              Variance Std.Dev.
## id      (Intercept)  69.97     8.365
## Residual                18.75     4.330
## Number of obs: 688, groups: id, 344
##
## Fixed effects:
##                                Estimate Std. Error      df t value
Pr(>|t|)
## (Intercept)                    93.36047      1.01567 424.16864  91.920 < 2e-
16 ***
## time                          -2.90698      0.66031 344.00001  -4.402 1.43e-
05 ***

```

```

## deviceTaudiobook      -1.66279      1.43637 424.16864 -1.158
0.24766
## deviceTe-reader      -0.88372      1.43637 424.16864 -0.615
0.53872
## deviceTprnt          1.13953      1.43637 424.16864  0.793
0.42802
## time:deviceTaudiobook  2.79070      0.93382 344.00001  2.988
0.00301 **
## time:deviceTe-reader  1.01163      0.93382 344.00001  1.083
0.27943
## time:deviceTprnt      0.02326      0.93382 344.00001  0.025
0.98015
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) time    dvcTdb dvcT-r dvcTpr tm:dvcTd tm:dT-
## time          -0.325
## deviceTadbk  -0.707  0.230
## deviceT-rdr  -0.707  0.230  0.500
## deviceTprnt  -0.707  0.230  0.500  0.500
## tm:dvcTdbk   0.230 -0.707 -0.325 -0.163 -0.163
## tm:dvcT-rdr  0.230 -0.707 -0.163 -0.325 -0.163  0.500
## tm:dvcTprnt  0.230 -0.707 -0.163 -0.163 -0.325  0.500  0.500

```