

Fiction as Autobiography: Characterizing the Phenomenology  
and Functions of Memories of Narrative Fiction

by

Brenda Wei Yang

Department of Psychology and Neuroscience  
Duke University

Date: March 19, 2021

Approved:

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Elizabeth J. Marsh, Supervisor

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Felipe De Brigard

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Mark R. Leary

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David C. Rubin

Dissertation submitted in partial fulfillment of  
the requirements for the degree of Doctor  
of Philosophy in the Department of  
Psychology and Neuroscience in the Graduate School  
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2021

ABSTRACT

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## Abstract

People expend a great deal of time and energy telling each other stories of events that are known to be invented. These fictional narratives—emerging from novels, films, television shows, radio dramas, and other media—can nevertheless leave an impact once a book’s cover is closed or the theater lights toggle on. This dissertation characterizes *memories of fiction*, a phenomenon both commonplace and understudied within empirical psychology. Not only is characterizing this behavior valuable in its own right, understanding how people remember and recruit memories of fiction also holds theoretical implications: any theory of memory which does not allow or account for how and why people recollect and use memories of events they know to be fiction is incomplete.

In Chapter 1, I knit together the theoretical precedent from prior work in autobiographical memory, mental models, and more, for considering memories of fiction as part of the “autobiographical record.” In subsequent chapters and across six studies, I examine the assumptions of this claim empirically. In Chapters 2 through 4, I characterize the subjective experience and function of memories of fiction by adapting established measures of autobiographical remembering across four studies, such as the Autobiographical Memory Questionnaire (AMQ), Centrality of Event (CES) scale, and Talking About Life Experiences (TALE) questionnaire (Berntsen & Rubin, 2006; Bluck et al., 2005; Rubin et al., 2003). I find that people readily ascribe phenomenological vivacity and functional significance to memories of fiction, and that these reports follow the same patterns as reports of memories of lived experience. On average, memories of fiction are less vivid and significant than personal memories, but not as a hard-and-fast-rule. Thus, these first four

chapters provide evidence for claiming that the differences between memories of fiction and memories of lived experience are of degree, rather than kind. Chapter 5 (Studies 5 and 6) explore the extent to which memories from works of fiction are recruited to fulfill similar directive functions as autobiographical memories, especially in the absence of lived experience. Chapter 6 concludes by summarizing this body of work and a discussion of notable differences between memories of fiction and lived experience.

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This dissertation was written on Indigenous land traditionally home to peoples speaking three language families—Eastern Siouan, Algonquian, and Iroquoian—and tribes including the Eno and the Occaneechi. North Carolina today is home to 8 tribes and 4 urban Indian organizations. As of writing, the Occaneechi Band of the Saponi Nation (OBSN) is working to buy back and build on a portion of its ancestral lands in NE Alamance County.

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# Chapter 1. Fiction as Autobiography: Introduction and Theoretical Background

“For surely it is a magical thing for a handful of words, artfully arranged, to stop time. To conjure a place, a person, a situation, in all its specificity and dimensions. To affect us and alter us, as profoundly as real people and things do.”

— Jhumpa Lahiri

Allen Newall famously offered a prescription to the field of experimental psychology: to analyze real tasks in order to gain understanding of a “complex slab of human behavior” (Newell, 1973; Berntsen & Rubin, 2012, p. 12). For others, this slab has been mental multiplication (Dansereau, 1969), the game of Go (Silver et al., 2016), or autobiographical memory (Berntsen & Rubin, 2012). In the present dissertation, it is the phenomenon of remembering works of narrative fiction, broadly including novels, short stories, films, and television shows.

As an illustrative example of the phenomenon at hand, consider the Jorge Borges short story “Funes el Memorioso,” which describes the eponymous main character who can remember all things perfectly: “He knew the forms of the clouds in the southern sky on the morning of April 30, 1882, and he could compare them in his memory with the veins in the marbled binding of a book he had seen only once” (Borges, 2006). The narrator is racing a storm on horseback with his cousin when he first sees Ireneo Funes, who made an impression on the narrator by giving the time without a reference:

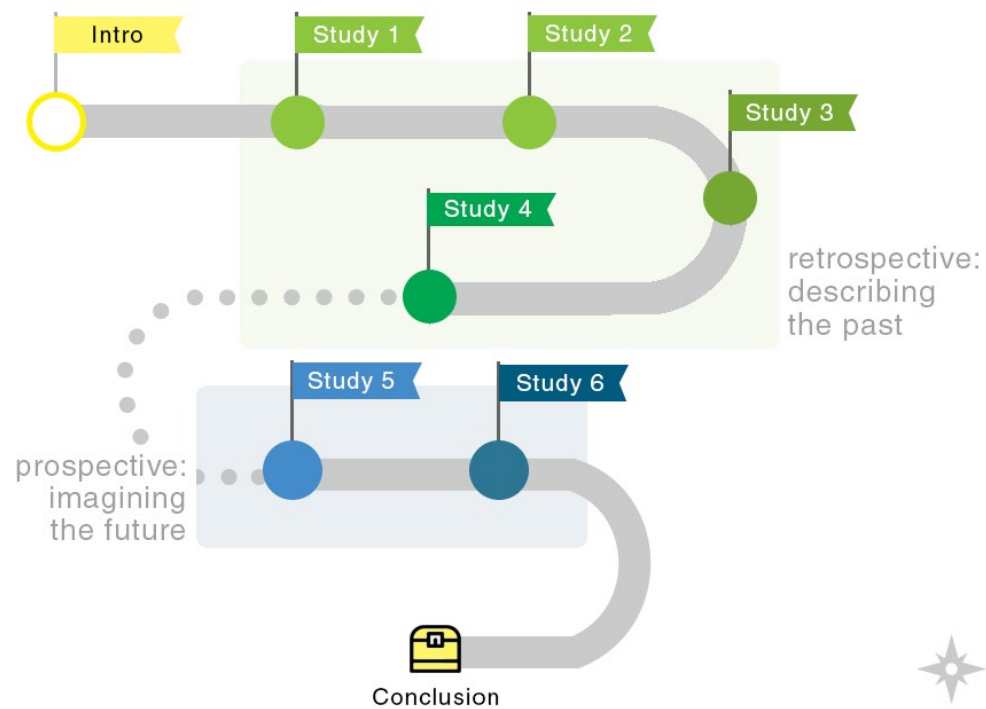
“After a sultry day, an enormous slate-gray storm had obscured the sky... We rode into a narrow lane which wound down between two enormously high brick footpaths. It had grown black of a sudden... I raised my eyes and saw a boy running along the narrow, cracked path... I remember the loose trousers, tight at the bottom, the hemp sandals; I remember the cigarette in the hard visage, standing out

against the by now limitless darkness. Bernardo unexpectedly yelled to him: 'What's the time, Ireneo?' Without looking up, without stopping, Ireneo replied, 'In ten minutes it will be eight o'clock, child Bernardo Juan Francisco.' The voice was sharp, mocking" (p. 108).

As the story proceeds, this trick of memory is revealed to be more of a curse than a gift:

Funes cannot understand abstraction. For example, while he could recall an entire day of his life precisely, this process of remembering would take another whole day.

This short story is a favorite among cognitive scientists. It is cited by articles and books communicating scientific concepts (Lombrozo, 2015; Quiroga, 2012) as well as peer-reviewed journal articles, including in *Science* and *Nature Neuroscience* (Chen et al., 2017; Izquierdo & Cammarota, 2004). "Funes el Memorioso," like other works of fiction, can serve as entertainment and diversion. It can also do a great deal more: it is used to make a point about the function of forgetting, it is a simulation that offers an understanding of the nature of memory, and it engages the reader differently than an expository argument with similar content. Like virtually all stories, it utilizes characters, briefly sketched here but vividly realized ("the cigarette in the hard visage"), moving through spatial contexts. And source confusion is unlikely in this example: the story is difficult to mistake for reality. The process of understanding, remembering, and discussing this scene and story is the behavioral phenomenon I will investigate in this dissertation (**Figure 1**).



**Figure 1. Illustrated Outline of Dissertation Studies**

Consuming, thinking about, and talking about fiction consumes vast acres of our psychological landscape. In this first chapter, I point to what parts of the phenomenon have been explored and what remains uncharted, laying the foundation for the empirical studies described in subsequent chapters. Primarily, I describe the theoretical precedent for considering memories of fiction as part of the “autobiographical record.” In Chapter 2 (Studies 1 and 2) and Chapter 3 (Study 3), I examine the subjective experience and reported ecological functions of memories of fiction as they compare to memories from lived experience. In Chapter 4 (Study 4), I combine the insights of the previous chapters to investigate memories of fiction and lived experience from both childhood and recent experience, which points to a difference between personal memories and memories of fiction: the sources of the latter can be re-experienced at will. In Chapter 5 (Studies 5 and 6),

we move from the land of retrospection (characterizing the properties of memories participants retrieve, re-construct, and then report on) to that of prospection: constructing simulations of events that have not (yet) occurred. Autobiographical memories have a *directive* function: they help us make decisions about the future. In Chapter 5 we explore the extent to which memories from works of fiction are recruited to fulfill similar directive functions, especially in the absence of lived experience. Finally, as with any good adventure, we aim to return with a new understanding of the world at large; Chapter 6 consists of a conclusion and a discussion of where future explorations embark.

## **1.1 Motivation & Consequences of Fiction**

Why study fiction? For one, it is a pervasive human activity. Narrative media is a large part of people's day to day lives: 74% Americans have read a book in the past year (Perrin, 2018), 71% watch a movie once a week or more (Taylor, Funk, & Craighill, 2006), and as of April 2019, Netflix users watch a cumulative 165 million hours daily (Iqbal, 2021). Works of fiction make headlines and create cultural moments. Universities devote buildings and departments to the scholarly analysis of literature, movies, television shows, and other forms of narrative art. Thus, studying engagement with fiction is of inherent interest and importance to psychology, a science concerned with describing and understanding all aspects of human behavior. Second, fiction is of particular relevance to memory researchers, as it is clear that people recollect works of fiction day to day, whether in conversation with others or in written form. Any theory of memory which does not allow or account for how and why people remember fictional events fails to capture key aspects of remembering. And third, reading fiction has downstream effects on learning, attitudes, and behavior in the real world. In other words, reading and watching fiction matters, and a full description of how

people read and remember fiction can contribute to understanding why. While a thorough review of the many ways fiction impacts people's lives is beyond the scope of the present project, I present a survey here to give a flavor of this work and to motivate the topic more generally.

### ***1.1.1 People Learn from Fiction***

While the people, places, and events in fiction are frequently—by definition—invented, there is great overlap between what is true of the world and what is true in a work of fiction. For example, while reading “Funes el Memorioso,” the reader assumes that horses have four legs and run quickly, that storms involve water falling from the sky, that most people have normal memories, and so on. This brings up an interesting theoretical issue: how do people decide what information in a story is true in general versus what information is true only in the fictional world? Information in the former category might be incorporated into general knowledge, while the latter should be held apart. In general, work has shown that information learned in a story is partly incorporated into the knowledge base and partly compartmentalized (e.g., Potts & Peterson, 1985). People's knowledge base and fiction have a dialogical relationship: people leverage what they know in order to make sense of stories, and they can also learn information about the world from fictional narratives (Marsh et al., 2003; Marsh & Mullet, 2016; Rapp et al., 2014). Thus, educators across disciplines incorporate works of fiction into curricula, such as utilizing the feature film *GATTACA* to help teach genetics (Knippels, Severiens, & Klop, 2009) or using fictionalized historical diaries to bring history “to life” (Storey, 1982).

However, there is a dark side to learning from fiction. For example, novels have been used to teach secondary students about the Holocaust, which vary in how well they

serve this pedagogical role (Short, 1997). Some are commendable for their vivacity and accuracy in, for instance, describing the dire economic conditions in Germany preceding Hitler's rise to power. Others cultivate misconceptions either directly (e.g., depicting Jewish people in Germany as a highly religious group overall) or by omission (e.g., avoiding mention of the existence of extermination camps). Experimental research also supports the notion that works of fiction can result in learning both true and false information. In a series of studies, when true (e.g., Moscow is the capital of Russia) and false (e.g., the largest ocean is the Atlantic) statements were embedded into short stories, readers reproduced these facts on later tests of general knowledge (Marsh, 2004; Marsh & Fazio, 2006, 2007). Notably, this was true of both types of statements, meaning that while readers were more likely to answer Moscow correctly after reading the correct version of the story, they were also more likely to reproduce the false fact about the Atlantic Ocean. Interestingly, people are quite susceptible to falsehoods in both text and film even they know the correct answer (Butler, Zaromb, Lyle, & Roediger, 2009; Marsh, Butler, & Umanath, 2012).

### ***1.1.2 Media Can Shift How People View the World***

In addition to learning from fiction, media can also influence people's perspectives in subtle but significant ways. For example, people ranging from former first lady Michelle Obama to educators to popular psychology blogs have been quoted as saying "representation matters" (Hall, 2018; Jones, 2016; Thomas, 2016). This is the intuition that the people and situations seen in mass media shape how people view the real world. This idea has been examined at length in the communication literature: cultivation theory posits that the many hours people spend in front of their television and other forms of mass media will "cultivate" a view of the world that is skewed towards what is depicted on-screen, and

sometimes away from reality<sup>1</sup> (Morgan & Shanahan, 2010). This research finds that heavy viewers of television tend to have increased judgments about the prevalence of occupations such as doctors, lawyers, and scientists, as well as inflated estimates of divorce and murder rates (Gerbner, Gross, Morgan, & Signorielli, 1980; Shrum, Wyer, & O'Guinn, 1998). When people are made aware of their reliance on television as a source for such judgments, this difference between light and heavy viewers goes away, suggesting that people implicitly rely on the availability heuristic (Tversky & Kahneman, 1973). More recent work on this topic brings a more focused approach in examining the relationship between TV consumption and attitudes. One study finds a relationship between the number of the medical drama *Grey's Anatomy* episodes seen and evaluations of doctor courageousness, as mediated by judgments of *Grey's Anatomy's* credibility; judgments of doctor courageousness were also related to patient's satisfaction with their own physicians (Quick, 2009). Overall, cultivation effects appear to be small but consistent, with meta-analyses estimating an average effect size of 0.10 (Morgan & Shanahan, 1997; Shanahan & Morgan, 1999, p. Ch. 6).

One criticism of cultivation theory research is that this work is often atheoretical, relying almost exclusively on survey methods to describe an effect without explaining why they may occur (Morgan & Shanahan, 2010; Potter, 1994). The availability heuristic (Tversky & Kahneman, 1973) is likely one explanation, but it cannot be the only one. People sometimes rely on information in fiction explicitly i.e., even when they know they are drawing on it. When researchers interviewed prison inmates in Belgium about what they

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<sup>1</sup> Because this research examines mass media as a system, such work necessarily includes fictional programs, as well as other media, such as local news, talk shows, and reality shows. While I argue in subsequent sections that the distinction between fiction and non-fiction is not a psychologically significant one, in the present survey, I will focus on studies that examine works of fiction in particular.

expected when they were first incarcerated, the inmates made explicit references to American movies and TV shows in describing what they had imagined prison would look like (Van den Bulck & Vandebosch, 2003). However, these expectations were often misleading. While prisons and jails depicted by Hollywood are based on older models where the surroundings appear industrial, inmates eat in a large cafeteria, and guards are harsh, prisons in Belgium are smaller, most inmates eat meals alone, and guards are unarmed and fairly accommodating. And although people knew these images were not only fictional, but based on a different legal system in a different country, they nevertheless drew on this information in forming expectations and decisions upon entering prison. This phenomenon is currently unaccounted for by current theories in the cultivation theory literature.

### ***1.1.3 Fiction Changes Behavior in The World***

While narratives can be persuasive in shifting people's beliefs and attitudes (Green, Strange, & Brock, 2003), can works of fiction shift the key decisions people make about their lives and families? A body of work inspired by Albert Bandura suggests yes. While Bandura's "bobo doll" experiments and his insight that people can learn complex behaviors through observation are well-known (social learning theory; Bandura, 1971), less discussed are his efforts to apply principles of his theory to produce and study effects of serial dramas (soap operas and episodic radio shows) in communities as diverse as Mexico, India, Tanzania, and China (Bandura, 2006). Such programs were designed to promote causes such as family planning (Rogers et al., 1999), HIV prevention (Vaughan, Rogers, Singhal, & Swlehe, 2000), egalitarian gender practices (Papa et al., 2000), women's access to education (Bandura, 2006), environmental sustainability (Bandura, 2002), and more. Many of the 75+ series were quite popular, airing at prime time and enjoying viewerships in the millions. Anecdotally, their



impacts were palpable. After a soap opera in Mexico ended with an epilogue where an actor informed the audience how to enroll in a national literacy program, 25,000 people went to the distribution center in Mexico City the next day to learn more. A radio drama in India with 25 million listeners depicted a mother challenging cultural norms in order to advocate for her daughter's education. Listeners of the program launched schools for young women, with teenage girls explaining, "When Taru [the daughter] and her mother can fight harsh circumstances, why can't we?" Explicit mention of plot points and characters from the dramas are well-evidenced when people explain the reasoning behind their choices. And while testing the efficacy of such programs can be difficult to quantify for logistical and ethical reasons (e.g., a true control group may not be defensible), some implementations allowed for natural experiments, which did demonstrate effects specific to watching or listening to these programs, as indicated by measures such as national surveys about attitudes, demographic information (e.g., fertility rates), and visits to clinics (Rogers et al., 1999).

This work in shifting people's behavior is evocative of fiction's potential impacts. While theories of observational learning can be applied generally to explain these effects, there remains an explanatory gap in understanding how soap operas can move people to challenge cultural norms or alter the size of one's family. In other clinical and applied settings, novels are "prescribed" to treat depression, and showed comparable effectiveness to other forms of therapy (bibliotherapy; Cuijpers, 1997). Elsewhere, reading groups are used to teach life and coping skills to prison inmates (Billington, 2011). The emphasis in these settings is to design something that works, not necessarily to describe how and why it does so; psychological theory for the effects of fiction are scarce.

## 1.2 Preview of Arguments

In the psychological sciences, people's engagement with fiction has been examined from many angles, including: how reading in general and literary fiction in particular contributes to the development of intelligence, how properties of narrative texts affect readers' downstream reports, the characteristics of subgroups of readers, fiction's persuasive impact, interactions between knowledge of real and fictional worlds, use in clinical settings, relationships between people and fictional characters or celebrities (i.e., parasocial interactions), the impact of genre in comprehension, and more<sup>2</sup>. However, few studies have examined memory for the events which occurred in works of fiction (*memories of fiction*) on their own terms. And while it has been suggested that such memories share important qualities with memory for the personal past (Magliano et al., 2012; Rubin & Umanath, 2015; Zwaan, 1994), memories of fiction have not been examined using the methodologies and measures offered by the field of autobiographical memory.

Here, I argue for the following: that memories of fiction are event memories which should be considered part of the autobiographical record. To preview, my argument begins with the point that there is not a fundamental psychological distinction between fiction and non-fiction, and that representations of both personal memories and fictional ones share a narrative format as well as neural substrates. Events of all kinds—whether constructed through experience, words on a page, or scenes on a screen—are comprehended and

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<sup>2</sup> Keyword searches were conducted using the psycINFO database using Boolean combinations of the terms narrative, fiction, literature, film, movie, television, narrative, event memory, and autobiographical memory e.g. (film OR movie OR television) AND fiction. Results were limited to empirical or quantitative studies, literature and systematic reviews, brain imaging studies, and experimental replications. Results that were classified in the humanities or as psychoanalytic theory were excluded. The nature of the search terms still yielded irrelevant studies (e.g. titles containing: "Fact or **fiction**?"), which were examined on a case by case basis.

remembered as mental models: abstract representations of characters, their internal states, and the contexts through which they move. Such mental models become the substance of event memories and autobiographical remembering.

### **1.3 Fictionality is Not a Deeply Coded Psychological Property**

My argument assumes that the incorporation of fictional events into autobiography is not hindered by a monitoring process. After all, there appears to be a critical difference between experienced and fictional events: we do not believe the events described in the work of fiction really happened. Indeed, foundational figures in the philosophy of fiction have maintained that fiction is processed differently from nonfiction (Currie, 1990; Walton, 1990). Others have argued that research into fiction and its potential impacts was neglected partly because fiction was assumed to be impotent, as real events seem to obviously overshadow invented ones (Busselle, Ryabovolova, & Wilson, 2004; Potter, 1986). Indeed, it is intuitive that whether something is fictional or not should matter: books come clearly labeled as fiction or nonfiction, films are either based on true events or not, and the true status of a story has consequences for action. For example, a documentary about tragic events might move the viewer to act (e.g., donate money), whereas this would not be possible for a fictional cause. Consider *A Million Little Pieces*, a book publicized as a memoir about recovery from drug use and the second highest-selling book of 2005. When it was revealed that the author “wholly fabricated or wildly embellished” details in the book, he received widespread condemnation and a blistering response from Oprah Winfrey, who had initially promoted the book (Kakutani, 2006). In this case and others, people cared deeply when a work labeled as fact was revealed to be even partly fictional. In this section, I consider the important question of whether fictionality has cognitive consequences, with an

eye to whether events have the potential to be partitioned away from one's autobiography by nature of their fictionality. In other words, do our psychological processes care about the distinction between fiction and nonfiction?

### ***1.3.1 Stylistic Conventions Are Not Enough***

The surface features of books and movies are one place to begin the search for a fiction vs. nonfiction distinction. Textbooks and novels are written differently, and feature films and documentaries have distinct editing patterns. However, these differences are insufficient. While certain conventions do often indicate books and films as fiction ("indices of fictionality"; Hamburger, 1968), they are not "obligatory, constant, and sufficiently exclusive" enough that they could not be applied to works of fiction as well (Genette, Ben-Ari, & McHale, 1990). In other words, there is enough overlap on any possible index of fictionality between works of fiction and nonfiction to make classification impossible. One reason this is true is that fiction and nonfiction borrow from each other. For example, a writer might produce a novel in the style of a first-person diary, mimicking characteristics of a memoir. Nonfiction writers can also mimic a novelistic style for dramatic effect and engagement. Examples of techniques borrowed from fiction by journalists in the last few decades include the use of dialogue, scene-by-scene description, and highlighting a "character's" point of view (Wolfe, 1975; Djikic et al., 2013). Thus, there is often more heterogeneity within the classifications of nonfiction and fiction than across this category distinction. John Searle wrote that "there is no textual property, syntactical or semantic, that will identify a text as a work of fiction" (1975), which is born out in modern analyses. Thus, there are not reliable signals in works of fiction that mark them as such for psychological processes to depend on.

### ***1.3.2 The Influence of Paratext***

Fortunately for consumers of media, works of fiction almost always come labeled as such. This enveloping information is the *paratext* and typically makes clear whether the events described really happened in the world or not. Broadly, the term paratext refers to information surrounding or near the work of fiction, such as the cover of the book or opening sequence of a movie (Genette, 1997). Presently, we are interested in paratext which signals the fictional nature of text, video, and even still images.

Do people process information differently when it is labeled as either fact or fiction? This would be consistent with the idea that our cognitive systems are sensitive to belief in whether an event occurred. This is evaluated experimentally by holding content constant while manipulating the label of fiction or nonfiction, and looking for subsequent differences in memory, persuasion, emotional responses, or other measures. Generally, I limit this overview to empirical work satisfying the criterion of controlling for content. To preview the conclusion, the empirical evidence on the question of paratext is very mixed. This lack of clarity is partly due to variation in the operationalization across experimental designs and theoretical frameworks. For example, some studies used text as stimuli, while others used video clips or photographs. Most of the text stimuli were narrative in nature, but some were expository. The length and overall quality of narrative stimuli also varied drastically, from stories just a few sentences long and generated by experimenters, to longer excerpts of award-winning novels. However, the general answer to whether paratext matters is, “Maybe a little bit, sometimes.” Finding an effect of framing content as either fiction or nonfiction is comparable to tracking a rare and possibly mythical creature: it is difficult to find and seems to appear only under a specific set of shifting circumstances. We examine studies looking for

effects of memory first, then persuasion and emotional responses. **Table 1** provides a summary of studies.

**Table 1. Published Studies Comparing the Effect of Paratext**

<b>Study</b>	<b>Stimulus Type</b>	<b>Primary Measures</b>	<b>Effect of paratext?</b>
Zwaan, 1994	Text: narrative	Reading and response times	Yes
McDaniel et al. 1994	Text: narrative	Reading time, free recall	No
Hendersen & Clark, 2007	Text: interviews	Free recall	Yes
Slater, 1990	Text	Persuasion (beliefs about social groups)	Some conditions
Murphy, 1998	Text: narrative	Persuasion (judgement of political situation)	Some conditions
Strange & Leung, 1999	Text: narrative	Persuasion (beliefs about education)	No
Green et al., 2006	Text: expository	Persuasion	No
Appel & Malečkar, 2012	Text: narrative	Persuasion (beliefs about the mentally ill)	No
Mendelson & Papacharissi, 2007	Photographs	Emotion	Some conditions
Goldstein, 2009	Audiovisual	Emotion ratings	No*
LaMarre & Landreville, 2009	Audiovisual	Emotion (disgust, guilt), Interest, engagement, quiz performance	Yes, guilt only
Sperduti et al., 2016	Video	Emotion ratings, physiology	Some conditions
Hartung et al., 2017	Text: narrative	Reading time, memory for events, appreciation	No

One foundational study examined the influence of paratext by labeling short narratives as either non-fiction or fiction (Zwaan, 1994). Specifically, instructions for the

respective conditions were, “These stories are all excerpts from news stories... These stories describe important events that happened during the 1980s. Please read these stories just like you would normally read a news story” and “The following text are all excerpts from novels by famous Dutch and other European literary authors. Please read these texts like you would normally read a novel.” In this study, people read slower when they thought they were reading literary texts relative to news stories. Moreover, people tended to have stronger surface form (i.e., verbatim) representations of text in the fiction condition, as measured by successful identification of sentences taken straight from the text, as opposed to close paraphrases, inferences, and distractors. There was also some evidence that readers represented causal information more strongly in nonfiction conditions. The authors suggest that readers may delay thematic interpretation of a text when it is perceived as indeterminate, which can be influenced by reader expectations: in reading a news article, irrelevant information should be quickly disregarded, but in a literary text, what is or is not relevant to the plot or themes is more ambiguous. This might push readers to maintain the less abstract surface form representations when the text is presented as literary.

Another study, reported in a conference proceeding but as of writing otherwise unpublished, showed that when interviews from an NPR feature were framed as people talking about jobs they really held versus imagining what it would be like if they did had that job (e.g., flight attendant, medicine woman), people’s retellings of these interviews were on average 1.5 times longer for the imagine (i.e., fiction) condition (Hendersen & Clark, 2007). This effect disappears when the designation of fiction or nonfiction is given after participants read the text, suggesting that the effect is not due to a shift in retelling strategies at retrieval, but perhaps a different process at encoding. This may offer additional support

for the idea that fictional processing may preserve more of the surface form of a text.

However, other work is mixed on whether paratext affects memory. For example, McDaniel and colleagues use Grimm's fairy tales to investigate different aspects of memory for narratives (McDaniel, Hines, Waddill, & Einstein, 1994). In one study, a fairy tale was edited to fit a more modern context, and great pains were taken to make the story appear to be part of a newspaper (McDaniel et al., 1994, Experiments 4a and 4b). McDaniel et al. went as far as to use the campus newspaper's production facility to typeset the story. When this newsy version of a fairy tale was compared to the classic one, there was no effect of the paratext manipulation on either reading time or patterns of free recall.

Does paratext affect persuasion? A body of work demonstrates that narratives overall can be highly persuasive i.e., effective at changing people's beliefs and attitudes on related topics (Green et al., 2003; Shen, Sheer, & Li, 2015; Appel, Gnambs, Richter, & Green, 2015). Here, we consider a related but distinct issue: are texts labeled as true more persuasive than ones labeled as fictional? In one study examining this question, participants read a longer narrative from the perspective of a character who is considering dropping out of high school (Strange & Leung, 1999). No differences were found as a function of framing the story as an excerpt from a news story versus a literary magazine on judgments related to the story, such as listing the common causes of high school failure and what policy makers should do to address issues in K-12 education. Another study framed a more expository text as either a speech given by a real person or a fictional character on television, and found both framings to be similarly persuasive, even when the topic was manipulated to be of high personal relevance to participants (Green, Garst, Brock, & Chung, 2006). This parity also holds when participants explicitly state that they expect factual texts to be more useful and



trustworthy (Appel & Malečkar, 2012). Additional work and theories corroborate the idea that paratext has little effect on persuasion (Genette et al., 1990; Mikkonen, 2006; Wheeler, Green, & Brock, 1999). Some studies suggest that individual differences may come into play. For instance, Green et al. found that participants who scored high in need for cognition<sup>3</sup> were sensitive to manipulations of argument strength such that they found strong arguments to be more persuasive, regardless of whether they were labeled as fact or fiction (Green et al., 2006). Participants who scored low in need for cognition, in contrast, were not sensitive to argument strength, suggesting that for at least some people, work labeled as fiction may be scrutinized less; this direction merits follow-up work and clarification.

Does paratext have an effect on emotional impact? One might intuit that real events—having truly occurred—should elicit stronger emotions than fictional ones. On the other hand, fictional events might allow for a “distancing” that allows the reader or viewer to more safely embrace certain emotions (Menninghaus et al., 2017). However, there is not strong evidence of differences in emotional response as a result of manipulating paratextual information. One study compared students who watched a documentary (*The Triumph of Evil*) or a feature film (*Hotel Rwanda*) about violence in Rwanda (LaMarre & Landreville, 2009). While these conclusions should be taken cautiously as the content varies between conditions, the authors found that participants who saw the documentary rated themselves as feeling slightly guiltier. However, the remaining measures of disgust, interest, engagement, and performance on a quiz did not differ. Two studies using video clips, one including

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<sup>3</sup> “Need” for cognition is an individual difference measuring the tendency for someone to engage in and enjoy thinking (Cacioppo & Petty, 1982). Participants high and low in need for cognition in Green et al. (2006) were determined using a median split.

physiological measures, failed to find consistent effects of paratext. In one of the studies, participants watched video clips from sad television shows framed as fictional or based on real events in addition to describing “the saddest thing” they could remember happening in their life (Goldstein, 2009). Remarkably, participants’ ratings on their emotional responses from their own life did not differ from ratings of video clips labeled as real or fictional, which in turn did not differ from each other. However, participants did report a higher level of anxiety for the sad autobiographical memory compared to the television clips.

These results are not definitive on the question of whether and how belief in the occurrence of events affects cognitive processing. One concern with many of these studies is that they may be manipulating the goals and purpose readers bring to the text or video, rather than precisely isolating the effects of believing whether an event occurred. For example, several experiments manipulate fiction vs. nonfiction by instructing the participant to read text as they might typically consume the news or a novel (e.g., Zwaan, 1994). In addition to changing belief in the events described, these manipulations are also likely to shift how readers process the text in other ways. For example, people often approach newspapers with the goal of gleaning information quickly and literary stories with the goal of processing and interpreting broader themes. However, expectations are distinct from the question of belief. These differing approaches in goals could explain, for instance, longer reading times for texts framed as literary, without truly relying on the fiction-nonfiction distinction. And while it might be difficult to disentangle reading (or watching) goals from the question of paratext, as people often do bring distinct goals to works of fiction and nonfiction, it is important to note that these constructs are distinct. For example, sometimes fiction can be read to learn about the world, and nonfiction can be read for diversion and

entertainment. It should also be noted that this issue is not necessarily a flaw in the design of the cited studies. The experiments described by Zwaan et al. purport to examine genre expectations, which they do, but do not offer strong evidence on the more specific question of fiction versus nonfiction.

One well-executed attempt was recently made to distinguish between the issue of fictionality as opposed to reader goals and expectations (Hartung, Hagoort, & Willems, 2017). The authors address potential issues of previous work by including: a manipulation of paratext that does not explicitly give readers' distinct goals between conditions, multiple dependent measures, high-quality literary stimuli, a convincing back story for both fiction and nonfiction conditions, and a large sample ( $n = 1,742$ ). In a compromise between using experimenter-generated texts (which can be manipulated and are novel to participants, but often lack literary qualities) and published works of fiction (which readers could be familiar with and may not be easily manipulated), Hartung et al. used narratives written for the study by a creative writer. The respective instructions for the nonfiction and fiction conditions were, "You are going to read a story about Martin Rombouts. He is a young Dutch columnist. He writes about his everyday life, always inspired by a real event" and "You are going to read a story from Martin Rombouts. He is a young Dutch writer. He writes short fictional stories that are inspired by his imagination." The fiction vs. nonfiction manipulation had no effect on any of the dependent measures, which included: reading time, degree of narrative immersion, appreciation, or performance in a memory task.

While one experiment does not close this question for further investigation, the mixed nature of previous results combined with the rigor of the research by Hartung et al. suggests that people's cognitive processes are not particularly sensitive to the question of

whether described events really happened in the world or not. It appears that the fiction-nonfiction distinction is not a deeply coded one.

While this finding may be counterintuitive, it becomes less surprising in the context of other research. Our cognitive systems are likely built, in a Spinozan fashion, on an assumption of truth, in that not believing a falsehood requires an active second step after initial belief (Asp et al., 2012; Gilbert, 1991). This can be applied to works of fiction as well, meaning that accepting fictional information as true is the default, in contrast to the lay conception that disbelief must “suspended.” Moreover, applying a more critical lens may run counter to the goals people bring to fiction, such as following the narrative, emotional involvement, and overall enjoyment. This is supported by work demonstrating that people are less likely to notice false notes if they are more transported into the narrative (Green & Brock, 2000).

Of course, the idea that paratext has very limited effects does not mean that “anything goes” in works of fiction: novels, movies, and television shows ring true in ways that do not necessarily have to do with literal correspondence to the real world. For example, some have argued that while fictionality does not affect the processing of narratives, people do attend carefully to the perceived realism of works of fiction and are quick to respond if the story feels false (Busselle & Bilandzic, 2008). Communication research has described a variety of judgments which contribute to *perceived realism*, such as plausibility (the extent to which an event could exist), probability (the frequency with which such events might occur), internal coherence (e.g., lack of inconsistencies), and more (Busselle et al., 2004). Other research has also found that people, beginning at a young age, distinguish between the perceived reality of characters versus that of events (Hawkins, 1977). Indeed, writers and

creators of fiction have long played with different notions of realism, with genres such as fantasy and science fiction working entirely within the realm of the impossible. However, within the context of wars in space and hobbits in holes, the relationships between characters tend to be realistic, with people responding to betrayal or frustration as one might expect. While a more thorough consideration of different notions of truth is beyond the present scope, it is clear that while consumers of fiction do not necessarily distinguish between fiction and nonfiction cognitively, they do attend to other, complex notions of truth and reality.

## **1.4 Narratives and Autobiography**

I have argued in the preceding section that while fiction and nonfiction may be useful labels for bookshelves, this boundary category is not psychologically privileged. However, a distinction that appears to be critical is the one between narrative and non-narrative. While this line is theoretically distinct from the division between fiction and non-fiction—a good history book often contains narrative and one could formulate even an instruction manual into a narrative if pressed to do so—most fiction does come in a narrative form, while much of nonfiction is more expository in nature. It is possible that people’s intuitions about deep differences between fiction and non-fiction are derived from the differences between narratives and non-narratives.

Jerome Bruner wrote, “A good story and a well-formed argument are different natural kinds” (1986, p. 11). For example, consider the logical proposition “If x, then y” compared to “The king died, and then the queen died.” Loosely, narratives involve an event or series of events linked in a causal structure, whereas exposition outlines an argument or explanation (Graesser, Millis, & Zwaan, 1997; Mar, 2004). This dichotomy laid out by

Bruner, among others, is supported by converging empirical evidence. One line of support comes from McDaniel and colleagues, who argue that properties of the text will tend to afford different types of processing. In particular, the material appropriate processing framework (MAP) distinguishes between propositional processing, which deals with individual ideas, and relational processing, which has to do with the relationships between ideas (McDaniel & Einstein, 1989). Both propositional and relational processing are part of successful text recall, but texts tend to encourage one type of processing more than the other. Support for this framework is found when encoding manipulations improve memory for certain types of text but not others, with the underlying logic being that if a text already affords relational processing, a manipulation that also draws attention to the relationships between ideas will not further improve performance. For example, having participants reorder sentences of a text is assumed to encourage relational processing, and reading a text with many of the letters missing (while maintaining legibility) encourages propositional processing. Because narratives already encourage holistic processing, a sentence reordering manipulation does not improve recall; however, presenting a fairy tale with missing letters does help (McDaniel, Einstein, Dunay, & Cobb, 1986; McDaniel et al., 1994). A reverse pattern is found for propositional text.

Other work directly compares expository versus narrative texts. One study examined narratives and essays, and used a “think-aloud” procedure in which participants verbalized thoughts and associations while reading (Narvaez, Van Den Broek, & Ruiz, 1999). These comments were recorded and coded into categories such as repetitions, predictions, evaluations (e.g., “I think that’s a strong assertion”), and associations (e.g., “This reminds me of a planetarium show I saw”). Narvaez et al. found that expository texts took participants

longer to read and elicited more of certain comments compared to narrative ones. Other work shows differences in how prior knowledge is integrated between narrative and expository formats (Wolfe & Mienko, 2007), and that there are neural differences in how these formats are processed (Baretta, Tomitch, MacNair, Lim, & Waldie, 2009). Narratives and non-narratives also show developmental differentiation. Comprehension and production of narrative tends to happen earlier (Berman & Katzenberger, 2004), and educators often need to take more explicit steps to teach students how to successfully comprehend and produce expository texts compared to narrative ones (Kucer, 2011).

#### ***1.4.1 Linking Fiction and Autobiography Through Narrative***

Young children recount past experiences in conversation in a narrative format, and they form strong emotional attachments to events and characters as young as two years of age (Alexander, Miller, & Hengst, 2001; Fivush & Fromhoff, 1988; Miller & Sperry, 1988; Eisenberg, 1985). The early development of narrative offers some evidence for the primacy of this format in everyday cognition, which can also be found in common experiences: we dream in stories, discuss our day with friends and loved ones in narratives, and consume news about the world in a narrative form. And when the credits roll on a movie or the last page of a novel is turned, we can feel as if we have experienced the events ourselves. One reason for this is that works of fiction and autobiographical memories share a common narrative format, one that is distinct from argument or logic-based representations, as argued above. This idea has been suggested by several psychologists (Brown, 1990; Bruner, 1991; Fivush, Fivush, & Haden, 2003; Sarbin, 1998) and pondered by scholars in the humanities (Arendt, 2013; Mitchell, 1981). Whether or not autobiographical memories are stored as narratives or constructed from component parts into a narrative when recalled,

autobiographical memory researchers have conceptualized people's memories of themselves as stories since the field's inception (Barclay, 1996; Rubin, 1996).

#### ***1.4.2 Do Memories of Fictional Events Follow Autobiographical Rules?***

Here, I peer down the other end of the telescope. If narrative formats are shared between memories of lived experiences and memories of fiction, then not only should insights from narratology be applicable to studying autobiographical memory (Neisser & Fivush, 1994; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; van den Broek, 1988), but the reverse should be true as well: memory of events from fiction should mimic patterns of autobiographical memory. While there are relatively few psychological studies examining memory for works of fiction, what does exist suggests that memories for fiction mirror autobiographical memory in at least two ways: events are organized according to similar cues, and a reminiscence bump emerges when remembering across the lifespan.

Autobiographical events can be organized by several indices, which include location (remembering the last visit to Disney World), person (the first time you met a significant other), and time (what happened last New Year's Eve). Prior research shows that although autobiographical memories may be organized into time periods (e.g., time in college) and people are more-or-less accurate when dating their own memories (Janssen, Chessa, & Murre, 2006; Rubin & Baddeley, 1989), time is generally a poor cue for memory retrieval because it is likely not stored directly in memory as a single code (Conway & Bekerian, 1987; Friedman, 1993; Larsen, Thompson, & Hansen, 1996). Rather, evidence suggests that temporal information is actively and repeatedly constructed by using other cues as constraints, such as details about the event (e.g., "It was definitely casual Friday because Divya was wearing jeans"), the people present (e.g., My aunt only visits me during the Lunar



New Year), or even the weather. Indeed, these kinds of inferences are reported when participants are probed about their strategies for dating personal memories (Friedman, 1993). A reconstructive theory of memory for time can also explain odd patterns of errors people tend to make, which would not be predicted if temporal information was stored directly and decayed linearly (Friedman & Wilkins, 1985). In one study, people were asked to estimate the time an earthquake had occurred 9 months prior (Friedman, 1987). While people were generally accurate to within 1 hour of when the earthquake happened when judging the time of day, they were nearly 2 months off on average when judging the month. This pattern of dramatically reduced accuracy at coarser time scales compared to narrower ones is typical of such scale effects, reflecting a sensitivity to cyclic information in inferring information about time. In the absence of such landmarks, there is generally poorer retention of temporal information in autobiographical memory compared to memory for people and places (Friedman, 1993, 2004), and recent work suggests the same pattern holds true for simulations of the future (D'Argembeau et al., 2014; Felipe De Brigard et al., 2020).

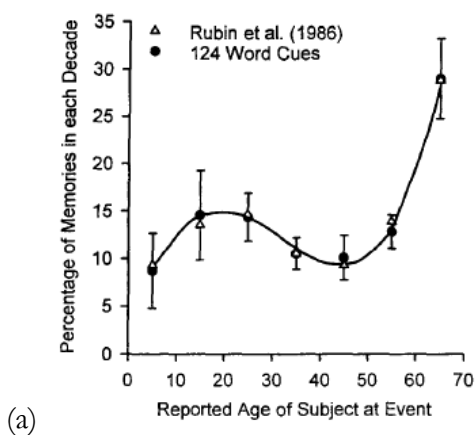
Is information about narrative organized similarly? One experiment directly pitted person and temporal characteristics against each other as organizational cues in memory. Taylor and Tversky designed stories in which character and time are symmetrical, and thus should a priori serve equally well as ways to index the events in the story (Taylor & Tversky, 1997, Experiment 1). People read vignettes (e.g., about a retirement home) organized by character or time. For example, the character-oriented story described each character's day in sequence (e.g. reading about Arnold's entire day, then about Marvin's and Jerry's), whereas temporally ordered stories described what all characters did at a given time (e.g., reading about what Arnold, Marvin, and Jerry all did in the morning before learning about

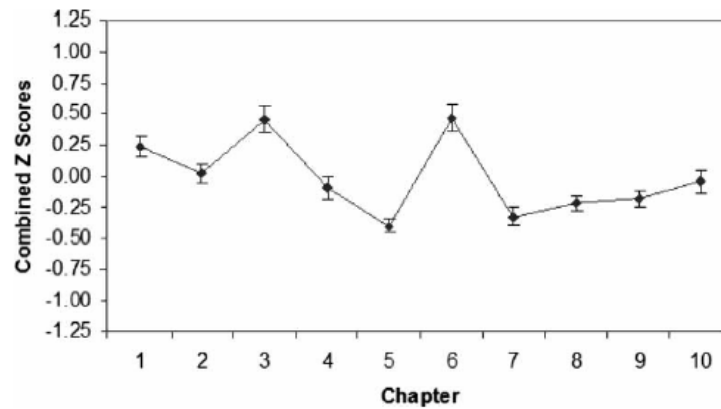
everyone's afternoons). Three data points suggest that participants prioritized the cues about people rather than time. One, it took longer for participants to read the temporally organized story compared to the character-oriented one. Two, when participants were asked in two tasks to indicate whether pairs of events were performed by same or different times or by the same or different characters, participants responded more quickly on the character-focused task. And three, when participants were asked to draw a diagram on a blank sheet of paper to represent the information they read, they tended to draw the diagrams organized by character, even if this meant remapping the temporally ordered story they read into a character based map.

Moving from recall cues, another pattern typical of autobiographical memory is the reminiscence bump (Rubin, Wetzler, & Nebes, 1986; Rubin & Schulkind, 1997; Rubin, Rahhal, & Poon, 1998). This robust phenomenon is found when older adults are asked to report important events from their life or to recall events based on neutral cue words (see Koppel & Berntsen (2015) and Koppel & Rubin (2016) for recent reviews). The typical shape of a reminiscence bump from lived experience is shown in the left panel of Figure 1, along with an effect of recency. Early explanations for this phenomenon included: the bump comes from forming one's identity (Conway, 2005), is the result of a peak in physiological and cognitive functioning (Rubin et al., 1998), is a function of novelty (Rubin et al., 1998), is a marker of life transitions (Conway & Haque, 1999), or is the result of using life scripts (Berntsen & Rubin, 2004).

Will people show a reminiscence bump when remembering a work of fiction? Note that, in addition to personal events, people also show a reminiscence bump for media consumed during adolescence, including music, television shows, books, and works of

fiction generally (Holbrook & Schindler, 1989; Janssen, Chessa, & Murre, 2007). However, the question currently at hand is distinct from this phenomenon. Rather than considering memory for specific works of fiction, we are considering how people will recall events from the life of a character. One experiment has examined this question, in which participants read *The Stone Diaries* by Carol Shields (Copeland, Radvansky, & Goodwin, 2009). Critically, the ten chapters of the novel proceed chronologically through a woman's life. A few days after reading the novel, participants completed a variety of memory tasks, which included summarizing the novel in a freeform way, recalling events in response to cued words or names, listing details from major events of the novel, and answering short answer questions. The results of collapsing and normalizing these memory measures are shown in the bottom panel of **Figure 2**.





(b)

**Figure 2. (a) Replication of the Reminiscence Bump (Rubin & Schulkind, 1997) (b) Events from the Novel *The Stone Diaries* (Copeland et al., 2009)**

Of note are two bumps in memory corresponding to Chapters 3 and 6, which refer to when the protagonist is about 20 years old (i.e., young adulthood, within the range of a classic reminiscence bump) and when the protagonist experiences a life transition around 50 years of age, respectively. The second bump is also consistent with the autobiographical memory literature, which shows that a “second bump” corresponding to major life transitions is sometimes seen (Conway & Haque, 1999)<sup>4</sup>.

In addition to revealing a similar pattern between memory for the experienced lifespan and a fictional story, this result is also interesting because it is not consistent with some of the explanations that have been offered for the reminiscence bump. It is unlikely this bump was due to identity formation, as participants were likely not incorporating the events of the novel they were reading for a study into their own identity. It is also unlikely to be the

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<sup>4</sup> The observant reader may note the recency effect in autobiographical memory is absent from narrative remembering. While this effect is interesting, the lack of a recency effect for the novel is far from damning. For one, some studies of autobiographical remembering also do not evince a recency effect, especially when participants are cued to retrieve important memories, rather than by words (Rubin & Schulkind, 1997) or when participants recall memories as a life narrative (Fromholt et al., 2003). There is a hint of a recency effect when only the results from the cued recall task were analyzed, which is the recall task most similar to the Galton word cueing technique used for autobiographical remembering. When collapsing across recall tasks, it is possible that such an effect was washed out.

result of physiological maturation. However, the life script explanation—that people recall details about important events in the narrative “script” of life—is consistent with the results here. Indeed, the authors note that participants tended to recall details from the protagonist’s life such as graduation from high school or marriage, but less from later chapters involving themes of hospitalization and death. This is in line with other findings in the autobiographical memory literature demonstrating no reminiscence bump for people’s recollection of negative life events (Berntsen & Rubin, 2004; Rubin & Berntsen, 2003). Thus, this is an instance where studying memory for fictional events can suggest evidence for theories of memory more broadly.

### ***1.4.3 Similar Neural Representations***

So far, we have discussed how fiction/nonfiction is not a key psychological distinction, while narrative/non-narrative is. Both memories of fiction and of lived experience share this narrative format, and memories of fiction follow similar rules. Another line of evidence supporting the idea that memories of fiction can be incorporated into the autobiographical record is based on neural similarities between consuming fiction and action and perception in the world. Seeking generalizable answers to questions about the mechanisms of perception, memory, and cognition, researchers in the neurosciences often use fictional stimuli as stand-ins for real life experience. For example, an episode from television’s *Curb Your Enthusiasm* was used as naturalistic stimuli to investigate how memory for events decays over weeks and months (Furman, Dorfman, Hasson, Davachi, & Dudai, 2007). Chen et al. (2017) used the pilot of TV drama *Sherlock* to examine how neural representations are shared between people and created an open dataset for subsequent explorations (e.g., Heusser et al., 2021); Nummenmaa et al. (2012) examined the synchrony

of emotion-processing using films *When Harry Met Sally* and *The Godfather*, and Yeshurun et al. (2017) utilized a J. D. Salinger short story to investigate how beliefs impact the interpretation of events.

Of course, the aim of these studies and more like them (e.g., Bartels & Zeki, 2004; Hasson, Ghazanfar, Galantucci, Garrod, & Keysers, 2012; Hasson, Nir, Levy, Fuhrmann, & Malach, 2004; Kauppi, Jääskeläinen, Sams, & Tohka, 2010; Koster-Hale & Saxe, 2013; Lahnakoski et al., 2012; Mobbs et al., 2006; Whittingstall, Bartels, Singh, Kwon, & Logothetis, 2010) is not a thorough description of Larry David sitcoms or feature films. Rather, the goal is to describe neural processes generalizable to the world at large. This assumption rests on a body of research demonstrating similarities in neural responses between fictional stimuli and perception and action in the world. One well-characterized phenomenon is that there are similar sensorimotor responses between reading or watching a stimulus and performing that action in the world. Classic neuroimaging work demonstrates that reading or hearing simple motor actions such as “kick” or “lick” elicits somatotopic responses in motor cortices (Hauk, Johnsrude, & Pulvermüller, 2004; Tettamanti et al., 2005). In one study (Aziz-Zadeh, Wilson, Rizzolatti, & Iacoboni, 2006), participants read or watched actions relating to the mouth, hand, and foot (e.g., “biting the banana”, “grasping the pen”, “pressing the car break”). Both reading and watching these phrases localized relevant somatotopic areas of interest in the premotor cortex. Recent and evolving work explores language processing at a cellular level, suggesting that motor and somatosensory neurons are involved in understanding sensory and motor actions encoded by verbs (Yang Y. et al., 2017). For a review of such findings in an embodied cognition framework, see Aziz-Zadeh & Damasio, 2008.

While analysis of neural responses to single verbs allows for reliable and relatively precise characterization of responses in the motor and premotor cortices, narratives show that responses to works of fiction can be similar to real world experience at higher levels of processing as well. For example, in one fMRI study, participants read excerpts from *One Boy's Day*, a novel which describes a 7-year-old boy's everyday activities in chunks, such as "Waking Up" and "Music Lesson." These excerpts were coded for dimensions of interest, including changes in characters' spatial locations, when characters initiate a new goal, and when characters interact with objects (Speer, Reynolds, Swallow, & Zacks, 2009). Composite maps time-locked to the dimensions were created from fMRI data of participants reading these narratives. Overall, they found that brain regions associated with, for example, grasping and somatosensory hand representations showed increased activation during parts of stories where characters were interacting with objects (e.g., "Raymond laid down his pencil"). Similarly, changes in characters' goals were associated with increased activity in areas of the temporal cortex previously associated with goal-directed actions, and reading about changes in spatial location were associated with changes in areas of the parahippocampal cortices otherwise related to spatial processing and navigation.

## **1.5 A Common Form of Representation: Mental Models**

To claim that memories of fiction constitute a meaningful part of the autobiographical record is to posit a common form of representation between fictional events and ones experienced in the world at large. In this section, I review research motivating and describing the powerful concept of mental models, also called situation models, which provides key principles for the nature of events both experienced and imagined (Johnson-Laird, 1983; Kintsch & Van Dijk, 1978). For the sake of consistency, I will use the more general term

mental model for the remainder of this document, although the terms situation model and event model (Richmond & Zacks, 2017) are often used to describe this idea as well.

### ***1.5.1 Motivation for And Definition of Mental Models***

Historically, the conceptual need for mental models arose from people's responses to text that could not be explained by memory for lower level features of the text itself. Early studies showed that people vary greatly in how often they misidentify (i.e., false alarm to) one pair of sentences compared to another, despite the sentence pairs being superficially very similar (Bransford, Barclay, & Franks, 1972). For example, people rarely mistake the following two sentences as the same:

“Three turtles rested beside a floating log, and a fish swam beneath them”  
“Three turtles rested beside a floating log, and a fish swam beneath it.”

However, people do frequently mistake the following pair:

“Three turtles rested on a floating log and a fish swam beneath them”  
“Three turtles rested on a floating log, and a fish swam beneath it.”

Because the pairs of sentences differ by only one word in each case (rested beside versus rested on), people's contrasting responses suggest a form of representation beyond the surface form or the text base (ideas of a text). Subsequent research provided accumulating evidence for the existence of this kind of mental representation, described the nature of such representations more precisely (Johnson-Laird, 1983; Kintsch & Van Dijk, 1978), and described mental models' major dimensions (Zwaan, Langston, & Graesser, 1995). This work frequently examined narratives, in part because reading narrative text was assumed to be similar to everyday experiences (Graesser, Singer, & Trabasso, 1994).

Today, most researchers agree that a mental model captures how an event is represented in the mind, and that the successful construction of a coherent mental model is



tantamount to successfully comprehending a text or event (Gernsbacher, Goldsmith, & Robertson, 1992; van der Schoot, Reijntjes, & van Lieshout, 2012; Zwaan et al., 1995). Mental models are an abstract representation of crucial relationships, likely having adaptive value despite their relatively high computational cost because such models have great predictive power (Richmond & Zacks, 2017). This is a critical function of an advanced nervous system. Ongoing work examines properties of the proposed dimensions of mental models, which include spatial layout, the protagonist, temporality, causality, and intentionality (e.g., the event-indexing model; Zwaan et al., 1995). I will pay particular attention to the dimensions of spatial layout and the protagonist (i.e., character or agent) here, because the former is well-delineated while raising interesting and relevant issues, and the latter is of particular concern for mental models from fictional sources.

### ***1.5.2 Spatial Dimensions***

Recent theory suggests that scene-making is essential to the construction of an event of any kind, whether experienced or imagined (Rubin et al., 2019; Rubin & Umanath, 2015). This brings to increased relevance how people construct and update spatial dimensions in mental models derived from text. Evidence that readers of a narrative can construct and access mental models containing spatial information comes from studies where participants internally represent locations not explicitly stated in the text. For example, participants in one classic study learned the map of a building shown in **Figure 3**, including the objects in each room (Morrow, Bower, & Greenspan, 1989). Then, they read a narrative written by the experimenters describing a character walking around the building layout they had previously learned. Critically, the text implied that the character walks through some rooms on the way from one location to another (e.g. laboratory to wash room) without explicitly mentioning

the middle room (the storage area). When the protagonist in the narrative has moved to the new room, participants are asked to determine whether two objects (e.g. LOCKERS and MIRROR) are in the same or different room, and reaction times are measured.



**Figure 3. Example of a Map Learned by Participants, with Dotted Path Added (Morrow et al., 1989)**

The key result here has been called the ‘distance effect’, in which participants’ reaction times to probes are a function of distance from where the character was located at that point in the story. In the example given above, participants responded fastest to objects in the wash room, where the character was located at that moment in the narrative. Critically, the next fastest response times were to objects in the storage area, which was never explicitly mentioned by the text. Objects in the laboratory or other, unrelated rooms were still slower. The study described above required that participants learned the building layout to criterion prior to reading the narrative text, which takes a substantive amount of time, between 30 to

45 minutes. However, readers can also construct these cognitive maps through narrative descriptions, which is closer to what occurs when people read works of fiction (Taylor & Tversky, 1992; Zwaan & Radvansky, 1998). Moreover, once such maps are constructed, they are divorced from the original perspective of the text, as shown by Taylor and Tversky (1992). They demonstrated that people form cognitive maps from either route (e.g., “You are walking down the path and see the art museum on the left...”) or survey (e.g., “The art museum is located west of the path...”) descriptions, but that once the mental representations are formed, they do not retain the original perspective of the text descriptions.

However, although spatial dimensions are some of the most thoroughly explored in the literature, evidence suggests that naturalistic reading typically does not result in detailed spatial maps. Intuitively, the experimental paradigms described above are not reflective of naturalistic reading, nor are the contrived narratives written by the experimenters reflective of published novels. When people who read *Chronicle of a Death Foretold*, a Gabriel García Márquez novella, were asked to draw a map of what events occurred, the resulting figures showed inconsistent spatial representations, with one person actually refusing to complete the task, explaining, “I never gave any thought at all to trying to place locations in relationship to one another” (Ryan, 2003). Experimentally, a body of work examines the extent to which some dimensions of mental models are generated spontaneously by readers, whereas others are used when the task specifically calls for it. Generally, while readers do spontaneously generate inferences about characters’ goals and what events lead to others (causality), people do not tend to automatically track spatial locations of objects unless the task specifically requires it (Zwaan & van Oostendorp, 1993; Gray-Wilson, Rinck,

McNamara, Bower, & Morrow, 1993; Graesser et al., 1994). Some work suggests that this might occur with age, such that younger adults tend to rely more on representations of the text base while eschewing mental models of the spatial layout, while older adults are more likely to use a constructed situation model (Stine-Morrow, Morrow, & Leno, 2002). Recent research is also consistent with the idea that whether or not spatial aspects are represented in a mental model is dependent on the instructions given to the reader and readers' goal in processing the narrative (Bailey, Kurby, Sargent, & Zacks, 2017). This difference between fictional narratives and everyday life may arise from situation demands: while one can read a novel quite well without constructing a spatial map, navigating the world requires understanding how to navigate one's house, or to drive from one place to another. Thus, one would predict that fictional contexts that require spatial knowledge (e.g., the James Bond video game *GoldenEye 007*, which requires navigating maze-like levels; a detective novel where positioning in a room is critical to solving the mystery) would be more likely to elicit distance effects.

Overall, there is ample evidence that people are capable of representing spatial information as a part of a mental model of a situation or event, although whether or not this happens is heavily dependent on context. Research into this topic remains an active one. However, if readers are inconsistently representing spatial information when reading narratives, what makes up people's mental models?

### **1.5.3 Character Dimensions**

People do not consume fiction because they find it thrilling to map out fictional spaces—people do it for the characters. This is borne out empirically: while people

inconsistently form mental maps of layouts in text, they spontaneously track the mental states of characters in complex ways, including their goals and emotions.

Initial evidence of this was found in the same set of experiments which also demonstrated the distance effect for spatial layouts (Morrow et al., 1989). As before, participants learned the layout shown in **Figure 3**, and read about a character strolling through said layout. However, the critical statements involved the protagonist being physically located in one room but thinking about another. When probed about objects in various rooms, as before, participants responded most quickly to objects in the room that was being thought about, rather than the room the participant was in, suggesting that they were tracking the thoughts of the character. More recently, the hypothesis that people track characters' thoughts when reading a narrative was tested in a more complex paradigm. In short, researchers nested a cognitive psychology experiment within a story, and found the predicted psychological effects that would be predicted for the characters in the story to be generally true for the reader (Gunraj, Upadhyay, Houghton, Westerman, & Klin, 2017). Specifically, Gunraj et al. nested a list-wise directing forgetting paradigm in the narrative (Bjork, 1970; Titz & Verhaeghen, 2010). In directed forgetting studies, participants study two (or more) lists of words. In the key "Forget" condition, after reading the first list of words, participants are told to disregard it, and that it will not be on the subsequent test. Then, they are exposed to the second list of words. Participants in the "Remember" condition are not given the instructions to forget the first list. Later, everyone is tested on both lists. The key result is that participants in the Forget condition show a cost for List 1 (the one they were told to disregard) and a benefit for List 2, relative to people in the Remember condition. In other words, people appear to have additional cognitive resources "left over" for List 2

without the burden of List 1. There are several theoretical mechanisms for the directed forgetting effect, which will not be discussed here (Sahakyan & Kelley, 2002; Wylie, Foxe, & Taylor, 2008).

The key question in Gunraj et al.'s study is whether readers will track a character's mental state well enough to mimic the respective costs and benefits to two lists. In one narrative, a protagonist plans to buy a list of items at one store (e.g., MIRROR, PENCIL, BOTTLE), then decides that such items are unnecessary luxuries. She then makes a new list of items (e.g., HONEY, COFFEE, LUNCH) to purchase at a different store. In the Remember condition, the protagonist buys both sets of items. A second narrative involves a character accidentally studying the wrong vocabulary list in the Forget condition; this story may mimic more closely a directed forgetting experiment in that it is a list of words to be memorized rather than items to be purchased. Across both narratives, a benefit in recall is seen for the second list of words for the Forget condition participants, relative to participants who read a narrative where the protagonist had to keep both lists in mind. Differences were not found with regard to the "cost" of List 1, which could be the result of this "secondhand" manipulation being weaker than the typical paradigm. However, the presence of a mnemonic benefit for List 2 provides compelling evidence that readers model the mental states of fictional characters in fairly complex ways.

An important class of mental states is emotions. On one hand, it is clear that works of fiction frequently evoke emotion in viewers, from exalted works of literature to the most predictable of genre fictions. Gerrig has referred to reactions from the reader or audience that arise as a result of being involved in the narrative *participatory responses* (Allbritton & Gerrig, 1991). A canonical example of a participatory response is a scene from a horror

movie: a shaky hand of the protagonist reaching for a door knob, the viewer knowing a horrible danger (a homicidal prison escapee, a ravenous ghoul, or the like) lies on the other side, resulting in the viewing feeling the urge to shout, “Don’t do it!” or “Watch out!” Experimentally, it has been demonstrated that the number of participatory responses elicited can be manipulated by altering the level of suspense in a story (Bezdek, Foy, & Gerrig, 2013), and that closer identification with characters tends to make events more suspenseful (Gerrig, 1993).

There is also significant evidence that people track the emotions of characters and respond in kind. Feeling participatory responses (dread about the door, frustration about the character’s obliviousness to a demon behind said door) is distinct from what the character may be feeling (mild curiosity about a shaking doorknob). This nesting of mental states is similar to false belief tasks, where people must distinguish between what is true of the world and what someone falsely believes (Wellman, Cross, & Watson, 2001). When texts and video clips are manipulated to imply one emotion, participants’ reading times slow for sentences that are incongruent with those implied emotions, suggesting that the characters’ emotions were part of the reader’s mental models (Gernsbacher et al., 1992; Töpper & Schwan, 2008; Vega, 1996). This kind of tracking seems to happen automatically during typical reading and movie-watching: in one study where one group of participants were instructed to empathize with the characters, researchers did not find differences between the instructions group and the people who did not receive any instructions (Komeda & Kusumi, 2006). When participants’ brain activity is monitored using fMRI, emotional content elicited activation in the ventromedial prefrontal cortex and the amygdala, and the types of inconsistencies in

emotional information elicited longer reading or verification times in earlier work engaged parts of the brain related to monitoring processes (Ferstl, Rinck, & Cramon, 2005).

#### ***1.5.4 Mental Models are Abstract***

A key assumption throughout this research is that the mental models derived from different media (text or video) and kinds of representation (perceived or imagined) use the same cognitive processes. There are 4 lines of evidence suggesting that mental models derived from these diverse sources are fundamentally the same. One is built on the assumption that these cognitive systems are parsimonious: why have separate systems when there could be just one? In considering evolutionary reasons why we even have the costly mechanism of mental models, Raymond and Zacks (2017) argue that mental models are powerful for predicting action in everyday life, which has enormous adaptive value. Being able to incorporate imagined or vicarious models into our personal predictions is likely a feature of the system. And since such processes could not have evolved for reading or the consumption of narrative fiction as we know it, it follows that the systems applied to narrative fiction are derived from ones designed for more general use (Boyd, 2009).

Second, experimental evidence strongly suggests that the mental models derived from prose-based and visual media are the same. A hint of this kind of agnosticism to medium was seen in work described above, where mental maps are similar whether constructed from survey or route descriptions (Taylor & Tversky, 1992). Other work has compared models derived from text, movies, pictures, or even video games (Gernsbacher, Varner, & Faust, 1990; Magliano, Miller, & Zwaan, 2001; Magliano, Radvansky, Forsythe, & Copeland, 2014; Radvansky & Copeland, 2006), and found that such models exhibit similar properties. Manipulations also affect cognition in similar ways across text reading and video



representation, and such convergence across media that bear few surface similarities (e.g., black text on a white page versus a feature film) is unlikely without assuming a more general structure.

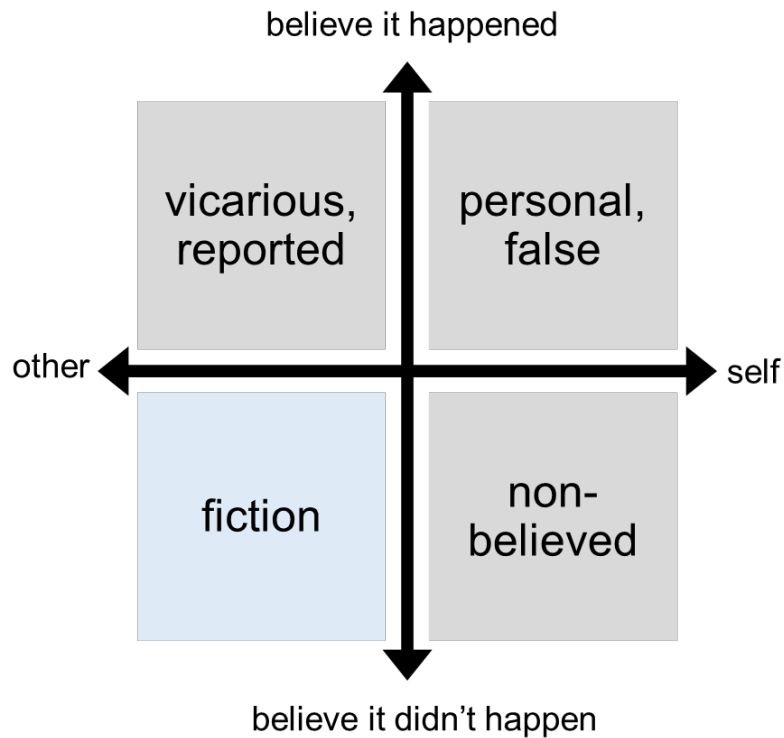
Third, there is evidence linking how well people can form mental models to actual performance of real-world tasks. This work provides a needed link between prose and audiovisual stimuli and experience in the world. There is a paucity of research utilizing the latter due to experimental intractability, but work with a population of mentally impaired older adults demonstrates that participants better at mental model formation also show improved performance on naturalistic tasks, which included packing a child's lunch and backpack (Bailey, Kurby, Giovannetti, & Zacks, 2013).

And finally, key models of comprehension posit that such processes are amodal in the sense that they are not dependent on the surface properties of the written text, auditory input, or visual stimulus. Gernsbacher's structure-building framework explicitly posits that comprehension of information involves general cognitive processes, i.e. that the skills of successfully comprehending a text are not just specialized linguistic ones. Evidence for this is found based on a close relationship between understanding written and auditory narratives and nonverbal, picture-based stories (Gernsbacher et al., 1990). This theory has been useful in developing a battery for assessing comprehension of media (Multimedia Comprehension Battery). In general, the structure building framework conceptualizes successful comprehension as the building of a "coherent, mental representation, or structure of the information being comprehended" (Gernsbacher, 1991). In this view, the text of a novel or the visual input of a television show can be conceived of as instructions for building the mental model, akin to a "doll house" in the mind. One implication of this theory is that once

the doll house/mental model is built, there is no longer a need for the instructions. This prediction is supported by experimental evidence for reduced memory for the surface form of a text once a complete “structure” is built (Gernsbacher, 1991). Overall, the structure building framework theory has strong experimental evidence and supports the idea that mental models are abstract.

## **1.6 The Argument: Fictional Events as Part of the Autobiographical Record**

So far, I have argued that mental models are an abstract form of representation, such that lived experience, text, and film all form mental models with similar characteristics. These mental models track intentionality and causality, and are capable of tracking other properties as needed, such as spatial layouts. Additionally, people are surprisingly neutral on the question of fictionality: we tend to process narratives and events similarly regardless of their status as fiction or nonfiction. Building from these points, I argue that memories of fiction should be examined as part of the autobiographical record. While potentially a counter-intuitive idea, recent work has expanded the notion of what we might consider autobiographical or episodic memory. For one, our memory for the past is far from a veridical record: it is highly constructive and prone to errors great and small. *False memories*—events that were believed to have occurred but in fact never did—are, if not rampant, at least unextraordinary (Loftus, 2005; Loftus & Pickrell, 1995). Thus, the notion of belief that an event occurred is dissociable from veracity.



**Figure 4. A Two-Dimensional Model of Event Memory**

More recently, researchers have described memories that have properties of reliving but are no longer believed to have occurred: *non-believed memories* (Mazzoni, Scoboria, & Harvey, 2010; Otgaar, Scoboria, & Mazzoni, 2014; Scoboria, Memon, Gawrylowicz, & Clark, 2015). This type of memory was famously described by Jean Piaget, who reported having a vivid and detailed memory that a man attempted to kidnap him at the age of 2 while he was out with his nurse. But as an adolescent, Piaget's nurse confessed to inventing this story, and he withdrew his belief that this kidnapping event occurred, while retaining properties of vivacity and a sense of reliving for the event. While such examples were assumed to be rare, more recent work shows that they are relatively common: 20% of respondents in a survey reported at least one non-believed autobiographical memory (Mazzoni et al., 2010). Examples of such events include vivid memories of impossible events (e.g., Santa Claus

coming down the chimney) or events that occurred, but to someone else (e.g., a childhood car accident that really happened to a sibling). Such memories can be conceptualized as false memories “exposed,” and demonstrate a disassociation between reliving and belief. These memories expand the theoretical space of autobiographical memory by exposing the dimension of belief of whether or not an event occurred, as shown as the vertical axis on

**Figure 4.**

Another latent and less explored dimension is that of self-reference, or whether or not the agent of the event memory is the self. Traditional conceptions of episodic and autobiographical memory left event memories not rooted in personal experience but are nevertheless accompanied by vivid recollection in a conceptual purgatory (Larsen, 1988). One category of event memories that do not involve the self as agent is described in recent work by Pillemer and colleagues characterizing the phenomenon of *vicarious memories*, which are recollected memories of events which occurred to someone else, and moreover, are known to not belong to the self i.e., there is no error in source-monitoring. An example might be an anecdote related by a parent so often as to have taken on a life of its own. These vicarious memories can be “borrowed” for a variety of reasons, such as to make a conversation more exciting, or to make enhance one’s social standing (Brown, Cadarao, Fields, & Marsh, 2015). Previous work has also circumscribed the category of *reported events* (Larsen, 1988; Larsen & Plunkett, 1987). Reported memories as described are similar in kind to vicarious memories, but the authors consider as prototypical exemplars events described in news reports and mass media sources, whereas work by Pillemer et al. consider as typical examples events as told by closer associates, such as friends or family.

The categories of personal memories (memories formed from lived experience), false memories (which are not distinguishable from personal memories to the person remembering), non-believed memories, and vicarious/reported memories populate three of four quadrants in the two-dimensional space formed by the dimensions of belief and self (Figure 4). While these dimensions are likely continuous in nature, they are shown and discussed as dichotomous here for conceptual ease. The bottom left quadrant of Figure 4 describes memories of events where the person remembering is not the agent and which the rememberer does not believe to have occurred. This description applies neatly to the present topic: *memories of fiction*. Considering memory by the two dimensions of belief and self-reference is illuminating for our present investigation into *memories of fiction*, but I note that these are not the only dimensions of interest in characterizing the broader space of memory spanning both semantic and episodic distinctions (Rubin, 2021a).

### ***1.6.1 Characterizing Memories of Fiction: A Preview of Subsequent Chapters***

In order for memories of fiction to “keep up” with the other categories of event memory described in Figure 4, they should demonstrate a similar constellation of phenomenological properties, such as a sense of reliving and sensory imagery. Intuitions about the memories of events from one’s favorite novel or movie suggest that such event memories do exhibit phenomenological qualities similar to personal memories. Chapter 2 examines this prediction in more detail across two studies, investigating phenomenology for frequently rehearsed memories (Study 1) and word-cued memories (Study 2). And in Chapter 4, I compare recent and childhood memories derived from both lived experience and fiction.

We know from previous research that autobiographical memories are more than vivid remembrances: they also have functional significance. Memories of one's personal past are thought to be used for at least three broad categories (Bluck, 2003; Bluck, Alea, Habermas, & Rubin, 2005; Bluck & Alea, 2011): planning and decision-making (directive functions), maintaining a sense of a continuous self over time (self functions), and maintaining and developing relationships (social functions). Data from diary studies (Marsh & Tversky, 2004) and surveys (Bluck et al., 2005) support the claim that people regularly think and talk about their past experiences in everyday situations. Chapter 3 provides evidence that people endorse memories of fiction for many of the same functions, albeit at lower rates.

And finally, our memories of past events—regardless of their source and truth status—are not inert. Rather, a primary adaptive function of existing event memories is likely to provide the vocabulary from which to construct simulations of future events: “Indeed, our ability to revisit the past may be only a design feature of our ability to conceive of the future” (Suddendorf & Corballis, 2007, p. 303). In Chapter 5, I examine the hypothesis that people lean on memories from works of fiction when asked to imagine possible events they do not have direct experience with.

### ***1.6.2 On Terminology***

When referring to memories of events which are, or at least believed to be, sourced from works of narrative fiction, I use the term *memories of fiction*. I avoid the term “fictional memories” to preemptively skirt confusion, as it can suggest a reference to *false memories* or *fabricated memories*, which is not my intention. When referring to events which are or believed to be sourced from “real life” experience in the world, I use the terms *memories of lived*

*experience* for clarity. I occasionally apply the terms *personal memories* or *autobiographical memories* for alignment to past research.

While I claim memories of fiction as part of the “autobiographical record,” I do not propose that the term autobiographical memory should be applied to scenes from books or movies more broadly. This shift in terminology would not only be confusing but would not be true to how the term is used in the vast majority of cases, which is memory for events in one’s personal past.

## Chapter 2. Phenomenology of Memories of Fiction (Studies 1 and 2)

“Tell stories filled with facts. Make people touch and taste and  
KNOW. Make people FEEL! FEEL! FEEL!”

— Octavia Butler, reminder to self

People are voracious consumers of fiction. But while fiction often diverts and entertains, its narratives can also change attitudes (Green & Brock, 2000; Paluck et al., 2021), teach facts about the world (Marsh & Fazio, 2007), improve navigation of social situations (Black & Barnes, 2015; Kidd & Castano, 2013; Tamir, Bricker, Dodell-Feder, & Mitchell, 2016), and more, leaving an influence even after the book is shut or the theater lights come on. Here, we focus on another enduring consequence of consuming fiction: namely, people have memories of specific events from novels, movies, comic books, and other fictional sources (*memories of fiction*), which may be remembered months or years later (Furman, Dorfman, Hasson, Davachi, & Dudai, 2007; Stanhope, Cohen, & Conway, 1993). In this chapter, we compare the subjective experience (phenomenology) of memories of fiction to memories from people’s own lives (*memories of lived experience* or *personal memories*).

The consideration of fictional events as potentially comparable to memories of lived experience may seem surprising at first. Autobiographical memory is typically defined as memory for one’s own past (Rubin, 1986). However, as discussed in Chapter 1, recent work has expanded the family of autobiographical memories beyond events that one has personally experienced. For one, memory for the past is far from a veridical record: it is highly constructive and prone to errors great and small (Schacter, 1999). Indeed, *false memories* – memories that were believed to have occurred but in fact never did – are, if not rampant, at least unextraordinary (Loftus, 2005; Loftus & Pickrell, 1995). Other work



describes events that feel real but are understood to not have occurred (*non-believed memories*; Otgaar, Scoboria, & Mazzoni, 2014; Scoboria, Memon, Gawrylowicz, & Clark, 2015), events that occurred to other people (*vicarious memories*; Pillemer, Steiner, Kuwabara, Thomsen, & Svob, 2015; Thomsen & Pillemer, 2016), projections of the self into the future (Schacter & Addis, 2007), memories of what might have been (Felipe De Brigard et al., 2016; Schacter et al., 2015), and imagined reconstructions of infancy (Akhtar, Justice, Morrison, & Conway, 2018). The idea that this growing collection of memory categories share fundamental properties is buttressed by a body of neuroimaging work suggesting that similar neural systems underlie both retrieving events from the past and imagining events that could have occurred (Schacter & Addis, 2007; Schacter et al., 2015).

In this chapter, we begin the investigation of memories of fiction by with a focus on examining phenomenology, the mental texture or “what-it’s-like” of retrieving an event from a work of fiction. Autobiographical memories have long been defined in part by their rich phenomenology, especially as contrasted to knowledge (Tulving, 1985): when recalling the personal past, one often feels a sense of reliving the past or of traveling back in time (Brewer, 1996; Rubin et al., 2003) and belief in the veracity of the recollection (Johnson, 1988; Scoboria et al., 2014). Here, we consider how memories of events from works of fiction may exhibit similar properties. For example, one might recall a scene in George Lucas’s seminal 1980 film *The Empire Strikes Back* in which a pilot (Han Solo) slices open the warm carcass of a large furry lizard (a tauntaun) and stuffs the film’s protagonist (Luke Skywalker) into the animal, preventing Skywalker’s frosty death on the ice planet Hoth. This event may be accompanied by phenomenological qualities, such as vivid sensory imagery,

emotional valence and intensity, and even a re-experiencing of the scene (a sense of reliving, recollection, or *autonoesis*) that are also hallmarks of other categories of event memories.

In two studies, we turn established methods and instruments developed to study autobiographical memories to the task of describing memories of fiction and how they compare to memories from one's personal life. Our goal is to provide an initial characterization of the phenomenon at hand: remembering events from works of fiction. Thus, to gather a naturalistic sample, we deliberately did not restrict the medium of fictional works, allowing events to be drawn from any book, movie, or television show that came to mind for participants. Past work has examined in some detail issues relating to memory accuracy and the processes behind assigning and monitoring what is perceived versus imagined (*reality-monitoring*; Johnson, 1988). While related, we set aside the question of reality-monitoring in the present work. Our interest is in the phenomenological characteristics of events believed by the individual to be derived from either lived experience or works of fiction.

## **2.1 Phenomenology of Well-Rehearsed Personal Memories and Memories of Fiction (Study 1)**

### ***2.1.1 Methods***

#### **Participants**

We recruited 105 participants (43 women;  $M_{\text{age}} = 34.2$  years,  $SD_{\text{age}} = 11.0$ ) from the United States through Amazon Mechanical Turk (MTurk). No participants were excluded from analysis.

## Materials

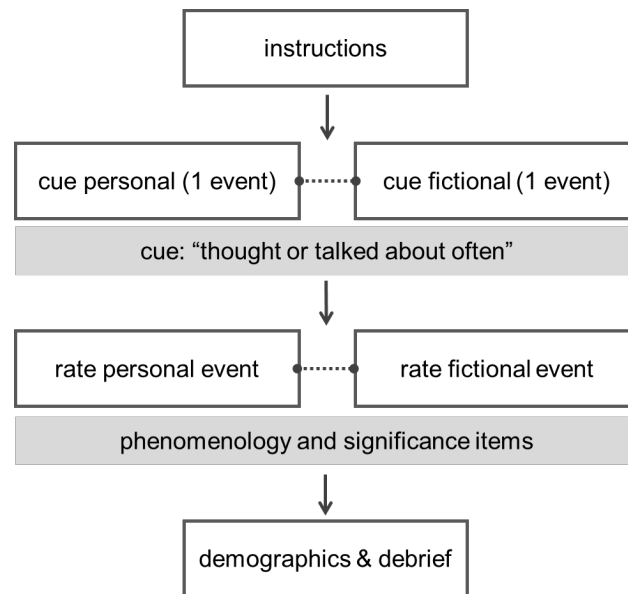
We selected items from the Autobiographical Memory Qualities (AMQ; Butler et al., 2016; Rubin et al., 2003) questionnaire to probe the phenomenology of personal and fictional memories by adapting the original measures to refer to fictional events as needed. All items were rated on 7-point scales with anchors throughout the scale. Participants rated their memories for how often they thought or talked about the event, visual imagery, auditory imagery, reliving, accuracy, point of view, emotions, valence of emotions, and intensity of emotions. **Table 2** provides these items for reference.

We also used 4 items from the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) as adapted by Pillemer et al. (2015) relating to the event's impact on identity ("I feel that this event has become part of my identity"), status as a reference point ("This event has become a reference point for the way I understand myself and the world"), status in one's life story ("I feel that this event has become a central part of my life story"), and influence on other experiences ("This event has colored the way I think and feel about other experiences"). All items were rated on a 5-point scale (1 = totally disagree, 5 = totally agree). Participants also answered a 5-item adaptation of the Thinking About Life Events (TALE) questionnaire probing functions of the events (Bluck et al., 2005; Bluck & Alea, 2011); results concerning these items are not discussed in this chapter, where we focus on phenomenology. Chapter 3 explores the question of functional significance in more depth.

## Procedure

**Figure 5** illustrates the procedure. After giving informed consent, we asked each participant to retrieve two memories of specific events they had *talked or thought about often*. Each participant provided one personal memory and one memory of fiction. We chose this

prompt and to request a single event per condition in part because of little empirical precedent for cueing events from works of fiction: we reasoned that asking about well-rehearsed memories would maximize the chances participants would succeed at this task. We also chose only one event per condition to minimize the length of the task to increase its suitability for administration to online workers.



**Figure 5. Visual Summary of Procedure for Study 1**

Participants were given specific instructions about what type of events they should be retrieving. For personal memories, they were told that events should be from their own life, ones they have thought or talked about often, and specific: “For example, do not write, ‘eating breakfast’ but try to think of a specific scene like, ‘I was eating breakfast with my boss and I spilled maple syrup into her lap’”. Instructions for memories of fiction were similar: participants were told that events should be from work of fiction, such as a movie, book, or TV show and *not* a real event, be one that they have thought or talked about often, and specific: “For example, do not write ‘Sherlock Holmes solves crimes’ but try to think of a

particular event or scene”. For both conditions, they were told the events could be chosen from any time period in their life and that it was normal to spend a little time retrieving the event.

Immediately following retrieval of a memory, participants generated a short label (for personal memories) or named the work of fiction (for memories of fiction). They also gave a description of each event before estimating how long ago the event occurred and their age at the time of occurrence. For the fiction condition, participants also noted whether the event they generated was from a book or novel, movie, TV show, or another medium. After all memories were generated, subjects were reminded of their previous descriptions and rated the qualities of each memory on the AMQ and CES. Participants also answered items relating to the functional significance of the event memory; for brevity, these results are not discussed here but are included in **Appendix A**. Finally, participants provided demographic information and optionally provided explicit consent for their responses to be shared in academic settings e.g., in talks and publications.

**Table 2. Phenomenology and Significance Items in Study 1**

Variable	Item for Personal Memories	Item for Memories of Fiction	Anchors
Rehearsal	Since it happened, I have <b><u>thought</u></b> or <b><u>talked about</u></b> this event.	Since reading or seeing this event the first time, I have <b><u>thought</u></b> or <b><u>talked about</u></b> this event.	1 = not at all, 3 = sometimes, 5 = many times, 7 = more than for any other (memory) / (event)
Visual imagery	When remembering the event, I can <b><u>see</u></b> it in my mind.	When remembering the event, I can <b><u>see</u></b> it in my mind.	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = (as clearly as it were happening now) / (as clearly as an event happening in front me)
Auditory imagery	When remembering the event, I can <b><u>hear</u></b> it in my mind.	When remembering the event, I can <b><u>hear</u></b> it in my mind.	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = as clearly as it were happening now / (as clearly as an event happening in front me)
Reliving (recollection)	When remembering the event, I feel as though I am <b><u>reliving</u></b> it again.	When remembering the event, I feel as though I am <b><u>actually living it</u></b> .	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = as clearly as if it were happening now / as clearly as if it were happening to me now
Belief: accuracy	My memory of the event is an accurate reflection of the event as a neutral observer would report it and is not distorted by my beliefs, motives, and expectations.	My memory of the event is an accurate reflection of the event as it is captured by the original fictional work. It is not distorted by my beliefs, motives, and expectations.	1 = 100% distorted; 100% accurate
Visual perspective	When you remember the event, do you see it:	When you remember the event, do you see it:	<i>Four discrete choices:</i> Through your own eyes, like a first-person perspective?, As an outside observer, like a third-person

			perspective?. As a mixture of the two perspectives above, Neither (no visualization)
Strength of emotions	When remembering the event, I feel the <b><u>emotions as strongly as I did then.</u></b>	When remembering the event, I feel the <b><u>emotions as strongly when as when I originally experienced it.</u></b>	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = as clearly as if it were happening now
Positive valence	When remembering the event, the emotions are <b><u>extremely positive.</u></b>	When remembering the event, the emotions are <b><u>extremely positive.</u></b>	1 = not at all, 3 = hardly, 5 = somewhat, 7 = entirely
Negative valence	When remembering the event, the emotions are <b><u>extremely negative.</u></b>	When remembering the event, the emotions are <b><u>extremely negative.</u></b>	1 = not at all, 3 = hardly, 5 = somewhat, 7 = entirely
Intensity of emotions	The emotions I feel are <b><u>intense.</u></b>	The emotions I feel are <b><u>intense.</u></b>	1 = not at all, 3 = hardly, 5 = somewhat, 7 = entirely

## Statistical Analyses

Analyses were completed in RStudio (2018). The alpha level was set to .05 for all analyses unless reported otherwise; Bonferroni corrections for multiple comparisons were implemented per family of analyses, when appropriate. Effect size was calculated using the ``effsize`` package (Torchiano, 2014). Generalized linear mixed-effects models were run using the ``lme4`` software package (Bates, Maechler, Bolker, & Walker, 2015). Significance for fixed effects was assessed using Satterthwaite approximations to degrees of freedom with the package ``lmerTest`` (Kuznetsova, Brockhoff, & Christensen, 2017). Nine-five percent confidence intervals (CIs) were computed using parametric bootstrapping (number of simulations = 1,000).

### 2.1.2 Results and Discussion

#### Modality and Specificity of Events Retrieved

Given that few previous studies have implemented similar methods, we first confirmed that participants successfully retrieved and described specific event memories from their own lives and works of fiction. We first found that all participants (100%) were able to retrieve and describe specific event memories from fiction and their own lives. **Table 3** provides examples of participants responses from Study 1 and Study 2.

When retrieving memories from works of fiction, most participants described events from movies (52%), with the remaining memories coming from books/novels (26%), and television shows (22%).

Then, we examined the extent to which the event memories retrieved were specific in nature. It would be possible, for example, for participants to provide memories of fiction, but for the events to be predominantly general in nature: for example, “Jim played many



pranks on Dwight in *The Office*,” rather than “Jim encased Dwight’s stapler in yellow Jell-O, which Dwight pulls out of a drawer.” A lack of specificity would have implications for understanding the phenomenology of the memories solicited; for example, it may suggest that memories of fiction are more semanticized than memories of lived experience. Previous work (Pillemer et al., 1986) coded memories as *specific* (containing an explicit description of a ‘one-moment-time’ event) or *general* (often going beyond a single event and presenting a theme for numerous, often recurring events).

**Table 3. Sample Participant Responses in Studies 1 and 2**

	Memory of Lived Experience	Memory of Fiction
<b>Study 1</b>	On October 28, 2008 my daughter was born. She was overdue, and her mom was going to be induced that day, but when we got to the hospital the Dr. noticed that the baby's heartbeat had dropped very low. It ended up being that she had wrapped her umbilical cord around her own neck. Her mom had to have an emergency C-section. In the end I had a perfectly healthy daughter. It was the most terrifying and happy day of my life.	On <i>Scandal</i> , I remember when Olivia was at her dad's house trying to take Jake away from him. I remember the intensity of the scene as her dad held the gun to Jake's head. Then her dad let him go and they both left the house scared. However, in the end, her dad got what he wanted.
<b>Study 2</b>	My junior year of high school, my family decided to renovate our house, so we had to move to a house fifteen minutes away. The night before we moved back home, I stayed up until 2 AM packing up my room. It was the latest I had ever stayed up in high school.	I am thinking of the scene from <i>The Office</i> in which Pam gives birth to hers and Jim's first child CC. Jim is called into the delivery room as Pam begins to "push" while Michael is stuck outside because only family members are allowed in the room. He lights up a cigar when it is announced CC is born but is quickly told to extinguish it by a passing hospital worker.

*Note.* Participant responses were minimally edited for grammar, spelling, and readability.

Overall, we found that the majority of events elicited were specific, as described in the instructions given to participants. This was assessed by having the first author and a trained research assistant code the event descriptions for. We used an established coding scheme by (Pillemer et al., 1986): events were coded as containing a specific event, general, or mixed (clearly contains elements of both specific and general events). We assessed inter-rater consensus using agreement between the two coders (McHugh, 2012). In general, the two coders agreed with each other: agreement was 87.6% overall, and of the agreed upon

events, 90.8% were coded as specific. Most disagreements were between events coded as “specific” by one rater and “mixed” by the other. Thus, we have fairly high confidence that that the events provided by participants in both conditions are specific in nature.

## Memory Qualities

Next, we tackled our primary research question: how do phenomenological qualities compare to personal memories and memories of fiction?

First, we examined potential differences in AMQ items by computing *t*-tests for each item. **Table 4** shows that only the difference in *reliving* was statistically significant at an adjusted alpha of .0056 (after Bonferroni correction). One possible explanation for this difference has to do with the way we wrote the adaptation of this item to probe fictional events: “When remembering the event, I feel as though I am actually living it.” No matter how vivid one’s memory from a novel or movie may be, it is not likely to feel as though one is “actually living” through it for a number of reasons, including the plausibility of the fictional event. Thus, the construct of “reliving” for fictional events might also include something akin to, “When remembering the event, I feel as though I am re-experiencing it as I first read or saw it again.”

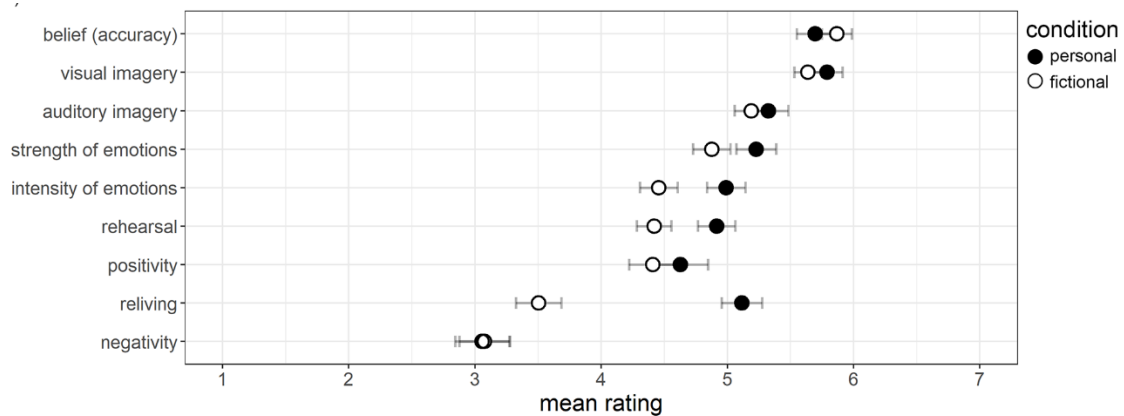
**Table 4. Means, Standard Deviations, and Mean Comparisons Between Personal and Fictional Conditions for AMQ Items in Study 1**

Item	Personal Mean (SD)	Fictional Mean (SD)	$t(104)$	Uncorrected $p$ -value	Cohen's $d$ [95% CI]
Rehearsal	4.91 (1.51)	4.42 (1.41)	2.79†	.006	0.27 [0.00, 0.55]
Visual imagery	5.79 (1.25)	5.64 (1.12)	1.15	.255	0.11 [-0.16, 0.39]
Auditory imagery	5.32 (1.63)	5.19 (1.36)	0.69	.49	0.07 [-0.21, 0.34]
Reliving	5.11 (1.65)	3.50 (1.85)	8.55****	< .0001	0.83 [0.55, 1.12]
Same strength of emotions	5.23 (1.63)	4.88 (1.52)	2.24	.03	0.22 [-.06, 0.49]
Intensity of emotions	4.99 (1.57)	4.46 (1.53)	2.70†	.008	0.26 [-.01, 0.54]
Valence: positivity	4.63 (2.24)	4.41 (1.95)	0.80	.43	0.08 [-0.20, 0.35]
Valence: negativity	3.06 (2.20)	3.08 (2.06)	0.07	.94	0.01 [-0.27, 0.28]
Accuracy	5.70 (1.51)	5.87 (1.22)	1.23	.22	0.12 [-0.15, 0.39]

*Note.* † < .10, \*  $p$  < .05, \*\*  $p$  < .01, \*\*\*  $p$  < .001, \*\*\*\*  $p$  < .0001 after Bonferroni correction for multiple comparisons.

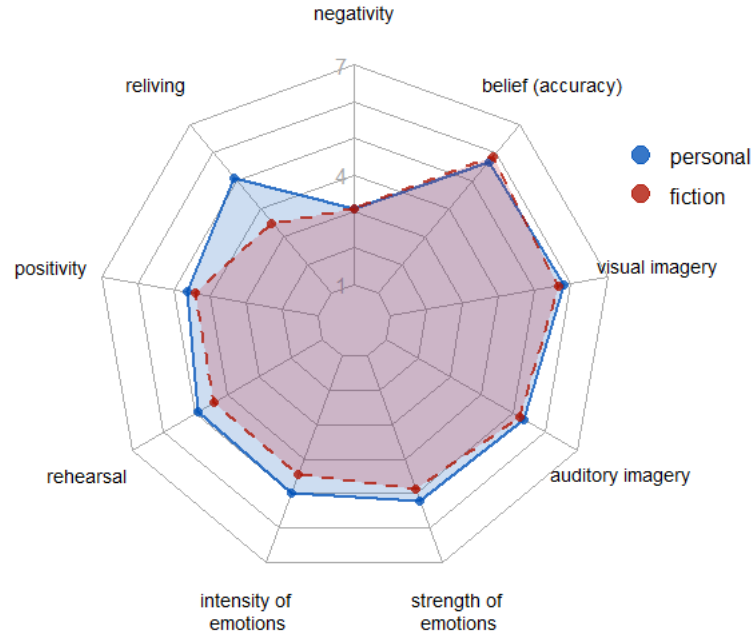
Given the conservative nature of Bonferroni corrections, we also note that these data may also suggest differences by condition for rehearsal and intensity of emotions, with participants rating personal memories higher than memories of fiction for both items.

**Figure 6** illustrates means and standard errors for these items.



**Figure 6. Dot Plot of Means and SEMs for Phenomenology in Study 1.**  
**Labeled endpoints of Likert scales indicated that “1” was a low value (e.g., not at all)**  
**and “7” was high (e.g., extremely)**

Overall, people reported remembering many fictional events similarly to how they remember events from their personal lives: accompanied by a sense of reliving, often with vivid sensory imagery. People consistently endorsed phenomenological experiences when recalling fictional events. Not only did we find that ratings for phenomenology were similar between conditions for individual AMQ items, we also found that the pattern of ratings *across* AMQ items was similar. This is evident visually in the radar plot below (**Figure 7**). Each spoke of the grid corresponds to an item, with mean ratings plotted moving outwards from the inside to the outside of the plot. Rather than examining the details of individual items, we emphasize here the resulting shapes from comparing the relationship between measures, which are quite correlated between fictional and personal conditions:  $r = .83$ . This pattern is consistent with the claim that the differences between remembering memories of lived experiences and remembering fictional events are ones of degree, and that these memory types are expressions of the same underlying system for event memories (Rubin & Umanath, 2015).



**Figure 7. Radar Plot of Phenomenology (Personal vs. Fictional) in Study 1**

### Visual Perspective

In addition to the measures of phenomenology above, we also explored differences in how participants reported experiencing the visual perspective of personal versus fictional memories. We found that participants reported experiencing personal memories differently from memories of fiction:  $\chi^2(3) = 110.96, p < .0001$ . Specifically, while most personal memories were remembered from the first-person or field perspective (73.3%), memories of fiction were predominantly remembered from a third-person or observer perspective (77.1%). Most participants (53.3%) reported being able to switch between perspectives for personal memories, while fewer participants (41.0%) reported being able to switch for memories of fiction.

## Significance of Events

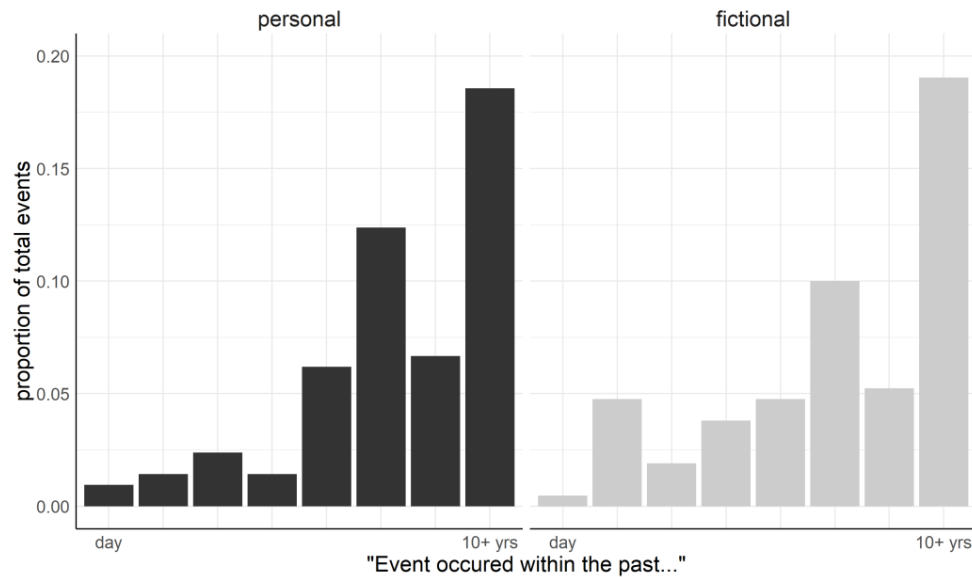
To compare the significance of events, we examined CES scores between personal memories and memories of fiction. The four items showed high reliability: Cronbach's  $\alpha = 0.93$  [0.92, 0.95]. We found that participants reported personal memories as more central than memories of fiction:  $M_{\text{personal}} = 3.21$  ( $SD = 1.32$ ),  $M_{\text{fictional}} = 2.08$  ( $SD = 1.22$ ). To assess statistical significance, we computed a linear mixed effects model predicting CES rating with condition (personal vs. fictional), modeling participant and CES item as random effects<sup>1</sup>. We found that memories of fiction were rated an average of 1.13 (95% CI: [0.95, 1.31]) lower than personal memories on a 5-point scale ( $SE = 0.09$ ,  $p < .0001$ , conditional  $R^2 = 0.53$ , marginal  $R^2 = 0.17$ ).

## Temporal Distribution

On average, events described by participants occurred 11.0 years prior to the moment of retrieval ( $M_{\text{personal}} = 11.1$ ;  $M_{\text{fiction}} = 10.8$ ). **Figure 8** shows the temporal distribution of retrieved memories. Visual inspection of the temporal distributions of personal and fictional memories within each study reveals that they were quite similar, further suggesting similarities between personal memories and memories of fiction.

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<sup>1</sup> This model exhibited a relatively high ICC (.44), so we chose the mixed effects model over a  $t$ -test. A  $t$ -test yields the same conclusion:  $t(418) = 9.14$ ,  $p < .0001$ .



**Figure 8. Temporal Distribution of Personal and Fictional Events in Study 1**

## **2.2 Phenomenology of Word-Cued Personal Memories and Memories of Fiction (Study 2)**

Study 1 examined the phenomenology of well-rehearsed personal memories and memories of fiction, finding that participants fluidly retrieved memories of fiction. In Study 2, we move to eliciting autobiographical memories using word cues, another standard technique of eliciting autobiographical memories (e.g., Crovitz & Schiffman, 1974). We expected this method to yield different types of memories than those in Study 1, given past work establishing that how memories are cued matters (Rubin, 2015; Rubin & Schulkind, 1997). In this way, we expand the understanding of the phenomenology of memories of fiction we established in Study 1.

### **2.2.1 Methods**

#### **Participants**

Participants consisted of 52 individuals (34 women,  $M_{\text{age}} = 19.08$ ,  $SD_{\text{age}} = 1.12$ ) from the undergraduate population at Duke University. The switch to the lab environment was



made due to the increased length of the task, as the number of memories to be retrieved and rated increased from two to ten. One additional participant was excluded for not following instructions.

## **Materials**

The materials used in Study 2 were similar to those in Study 1, with the following changes: we added additional items from the AMQ, altered the *reliving* item for the fiction condition, and changed our approach to measuring visual perspective. New items are shown in **Table 5**.

Study 1 provided strong evidence that memories of fiction exhibit phenomenological properties. Thus, we included additional AMQ items in Study 2 to assess additional properties. These included one item measuring the extent to which each memory elicited the same feelings as when originally experienced, two items measuring one's belief in the accuracy of each memory, and one item on spatial imagery. We also adapted the *reliving* item in the fictional condition to: "When remembering the event, I feel as though I am re-experiencing it as I first read or saw it again."

**Table 5. Additional Phenomenology Measures (AMQ) in Study 2**

Variable	Item for memories of lived experience	Item for memories of fiction	Anchors
Same feelings	While remembering, it is as if I am experiencing the same feelings, emotions, and/or atmosphere again.	--	1 = not at all 7 = as if it were happening now
Belief: Real/Imagined	I believe the event in my memory really occurred in the way I remember it and that I have not imagined or fabricated anything that did not occur.	I believe the event in my memory really occurred in the way I remember it. In other words, I am not fabricating or changing anything from the original work in my memory.	1 = 100% fabricated, 7 = 100% accurate
Belief: Testify	Would you be confident enough in your memory of the event to testify in a court of law?	--	[Rated from 1 (not at all) to 7 (as much as any memory)]
Spatial Layout	As I remember the event, I know its spatial layout	--	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = as clearly as if it were happening now
Reliving'	When remembering the event, I feel as though I am reliving it again.	When remembering the event, I feel as though I am re-experiencing it as I first read or saw it again.  and When remembering the event, I feel as though I am actually living through it.	1 = not at all, 3 = vaguely, 5 = distinctly, 7 = as clearly as if it were happening now / as clearly as if it were happening to me now
Field	When remembering, I see the memory from where I was during the event, that is, as if I were seeing	When remembering, I see the fictional event from my own eyes, as if I was a part of the event ("first person" view).	1 (not at all)

	it again from my own eyes at my original location.	7 (I know exactly where I am seeing the event from)
Switch	If I try, I can “switch” between “first-person” and “outside observer” perspectives.	Not relevant

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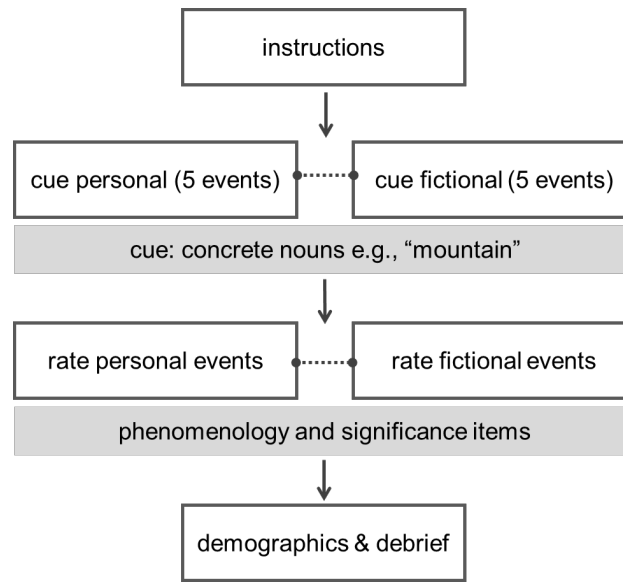
*Note.* -- indicates that that the item used to probe memories of fiction was the same as the item used to probe memories of lived experience.

We also altered the items used to measure visual perspective. Study 1 asked participants to categorize each memory as field, observer, mixed, or neither perspective. Study 2 assessed visual perspective with a different approach, as the previous approach puts the two perspectives in false opposition to each other, as events can be experienced as a combination of both perspectives (Rice & Rubin, 2009). Thus, two items probed the extent to which people experienced the memory from a field and observer perspective (1 = not at all, 7 = I know exactly where I am seeing the event from) and one item probed participants' abilities to switch between perspectives (1 = I cannot switch perspectives, 5 = I can switch perspectives easily), in keeping with previous work in this area.

## **Procedure**

Participants were asked to retrieve five personal memories and five memories of fiction, cued by concrete nouns, such as “flower” or “hospital” (Rubin, 1981). They were told that the event retrieved could be closely or loosely connected to the word, and that whatever came to mind was acceptable. Memory cues were presented in two blocks (personal vs. fictional) of five trials each. Whether participants answered questions about personal or fictional events first was randomized.

Otherwise, the instructions and procedures for Study 2 mirrored those of Study 1 (**Figure 9**). Participants provided a description and short label after cueing each event. After all events were cued, participants were reminded of their previous descriptions and rated the qualities of each events.



**Figure 9. Procedure for Study 2**

## Statistical Analyses

Analyses were completed in RStudio (2018). Visualizations were created with the `ggplot` package (Wickham, 2016). The alpha level was set to .05 for all analyses unless reported otherwise; Bonferroni corrections for multiple comparisons were implemented per family of analyses, when appropriate. Effect size was calculated using the `effsize` package (Torchiano, 2014). Generalized linear mixed-effects models were run using the `lme4` software package (Bates, Maechler, Bolker, & Walker, 2015). Significance for fixed effects was assessed using Satterthwaite approximations to degrees of freedom with the package `lmerTest` (Kuznetsova, Brockhoff, & Christensen, 2017). Nine-five percent confidence intervals (CIs) were computed using parametric bootstrapping (number of simulations = 1,000).

## ***2.2.2 Results and Discussion***

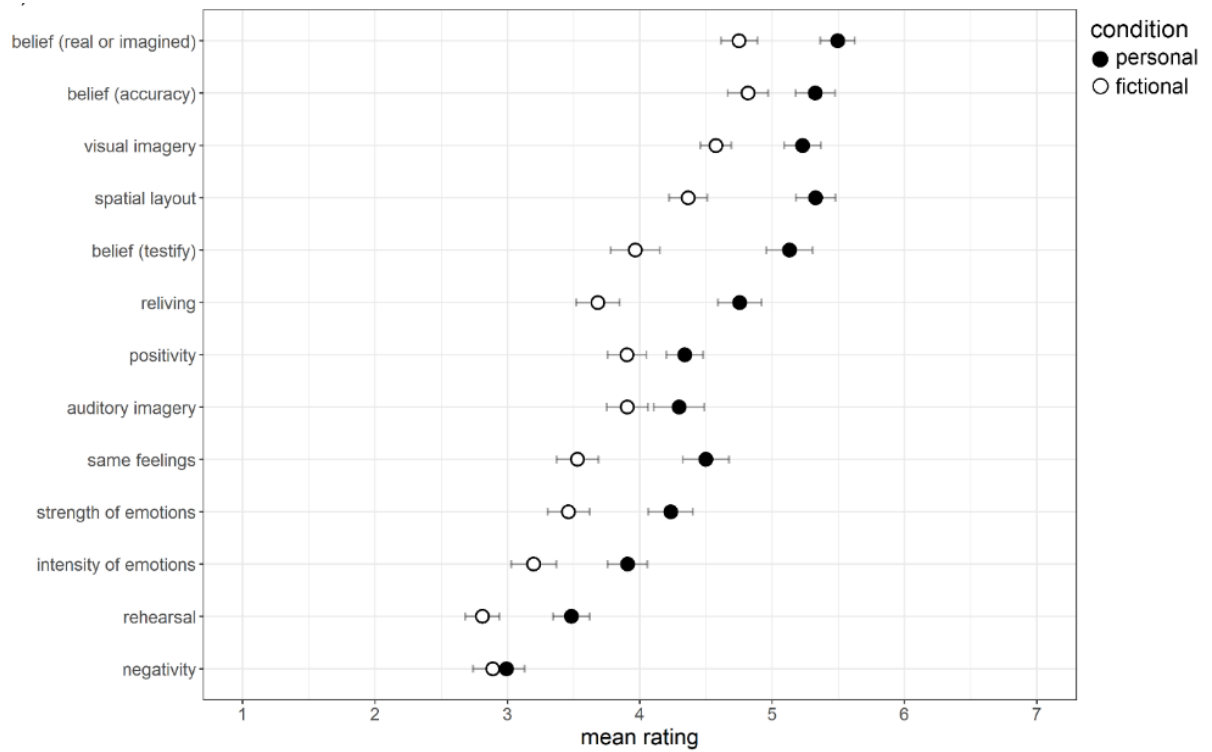
### **Modality and Specificity of Events Retrieved**

We found that most participants were able to retrieve the full five events per condition: they retrieved an average of 4.92 personal memories and 4.79 memories of fiction per person. When retrieving memories from works of fiction, most participants described events from movies (56%), with the remaining memories coming from books/novels (16%), television shows (26%), and other sources (3%; e.g., video games). **Table 3** provides examples of participant descriptions of events.

As in Study 1, we found that participants provided largely specific events, as requested in the instructions. The first author and a trained research assistant coded a randomly selected sample of 200 events (100 of each condition) using the same coding scheme described in Study 1. The two coders agreed with each other (90.5%) overall, and of the agreed upon events, 92.8% were coded as specific.

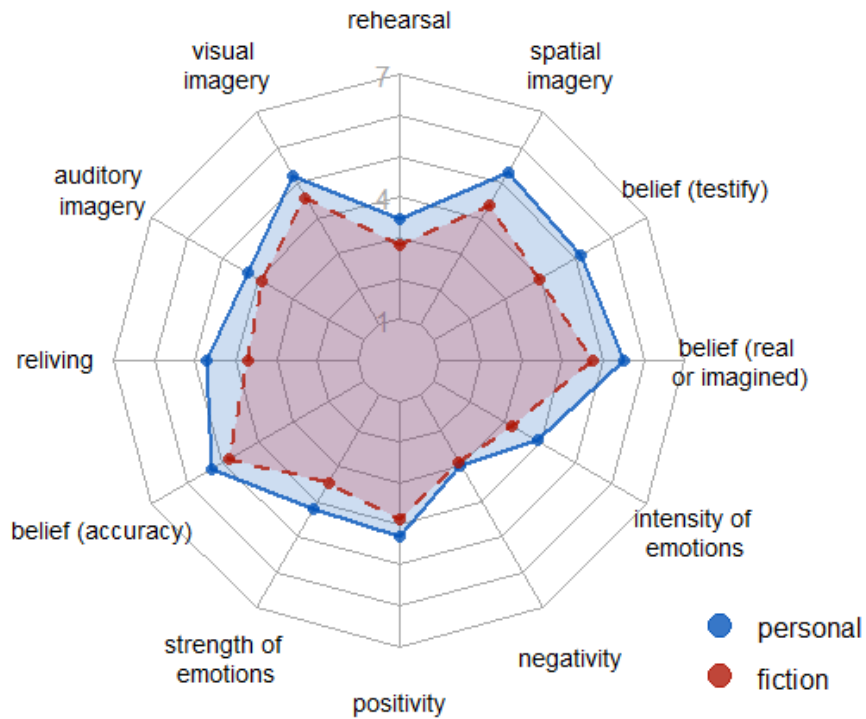
### **Memory Qualities**

First, we examined potential differences in the AMQ items by computing *t*-tests for each item. **Figure 10** compares these means and **Table 21** in **Appendix A** shows the items that were statistically significant after correction for multiple comparisons, which were: rehearsal, visual imagery, spatial layout, reliving, strength of emotions, same feelings again, intensity of emotions, belief (accuracy), and belief (real/testify). Overall, we found that ratings for memories of fiction were consistently lower than personal memories—in contrast to Study 1, where we found that ratings were generally similar.



**Figure 10. Dot Plot of Phenomenology Items for Study 2**

As in Study 1, we also found that the *pattern* of ratings across AMQ items was similar. This is evident visually in **Figure 11**. Quantitatively, the means of AMQ items for both studies are highly correlated across fictional and personal conditions:  $r = 0.93$ .



**Figure 11. Radar Plot for Phenomenology Items in Study 2**

### Visual Perspective

Replicating the results of Study 1, we found that personal memories tended to be remembered with a field perspective, and memories of fiction with an observer perspective (Table 6).

**Table 6. Means and Inferential Statistics for Comparing Visual Perspective for Personal and Fictional Conditions in Study 2**

Item	Personal	Fictional	<i>t</i>	Cohen's <i>d</i> [95% CI]
Field	5.57 (1.61)	3.19 (2.14)	9.89***	1.17 [0.74, 1.59]
Observer	3.77 (2.08)	5.07 (1.83)	4.86***	0.73 [0.32, 1.13]
Switch	3.19 (1.49)	2.61 (1.44)	4.27*	0.33 [0.06, 0.72]

*Note.* † < .1, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001. 7-point scale.



## Significance of Events

To compare the significance of events, we examined CES scores between personal memories and memories of fiction. The four items showed high reliability: Cronbach's  $\alpha = 0.91$  [0.89, 0.92]. We found that participants reported that personal memories as more central than memories of fiction:  $M_{\text{personal}} = 1.88$  ( $SD = 1.19$ ),  $M_{\text{fictional}} = 1.36$  ( $SD = 0.78$ ). To assess statistical significance, we computed a linear mixed effects model predicting CES rating with condition (personal vs. fictional) and modeling participant and CES item as random effects<sup>2</sup>. We found that memories of fiction were rated an average of 0.52 (95% CI: [0.41, 0.63]) lower than personal memories on a 5-point scale ( $SE = 0.06$ ,  $p < .0001$ , conditional  $R^2 = 0.27$ , marginal  $R^2 = 0.06$ , ICC = 0.22).

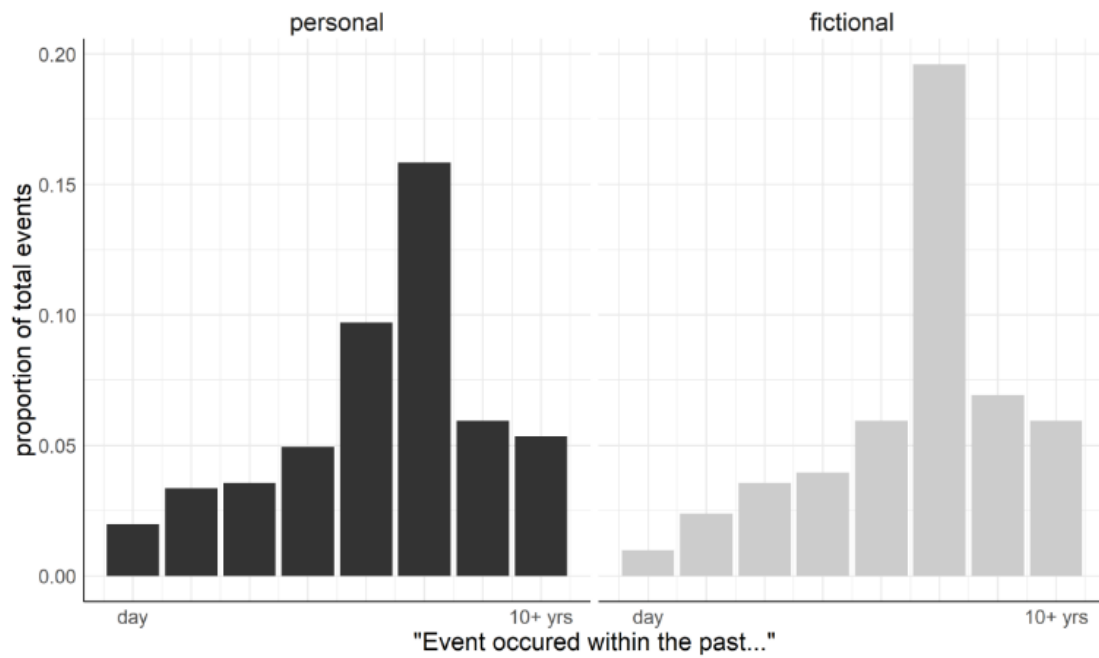
Compared to Study 1, events in Study 2 were less likely to represent significant events in participants' lives. Representative examples of personal events described in Study 1 include weddings, births of children, and memorable childhood accidents, whereas those cued by nouns in Study 2 were more likely to represent quotidian situations.

## Temporal Distribution

On average, events described by participants occurred on 4.39 years prior to the moment of retrieval ( $M_{\text{personal}} = 3.97$ ;  $M_{\text{fiction}} = 4.52$ ). **Figure 12** shows the temporal distribution of retrieved memories. As in Study 1, visual inspection reveals that the distribution between personal and fictional memories is quite similar.

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<sup>2</sup> A  $t$ -test yields the same conclusion:  $t(1018) = 8.29$ ,  $p < .0001$ . We computed a mixed effects model to be consistent with Study 1. There was also evidence that the model residuals showed non-normality; mixed effects models are likely more robust to these violations than the  $t$ -test (Schielzeth et al., 2020).



**Figure 12. Temporal Distribution for Personal and Fictional Events in Study 2**

## 2.3 Discussion for Chapter 2

Studies 1 and 2 adapted methodological approaches from autobiographical memory to studying memories of fiction. By examining phenomenology for personal memories and memories of fiction, we provide one pillar of empirical evidence to support the argument established in Chapter 1: memories of fiction are part of the autobiographical record. We found that people readily report phenomenological characteristics such as reliving, sensory imagery, and knowledge of a spatial layout for memories of fiction. Across studies, temporal distribution (**Figure 8, Figure 12**) and reports of subjective experience (**Figure 7, Figure 11**) were strikingly similar across studies between memories of lived experiences and of fictional events, consistent with the hypothesis that differences between the two event categories are those of degree, rather than natural kind.

In Study 1, we found that phenomenological measures were quite similar between personal memories and memories of fiction that were well-rehearsed. This is surprising, considering that the events described in the personal condition were often of personal significance, such as the birth of children, weddings and proposals, getting divorced, being hired for an important job, the last words spoken to a loved one, and more. In other words, this sample of personal memories represent some of the most vivid memories of people's lives. And yet, we found that well-rehearsed memories of fiction exhibited comparable phenomenological qualities.

In contrast, we found in Study 2 that memories of fiction were consistently rated lower on scales relating to phenomenology. Do Study 1 and Study 2's conclusions contradict each other?<sup>3</sup> We would argue they do not, but rather provide two complementary characterizations of the phenomenon at hand. Taken together, these studies suggest that memories of fiction are not typically as vivid or significant as memories of lived experience—but that this pattern is a tendency, not a hard and fast rule. In other words, a significant or well-rehearsed event from a work of fiction has the potential to score similarly on the major dimensions of autobiographical memory, including phenomenology and centrality of the event. Indeed, when we directly compared the overall means of event centrality (CES) of personal memories and memories of fiction for each participant in Study 1, we found that 13.3% of participants scored their fictional event as more significant than the personal event (which was also well-rehearsed).

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<sup>3</sup> We perform cross-study comparisons with caution, noting multiple differences in the design, including different populations sampled (MTurk versus undergraduates).

In addition to variance between studies, we also saw variance within studies and even within participants. Participants' responses for items probing fiction conditions in both studies spanned from floor to ceiling of the response scales. Thus, we do not argue that memories of fiction are of phenomenological liveliness for all, partly because the extent to which people consume fiction varies widely. For example, while 6% of United States adults report going to the movies one or more times a week, 14% report never visiting the movie theaters at all (Morning Consult, 2018). Thus, the role that memories of fiction play in people's lives varies. We do not believe this variation to be a "bug" of the present research topic, but suggest that future work may do well to follow William James's advice that if one wants to study religious experience, one should probably observe the most religious man in his most religious moments (James, 1902). This variance of memory qualities between individuals for memories of fiction is also consistent with recent autobiographical memory research, which suggests that how people experience autobiographical remembering is a stable individual difference (Berntsen et al., 2019; Rubin, 2021b).

In both studies, we found memories of fiction tended to be recalled from an observer perspective whereas personal memories tended to be recalled from a field perspective. We speculate that differences may be driven by the initial mode of encoding. Personal memories are originally experienced from a field perspective, whereas in fiction, perspective varies, often by modality (e.g. first versus third person writing, camera angle). In most instances, these events are experienced from the stance of an observer, who may – at least in the case of books – imagine events from multiple locations (Rice & Rubin, 2011). Furthermore, fiction memories were remembered with fewer visual details, which are needed to support a field perspective (Butler, Rice, Wooldridge, & Rubin, 2016). However, research

into what determines the visual perspective of a retrieved memory and the consequences of visual perspective remain ongoing; understanding visual perspective in memories of fiction may help to illuminate properties of this topic more generally.

Previous work in this arena has examined memories from fictional sources in the context of reality-monitoring i.e., discerning the difference between real and imagined events (Johnson, 1988; Kensinger & Schacter, 2006). While such errors certainly do occur, we want to be clear that our aim has been to characterize an even more basic phenomenon: events from works of fiction which are correctly identified as such. Popular fictional worlds, from *Harry Potter* to *Star Wars*, form parts of the psychological landscape even while it is virtually impossible to mistake them for reality. While others have made claims that fiction can shift belief and behavior (Bandura, 2006; Green, Strange, & Brock, 2003; Morgan & Shanahan, 2010), this work characterizes memories of fiction at the scale of specific events, which is a unique contribution. Our work contributes to a question at least as interesting as those raised by reality-monitoring errors: how do fictional events yield psychological realities even when they are known to be fictional?

## Chapter 3. Function of Memories of Fiction (Study 3)

"Fairy tales are more than true: not because they tell us that dragons exist, but because they tell us that dragons can be beaten."

— Neil Gaiman<sup>1</sup>

Autobiographical memories are more than vivid remembrances: they have functional significance. A thorough understanding of autobiographical remembering involves examination of not only of how such systems work, but also the purposes they serve (Hyman & Faries, 1992). Data from diary studies (Marsh & Tversky, 2004) and surveys (Bluck et al., 2005) support the claim that people regularly think and talk about their past experiences in everyday situations. Past work has explored three theoretically-driven categories for functions of autobiographical memory: directive (planning and decision-making), self (sustaining the sense of a continuous self over time), and social (developing and maintaining relationships; Bluck, 2003; Pillemer, 2003).

Here, we build on the studies in Chapter 2 to ask how memories of fiction are used in day to day remembering, and how these reported frequencies compare to those of personal memories. To directly compare these situations, we adapted the Thinking About Life Experiences (TALE) questionnaire, a previously validated survey used to assess theoretically motivated memory functions across the lifespan (Bluck, 2003; Bluck et al., 2005). We hypothesized that people would report utilizing both personal memories and memories of fiction for directive, self, and social functions, but that reported frequencies would be higher for personal memories than for memories of fiction. Additionally, previous

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<sup>1</sup> Paraphrasing G.K. Chesterton

work suggests that engaging in fictional narratives may serve to simulate social experience (Mar & Oatley, 2008). Thus, we also hypothesized that people may report recalling memories of fiction for the social function more frequently than for a directive or self function. Finally, we sought to provide a replication of previous work establishing the degree to which people endorse these theoretically driven functions of autobiographical remembering.

### **3.1 Methods**

#### **3.1.1 Participants**

We recruited 164 participants ( $M_{\text{age}} = 33.8$ ,  $SD_{\text{age}} = 10.8$ , 74 women, 1 undeclared gender) from the United States completed the study through Amazon's Mechanical Turk (MTurk) in return for monetary compensation. In this study, 46.6% of participants reported at least a bachelor's degree and 89.6% reported taking at least some college courses. Our initial estimate of sample size was guided by previous work with the TALE (Bluck et al., 2005). No participants were excluded from analysis. Participants were randomly assigned to retrieve and rate a personal or fictional memory. These procedures were approved by the Duke Institutional Review Board, and all participants gave informed consent before beginning the studies.

#### **3.1.2 Materials**

We used the TALE questionnaire to probe personal memories (Bluck et al., 2005), and administered a close adaptation of the TALE to address memories of fiction. **Table 7** shows a representative sample of items; materials are available online at [osf.io/m2aew](https://osf.io/m2aew) under "Study 1 Materials."

The first two questions of the TALE for both conditions (personal and fictional) probe the overall frequency of talking and thinking about memories: "How often do you

think back over (your life) / (works of fiction)?” and “How often do you talk to others about (what’s happened) / (works of fiction you have consumed) in your life so far?”

Twenty-eight items followed to assess directive, self, and social functions of remembering. Each item was rated on a scale of 1 (*never*) to 6 (*very frequently*), with descriptive anchors for each point. Per previous work, these 28 items were displayed in a fixed random order for both conditions.

**Table 7. Sample TALE items used in Study 3**

	Personal Condition	Fiction Condition
	I think back over or talk about my life or certain periods of my life...	I think back over or talk about events from fictional works...
<b>Directive</b>	...when I feel I can learn a lesson about something bad that happened by thinking about it.	...when I feel I can learn a lesson about something bad that happened in the story.
<b>Self</b>	...when something unexpected happens to me and I want to fit it into my view of my life.	...when something unexpected happens to me and I want to fit it into my view of my life.
<b>Social</b>	...when I want to make myself feel better by talking to others who have had similar past experiences.	...when I want to make myself feel better by thinking about events in stories similar to my current experience.

*Note.* 1 to 6 scale: 1 = Never, 2 = Rarely, 3 = Seldom, 4 = Occasionally, 5 = Often, and 6 = Very Frequently.

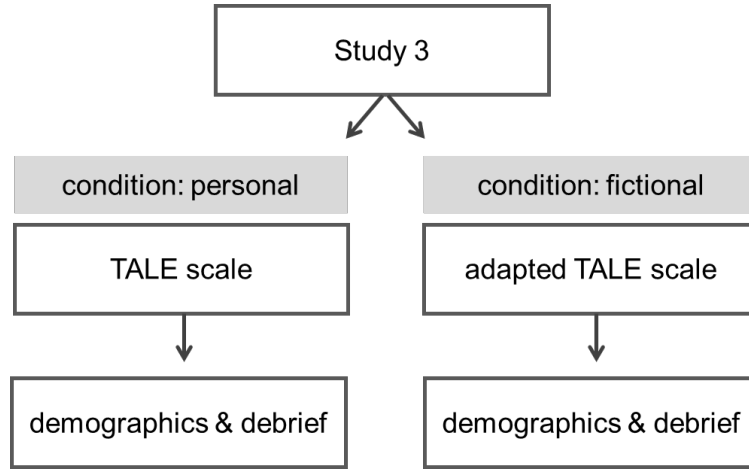
### 3.1.3 Procedure

Participants completed either the personal or fictional version of the TALE questionnaire, due to concerns that how participants answered questions on one version of the survey would influence responses on the other version. The survey was self-paced, and up to five questions appeared on the screen at the same time. After completing the survey,



participants reported demographic information such as gender, age, level of education, and first language. After completing the survey, participants were thanked and compensated.

**Figure 13** shows this procedure.



**Figure 13. Study 3 Procedure**

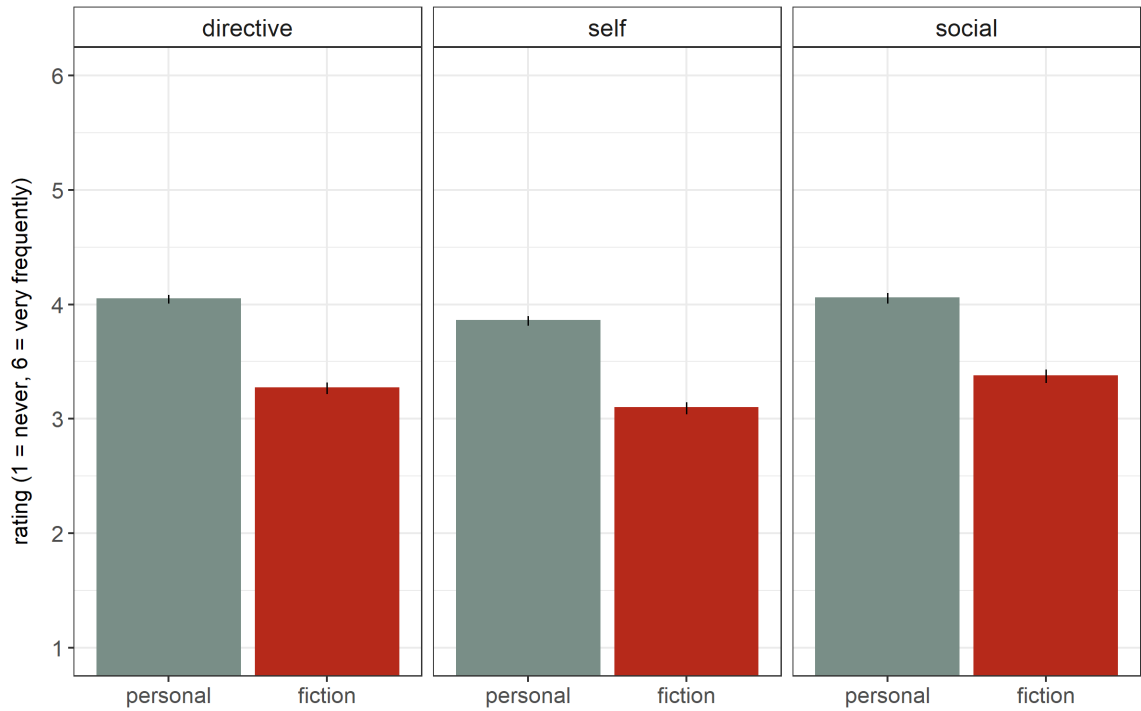
### 3.2 Results and Discussion

First, we examined the two items probing the general frequency of thinking and talking about personal memories or memories of fiction. Participants reported *thinking* about personal memories slightly more than memories of fiction ( $M_{\text{personal}} = 4.54$ ,  $M_{\text{fiction}} = 4.23$ ,  $SD_{\text{personal}} = 0.86$ ,  $SD_{\text{fiction}} = 1.03$ ,  $t(162) = 2.08$ ,  $p = .04$ ,  $d = 0.32$  [0.01, 0.64]), although the median was 4 (*occasionally*) for both conditions. Participants reported *talking* about memories of fiction more frequently than personal memories ( $M_{\text{personal}} = 3.80$ ,  $M_{\text{fiction}} = 4.57$ ,  $SD_{\text{personal}} = 0.93$ ,  $SD_{\text{fiction}} = 1.40$ ,  $t(138.72) = 4.14$ ,  $p < .0001$ ,  $d = 0.65$  [0.33, 0.96]).

Next, we examined the specific reasons why people reported thinking or talking about their life or works of fiction, divided into directive, self, and social functions. Thus, these 28 items were averaged into their respective three subscales, which proved at least as

reliable as previously reported work, with comparable measures of Cronbach's  $\alpha$  (all  $\alpha > .85$ ).

**Figure 14** shows how frequently participants reported using personal memories or memories of fiction for directive, self, and social functions.



**Figure 14. Bar Graph of Personal and Fictional Means and SEMs for Directive, Self, and Social Subscales in Study 3**

Reported usage of personal memories was very similar to that reported in Bluck et al. (2005), replicating this previous study. Participants consistently reported using their personal memories more frequently than memories of fiction for all three functions (Cohen's  $d$  ranging from 0.51 to 0.60). This difference between conditions was also consistent across individual items: personal memories were rated higher on average than memories of fiction for all 28 items except one: "I think back over or talk (about my life or certain periods of my life) / (events from fictional works) when I feel down and I want to make myself feel better."

Of interest is an apparent discrepancy: participants report talking about fiction more than their personal pasts when probed generally, but not when asked using the more specific items that make up the social subscale. While this could be due to inconsistencies in participants' self-report strategies, it hints that people may in fact think or discuss memories of fiction more often than is represented on these subscale items, especially in social contexts. For the social subscale, we note that the median was 4 for both fictional and personal conditions. The items on the TALE were developed and validated with respect to personal memories; they were not designed with the intent of including memories of fiction. Our present data offer evidence for overlapping functions between memories of lived experience and of fiction. However, to the extent that fiction may offer unique functions—ones distinct from personal memories—the present measures do not yet capture them.

This study documents that people report talking and thinking about memories of events from works of fiction on a regular basis, albeit at a lower rate than personal memories. People report drawing on memories of fictional events—which by definition, never happened—to solve problems in their lives, maintain a sense of self, and to create and maintain social relationships. This work adds to Chapter 2 by providing another pillar of empirical evidence to support the argument that memories of fiction are part of the autobiographical record.

## Chapter 4. Phenomenology and Function of Memories of Fiction and Personal Memories in Childhood and the Recent Past (Study 4)

“I was talking to one of my donors a few days ago who was complaining about how memories, even your most precious ones, fade surprisingly quickly. But I don’t go along with that. The memories I value most, I don’t see them ever fading.”

— *Never Let Me Go*, by Kazuo Ishiguro

Chapters 2 and 3 provide empirical evidence that memories of fiction can elicit vivid phenomenology and hold functional significance, comparable to memories of lived experience. In this chapter, we build from this prior work and introduce an experimental manipulation in our design to explore how it may affect personal memories and memories of fiction similarly or differently. To this end, we ask participants to generate personal memories and memories of fiction from childhood as well as the recent past, and then to report on the memories’ phenomenology, significance, and function, combining the measures of the previous chapters.

Past research establishes that not all memories of lived experience are equally vivid or elicit strong feelings of reliving. Childhood memories, for example, are often rated as less emotional and detailed than memories of recent events (e.g., Chin & Ward, 2018). Previous work also suggests that the subjective experience of memories that were either experienced or merely imagined differ by the age of the memory, i.e. whether the event occurred recently or in childhood (Johnson et al., 1988). In Study 4, we examined whether the age of a memory has similar effects on personal memories and memories of fiction. We predicted that people would be able to retrieve memories of fictional events from childhood, given that the two types of memories were similarly distributed across time in Studies 1 and 2 (see

**Figure 8** and **Figure 12**). Less clear was whether there would be forgetting or degradation of memories of fiction, given that they can be re-experienced in a way that lived experiences cannot, which can be rehearsed in conversation or reviewed via photos, but never literally re-experienced again.

The procedure of Study 4 paralleled that of Study 1, except that one half of participants were instructed to retrieve memories from childhood whereas the others retrieved recent memories. Both groups retrieved and described two events, one personal and one fictional, with order randomized across subjects. Both groups rated each event on measures relating to phenomenology, significance, and function.

## **4.1 Methods**

### **4.1.1 Participants**

Participants consisted of 106 individuals from the undergraduate subject pool at Duke University (67 women;  $M_{\text{age}} = 19.21$ ,  $SD_{\text{age}} = 1.01$ ) and 107 Amazon Mechanical Turk (MTurk) workers (51 women;  $M_{\text{age}} = 37.97$ ,  $SD_{\text{age}} = 11.57$ ), resulting in a final sample size of 213 total participants. In this study, 53.2% of MTurkers reported at least a bachelor's degree, and 85.9% reported having taken at least some college courses. We recruited from these two populations, which were used in the previous three studies, to maximize the generalizability of our findings. We did not have *a priori* predictions about differences between memories of fiction and personal memories based on sample, outside of anticipated differences in average participant age.

In addition to those above, we excluded 1 participant from the undergraduate population and 19 participants from the MTurk population for not following directions or

giving nonsensical responses. For relevant analyses, we also excluded memories drawn from the incorrect time period; for example, we excluded childhood memories in the condition where participants were told to retrieve recent memories. Including these observations does not alter the conclusions drawn.

#### **4.1.2 Materials**

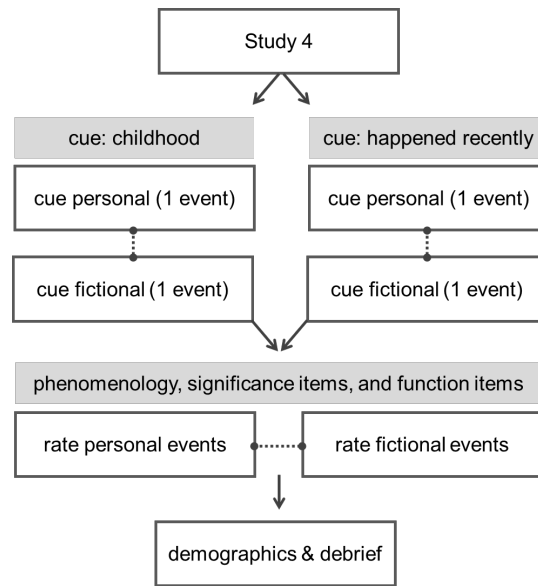
Building from our approach in Studies 1 through 3, we included items from the Autobiographical Memory Qualities (AMQ) questionnaire, Centrality of Events Scale (CES), as well as a shortened form of the Talking About Life Events (TALE) questionnaire.

For each event, participants answered adapted items from the Autobiographical Memory Qualities (AMQ) questionnaire. As the results of Study 3 suggested potential distinctions between the frequency of thinking and talking about personal and fictional events, we divided the “rehearsal” item into two separate questions: thought (“Since it happened, I have thought about this event”) and talked (“Since it happened, I have talked about this event.”), both rated on a 1 (not at all) to 7 (more than for any other event) scale. To gather a more complete picture of the phenomena at hand, we added two additional items that probed whether events were voluntary or involuntary memories, adapted from Rasmussen & Bernstein (2009). These two items were, “Since the event first happened, how often have you willfully thought back to the event in your mind and thought or talked about it?” and “Has the memory of this event suddenly popped up in your thoughts by itself—that is, without your having attempted to remember it?”

### **4.1.3 Procedure**

Study 4 had a 2 (recent or childhood) x 2 (personal or fictional) mixed design (**Figure 15**). Each participant retrieved two memories: one of lived experience and one from a work of fiction. In the recent condition, participants were told to retrieve an event that had “happened recently” or that they had “read or watched recently.” In the childhood condition, participants were told to retrieve an event that “happened in your childhood” or that they “read or watched in your childhood.” Otherwise, the instructions for retrieving memories were the same as those used in Studies 1 and 2. Thus, all participants retrieved a personal memory and a memory of fiction that was experienced recently or in childhood. Participants were randomized into conditions.

Immediately following retrieval of the memory, participants generated a short label (for personal memories) or named the work of fiction (for memories of fiction). They also described how long ago the event occurred, and for works of fiction, an approximation of the number of times the work of fiction had been read or seen. Then, participants were reminded of their descriptions of the events, rated the qualities of each memory on the AMQ, CES, and TALE, and provided demographic and additional consent information.



**Figure 15. Procedure for Study 4**

#### ***4.1.4 Statistical Analyses***

Analyses were conducted in RStudio (RStudio Team, 2016). We computed MANOVAs using the `MANOVA.RM` package (Friedrich et al., 2018). This package uses test statistics which are more robust to violations of distributional assumptions than more classic multivariate test statistics. We report modified ANOVA-type statistics (MATS) with resampled  $p$ -values (5,000 iterations), as the alternative (Wald-Type Statistic) may be more prone to type I errors (Hahn et al., 2013). We computed mixed effects ANOVAs using the `lme4` and `lmerTest` packages, using a type III analysis of variance table and computing  $p$ -values with Satterthwaite approximations for denominator degrees of freedom (Bates et al., 2015; Kuznetsova et al., 2017).



## 4.2 Results

### 4.2.1 Source of Memories

Most participants described events from movies (46.5%), followed by events from TV shows (35.2%), books (15.5%), and other (2.8%). **Table 8** shows examples of written descriptions for events.

**Table 8. Examples of Participant Responses in Study 4**

	Memory of Lived Experience	Memory of Fiction
<b>Childhood Condition</b>	I was sitting at the table in my grandparents' RV at midnight, eating Oreos with my grandfather while my grandmother yelled at my cousin Andrea for sneaking out of the RV to meet boys and ruining our vacation.	In the television show <i>Hannah Montana</i> , there is a scene where she's singing the song "I Miss You" about her mother who passed away. She sings the song out on her back porch while she looks up at the stars.
<b>Recent Condition</b>	I was working on a software program and my supervisor looked over my shoulder and said I was doing well. It made me feel appreciated and special because she rarely makes comments like that. I explained my strategy to her, and she was very pleased.	A man and a woman were arguing with each other about attending a birthday party. During their argument, a blanket on their bed caught fire. However, neither of them paid attention to it and they continued arguing. The discussion was very high intensity, their voices were raised, and both people involved seemed to be very passionate about the discussion.

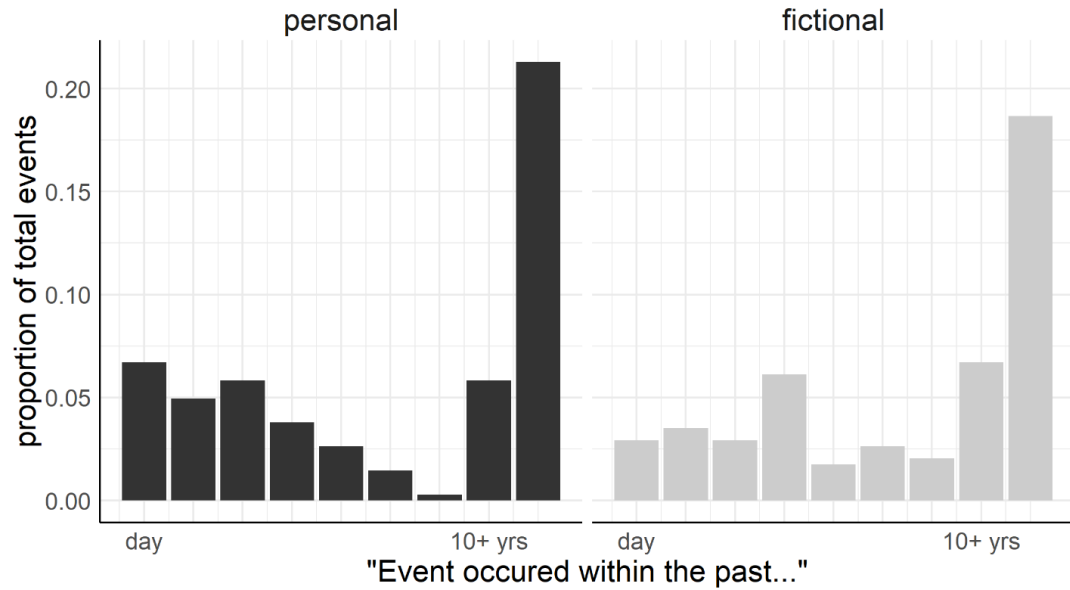
*Note.* Participant responses were minimally edited for grammar, spelling, and readability.

### 4.2.2 Temporal Distribution

We examined the temporal distribution of memories primarily as a manipulation check (

**Figure 16**). As expected, events in the childhood condition were reported to have occurred at an earlier age ( $M = 10.65$  years) than those in the recent condition (25.60 years;

$t(339) = 14.90, p < .0001$ ). This difference was consistent for both personal and fictional conditions and within both participant populations.

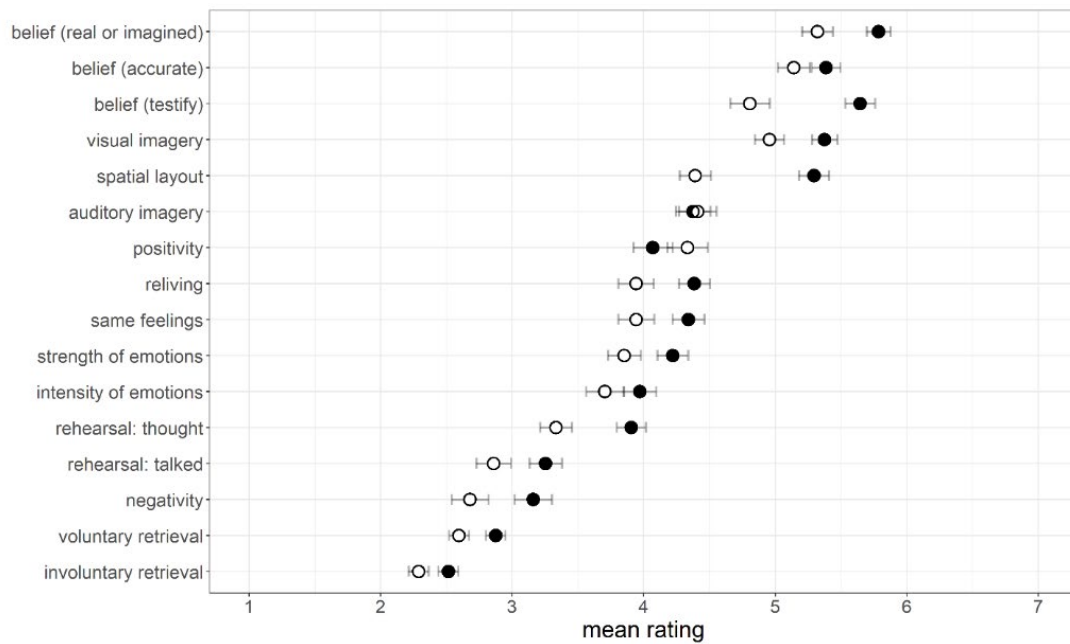


**Figure 16. Temporal Distribution for Study 4**

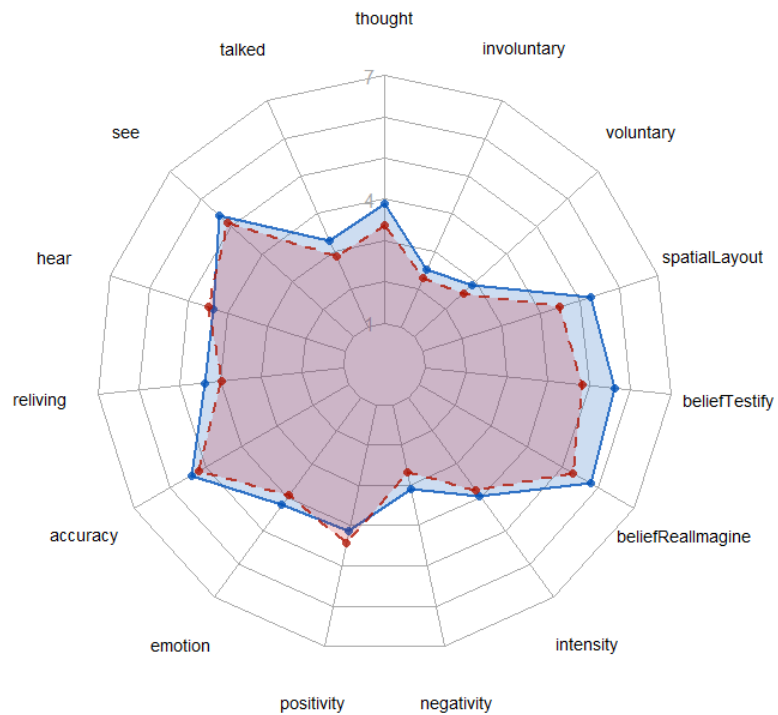
### 4.2.3 Memory Qualities

To allow comparison to Studies 1 and 2,

**Figure 17** illustrates how personal versus fictional memories differed in their rated phenomenology. and **Figure 18** illustrates the relationships between these items. As in Study 2, personal memories are rated on average more highly than memories of fiction on almost all measures. To support these impressions, we computed a multivariate analysis of variance (MANOVA) using the 19 measures related to subjective experience as dependent variables and the two conditions (memory type, age of memory) as crossed predictor variables (Friedrich et al., 2018). This analysis revealed statistically significant effects of personal versus fictional memories ( $MATS = 407.36, p < .001$ ) and time period ( $MATS = 87.69, p = .001$ ). We also observed a memory type by time interaction:  $MATS = 40.16, p = .045$ .



**Figure 17. Phenomenology Means and SEMs for Study 4**



**Figure 18. Radar Plot of AMQ Means for Study 4**

To preview subsequent analyses, we next completed factor analyses to simplify the number of items in our analyses by identifying latent factors consistent with past theory and research (Berntsen et al., 2019; Fitzgerald & Broadbridge, 2013). Our focus is on examining how time period affected personal and fictional memories for the six resulting factors.

#### **4.2.4 Dimensionality Reduction**

**Exploratory Factor Analysis.** All 27 items of the AMQ, TALE, and CES were used to compute a maximum likelihood factor analysis with oblique rotation (oblimin), as we anticipated correlations between factors. We hypothesized a 6-factor solution, which was confirmed by the results of the exploratory factor analysis; details are provided in **Appendix B**. Interestingly, all four factors identified in previous research computing a factor analysis of the AMQ—recollection, belief, impact, rehearsal—were in the present analysis (Fitzgerald & Broadbridge, 2013).

The first factor identified relates to the dimension of *significance* or impact; it includes all four of the CES items as well as three of the four autobiographical memory function items (directive, self, belong). The second factor identified relates to the tendency for the memory for be retrieved or rehearsed (*retrieval*) and includes measures relating to how often the event is thought about and talked about, as well as often the memory is retrieved voluntarily or involuntarily. The third factor relates to *recollection* of the event and included six measures: strength of emotions, same feelings or atmosphere again, sense of reliving, auditory imagery, visual imagery, and intensity of emotions. We note that intensity of emotions behaved irregularly in it loaded onto four of the six factors. The fourth factor relates to *belief*, and included items relating to confidence in the accuracy of the memory and willingness to testify about the events in play. The fifth factor related to the *valence* of the

memory, and included the items of positivity and negativity, which were inversely correlated to each other. The sixth factor related to *visual perspective* of the memory and included the items of field and observer visual perspectives. The items relating to spatial layout and ability to switch perspectives did not load satisfactorily onto any one factor.

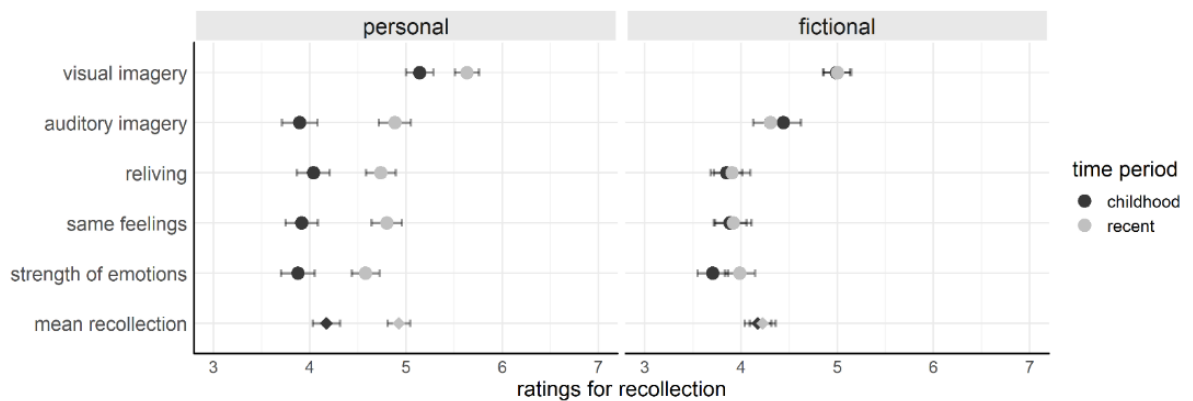
**Confirmatory Factor Analysis.** The model that emerged in the exploratory factor analysis described above was further examined using confirmatory factor analysis. The model that included the perspective factor did not converge, so it was removed; results involving visual perspective are examined separately below. Thus, maximum likelihood extraction was used to estimate the model with the five remaining factors. We removed the intensity of emotions variable in the final model, which showed an acceptable fit: CFI = .94, TLI = .93, RMSEA = .08, SRMR = .05,  $\chi^2(164) = 627.67, p < .001$  (Schreiber et al., 2006). Given the convergence of past literature, our hypothesized factors, and results of the exploratory and confirmatory factor analyses, we felt confident using these six factors to guide our analysis. Spatial layout, perspective switching, and intensity of emotions were removed from the models in the present analysis; including them does not alter the conclusions drawn. However, we note that this study was not designed to analyze the latent structure of the variables at hand, and that the results of the factor analysis should be taken as exploratory.

**Creating Composite Variables.** We created a new dependent measure for each of the first four factors (significance, vivacity, retrieval, belief) by averaging the relevant items together. We review these before exploring a possible explanation for observed differences i.e., that fictional memories can be repeatedly re-experienced. Items in the fifth factor (valence) and sixth factor (perspective) were analyzed individually, as these items were

negatively correlated to each other (e.g., positive and negative valence). We also computed MANOVAs for each factor, using a multivariate approach rather than averaging the relevant items together into one variable. These two analytical strategies led to the same conclusions in all but one instance. Thus, we largely report analyses using the first method for clarity and discuss the results for both analytical strategies in the case where they conflict.

#### 4.2.5 *Recollection Over Time*

We computed a mixed-effects ANOVA with time (recent versus childhood) as a between-subjects factor and memory type (personal versus fictional) as a within-subjects factor on the *recollection* dependent variable. This revealed main effects of time period ( $F(1, 214.60) = 7.52, p = .007$ ), and memory type ( $F(1, 201.16) = 9.50, p = .002$ ), as well as a statistically significant interaction between the two ( $F(1, 201.16) = 9.07, p = .003$ ).



**Figure 19. Recollection (Personal vs. Fictional) in Study 4**  
Five items (visual imagery, auditory imagery, reliving, same feelings, strength of emotions) were averaged to create the recollection composite. Means for the composite variable recollection are shown as diamonds on the bottom row.

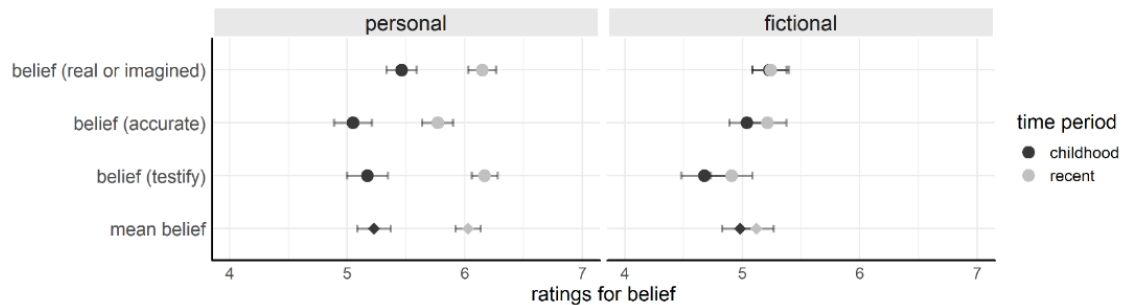
To interrogate the observed interaction, we computed *t*-tests for personal and fictional events separately, with the composite variable *recollection* as the dependent measure. As expected, recent memories of lived experience were rated higher than childhood

memories of lived experience:  $M_{\text{childhood}} = 4.17$ ,  $SD = 1.45$ ;  $M_{\text{recent}} = 4.93$ ,  $SD = 1.12$ ;  $t(199) < .0001$ , 95% CI of the difference =  $[0.39, 1.12]$ , Cohen's  $d = 0.58$ .

However, recent and childhood memories from fiction did not differ in how much recollective detail they elicited:  $M_{\text{childhood}} = 4.17$ ,  $SD = 1.42$ ;  $M_{\text{recent}} = 4.22$ ,  $SD = 1.18$ ;  $p = .79$ , 95% CI of the difference =  $[-0.43, 0.33]$ . This effect is consistent across individual items of the *recollection* factor, as illustrated in **Figure 19**: childhood *personal* memories were rated as evoking less vivid recollection (for visual and auditory imagery, a sense of reliving, evoking the same feelings/atmosphere, and re-experiencing emotions) than recent personal memories. However, this effect of time was not true for recollection of memories of fiction.

#### 4.2.6 Belief Across Time

We computed a mixed-effects ANOVA with time (recent vs. childhood) as a between-subjects factor and memory type (personal versus fictional) as a within-subjects factor on the *belief* dependent variable. This revealed a main effect of time period ( $F(1, 211.95) = 8.36$ ,  $p = .004$ ), memory type ( $F(1, 192.93) = 32.05$ ,  $p < .0001$ ), as well as a statistically significant interaction between the two factors ( $F(1, 192.93) = 9.38$ ,  $p = .003$ ).



**Figure 20. Retrieval (Personal vs. Fictional) in Study 4**  
Three items were averaged to create the retrieval composite. Means for the composite variable retrieval are shown as diamonds on the bottom row.

To interrogate the observed interaction between the two conditions, we computed  $t$ -tests for personal and fictional events separately, with *belief* as the dependent measure. Personal recent memories were rated as more believed than personal childhood memories,  $M_{\text{childhood}} = 5.23$ ,  $SD = 1.46$ ;  $M_{\text{recent}} = 6.03$ ,  $SD = 1.05$ ;  $t(199) = 4.43$ ,  $p < .0001$ , 95% CI of the difference = [0.44, 1.16], Cohen's  $d = 0.63$ . However, recent and childhood fictional memories were rated as equally believable:  $M_{\text{childhood}} = 4.98$ ,  $SD = 1.55$ ;  $M_{\text{recent}} = 5.12$ ,  $SD = 1.28$ ;  $p = .51$ , 95% CI of the difference = [-0.56, 0.28]. As one might expect, we found that participants were less confident in the details of their personal childhood memories (e.g., confident they would be if asked to testify about the event in a court of law, how accurate the event is) compared to more recent personal memories. However, while participants overall exhibited less belief in memories of fiction compared to personal memories (95% CI of the difference = [0.28, 0.85], Cohen's  $d = 0.41$ ), memories of fiction did not show the same difference between recent and childhood memories. **Figure 20** illustrates these effects.

#### ***4.2.7 Explaining the Effect of Time Period***

Memories of fiction were remarkably similar across childhood and recent time conditions in recollective detail, belief, and retrieval frequency. However, memories of lived experience showed the expected fading of memories over time. It is unlikely that memories of fiction are unaffected by the passage of time, as laboratory models of memory that use fictional stimuli show clear forgetting effects (e.g., Stanhope et al., 1993; Furman et al., 2007). Instead, we believe the results highlight one of the unique qualities of fiction: fictional events can be re-experienced at will, distinct from personal events. (While similar events may be experienced, it is not, to our knowledge, possible to time travel and experience the same exact moment again.) One hypothesis is that more frequently consumed works of fiction

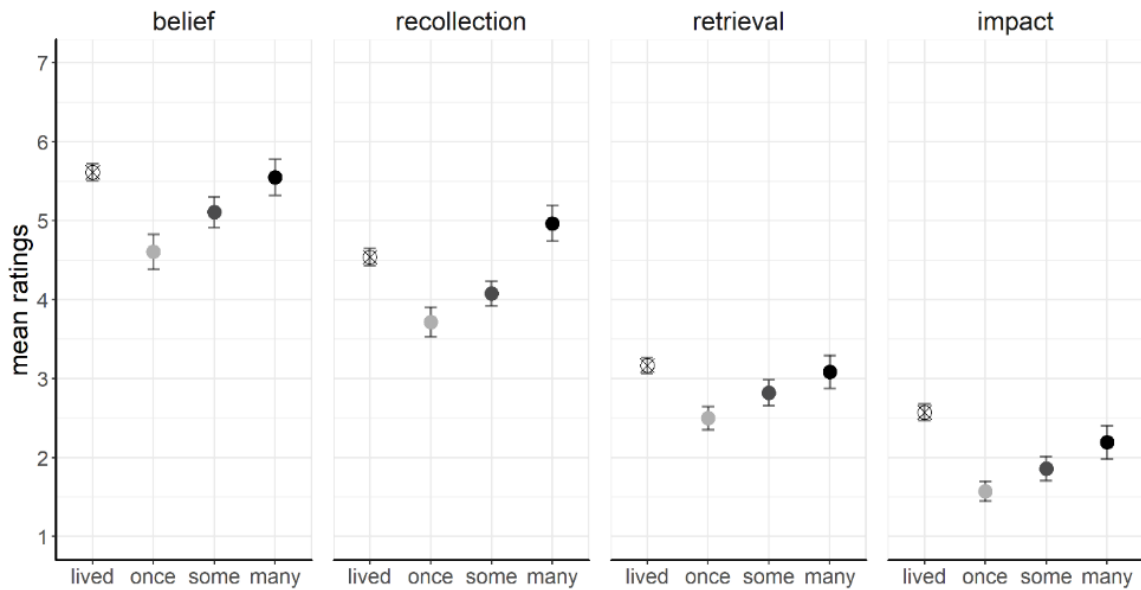


may be more vivid, believed, and frequently retrieved than works of fiction that were less frequently read or watched. Thus, how often a work of fiction has been read or watched may explain why memories of fiction are affected differently than personal memories for many of the dependent measures.

If this hypothesis is true, higher frequency should predict higher ratings for fictional events for significance, vivacity, retrieval, and belief factors. To explore this, we sorted memories of fictional events into three categories based on the *frequency*: works of fiction that were consumed only once ( $n = 58$ ), between two and five times (some;  $n = 54$ ), and more than five times (many;  $n = 44$ )<sup>1</sup>. Then, we computed a MANOVA, predicting the dependent variables of interest (significance, vivacity, retrieval, belief) with the predictor variable *rehearsal* (once, some, many) for memories of fiction. We found that rehearsal was a statistically significant predictor of the composite dependent measure ( $MATS = 41.93, p = .001$ ).

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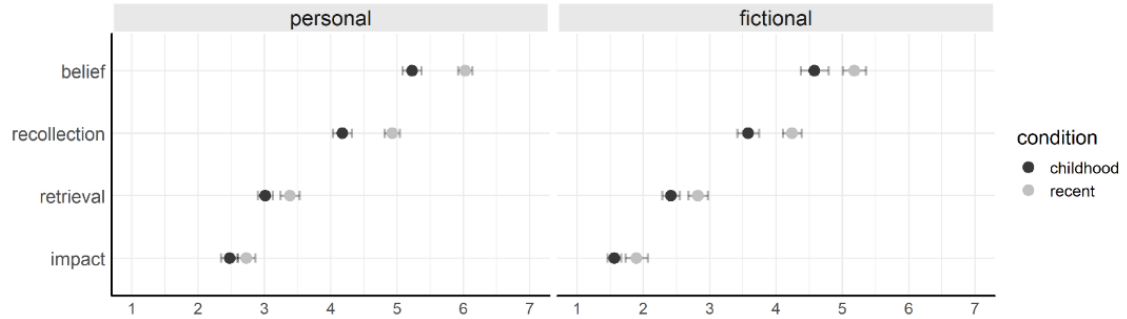
<sup>1</sup> We also examined these data using rehearsal as a continuous variable. However, we found that participant estimates for frequency were not distributed normally across the scale; once/some/many bins appear to better represent participant estimates of frequency. See Supplemental Information.



**Figure 21. Explaining the Effect of Time Period**  
**Belief, recollection, retrieval, and impact factors for personal memories and memories of fiction. Memories of fiction are disaggregated by consumption frequency: once, some (2 to 5 times), and many (more than 5 times).**

Next, we investigated this with separate ANOVAs on each of the dependent variables of interest with frequency as a predictor (consumed once, some, many). We found that frequency was a statistically significant predictor in all four models: impact ( $F(2, 154) = 3.31, p = .04$ ), recollection ( $F(2, 154) = 12.4, p < .0001$ ), retrieval ( $F(2, 154) = 3.45, p = .03$ ), and belief ( $F(2, 154) = 4.35, p = .01$ ). Post-hoc Tukey multiple comparisons of means indicated that memories of fiction that had been consumed many times were consistently distinct from memories of fiction that had been consumed fewer times, and indeed more similar to the subjective ratings of personal memories, as seen in **Figure 21**. Overall, we find correlational evidence that the variable of frequency explains why memories of fiction did not always exhibit an effect of time. **Figure 22** shows that when we exclude memories that

have been consumed many times, the manipulation of time period (recent versus childhood) is more similar across memory types.



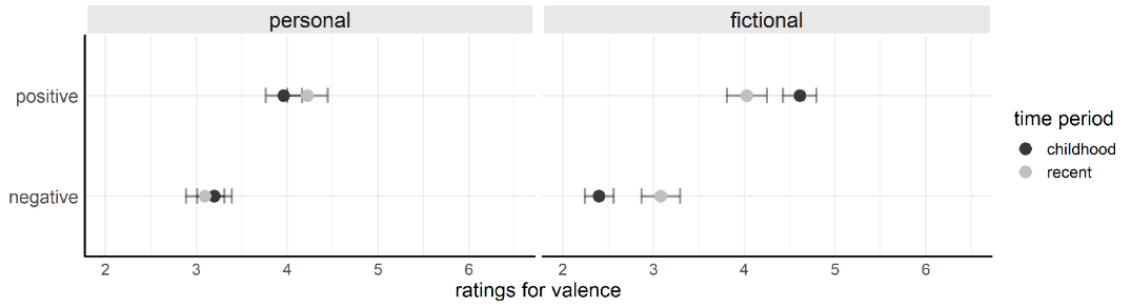
**Figure 22. Revealing an Effect of Time by Excluding 44 Fictional Events Seen 5+ Times**

#### 4.2.8 Valence Across Time

Next, we examined the effect of time period on valence, or the negativity and positivity associated with the memory. As illustrated in **Figure 23**, while personal memories did not differ by valence between childhood and recent memories, memories of fiction from childhood are more positive in nature than recent memories of fiction. This was confirmed by two mixed-effects ANOVAS with time (recent versus childhood) as a between-subjects factor and memory type (personal versus fictional) as a within-subjects factor on measures of positive and negative valence. For the model predicting positive valence, the ANOVA revealed an interaction:  $F(1, 195.99) = 4.66, p = .03$ . For the model predicting negative valence, the ANOVA revealed a main effect of memory type ( $F(1, 202.09) = 3.93, p = .03$ ) and an interaction ( $F(1, 202.09) = 4.38, p = .04$ ).

To interrogate the observed interaction between the two conditions, we computed *t*-tests for personal and fictional events separately, with *positive* and *negative* valence as the dependent measures. For personal memories, there was not a statistically significant

difference between childhood and recent memories for either positivity or negativity ( $p$ s > .39). For memories of fiction, we found that childhood memories were more positively valenced compared to recent memories:  $M_{\text{childhood}} = 4.61$ ,  $SD = 1.88$ ;  $M_{\text{recent}} = 4.03$ ,  $SD = 1.91$ ,  $p = .04$ , 95% CI of the difference = [0.02, 1.15], Cohen's  $d = 0.31$ . Similarly, we found that childhood memories were less negatively valenced compared to recent memories, although both were rated relatively low on the scale overall:  $M_{\text{childhood}} = 2.40$ ,  $SD = 1.64$ ;  $M_{\text{recent}} = 3.08$ ,  $SD = 1.84$ ,  $p = .01$ , 95% CI of the difference = [0.16, 1.20], Cohen's  $d = 0.39$ . We speculate that this effect of valence may be due to the kinds of fictional media people are permitted to consume in childhood.

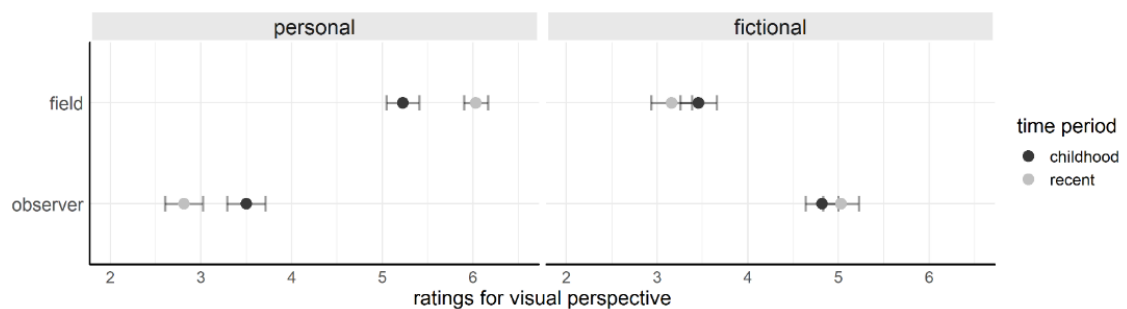


**Figure 23. Valence of Personal and Fictional Events by Time Period in Study 4**

#### 4.2.9 Visual Perspective Across Time

Finally, we investigated the role of perspective across time periods and memory types. We computed two-mixed effects ANOVAS with time (recent vs. childhood) as a between-subjects factor and memory type (personal vs. fictional) as a within-subjects factor on measures of field and observer perspective of the event memory. *Field* relates to a first-person perspective when reliving the event, whereas *observer* relates to a third-person perspective. For the model predicting field perspective, the ANOVA revealed a main effect of memory type ( $F(1, 211.47) = 154.22$ ,  $p < .0001$ ) and an interaction ( $F(1, 211.03) = 8.69$ ,  $p$

= .004). For the model predicting the observer perspective, the ANOVA also revealed a main effect of memory type ( $F(1, 201.48) = 92.97, p < .0001$ ) and an interaction ( $F(1, 201.48) = 5.34, p = .02$ ). Overall, we replicated the finding from Studies 1 and 2 that personal memories are more likely to be recalled in a field perspective, and memories of fiction are more likely to be recalled from an observer perspective. **Figure 24** illustrates these effects, which are in line with previous studies suggesting that personal memories are more likely to transform from field to observer-like with the passage of time (Nigro & Neisser, 1983; Rice & Rubin, 2009; Robinson & Swanson, 1993). However, this pattern did not hold for memories of fiction.



**Figure 24. Visual Perspective of Personal and Fictional Events by Time Period in Study 4**

### 4.3 Discussion for Chapter 4

Memories of lived experience showed the expected differences between recent and childhood events: compared to childhood events, memories of recent events were more likely to elicit recollective detail, were believed at a higher rate, and rehearsed more often. In contrast, memories of fiction did not. Childhood fictional memories were as vivid, believed, and rehearsed as recent memories. While this pattern is surprising, it is explainable by a unique characteristic of fiction, namely the ability to exactly re-experience an event. That is, some memories of fiction appeared to weather time because they were repeatedly consumed

over a longer time period. An examination of once-consumed fictional memories reveals the expected effects of time.

Examining the extent to which memories of fiction and personal memories are similar is a key initial step in determining the contribution of memories of fiction to the autobiographical record. However, there are important and interesting differences between experiencing events in the world and consuming fiction, which remain to be explored. In Study 4, we gather evidence for one such property: the potential for fictional events to be re-experienced. This is discussed in more detail in Chapter 6.

## Chapter 5. Recruitment of Narrative Fiction in Episodic Thought (Studies 5 and 6)

“What stories can do, I guess, is make things present. I can look at things I never looked at. I can attach faces to grief and love and pity and God. I can be brave. I can make myself feel again.”

— Tim O'Brien, *The Things They Carried*

In previous chapters, I cued existing memories retroactively to show that people have event memories of more than events they directly experienced. Indeed, we also have memories of events which occurred in works of fiction that are accompanied by a sense of reliving, and which can serve functional roles in our lives, i.e., *memories of fiction*. In this chapter, we explore whether people are willing to recruit memories of fiction spontaneously when simulating episodes by examining what makes up the stuff of our imaginations. While there is high-level consensus among memory researchers that imagining possible futures involves recombining pieces of our past, we can also readily imagine ourselves into situations for which we have no lived experience, that are implausible, and even ones that are impossible. For example, asking someone, “What would you do if you were being chased by a velociraptor in a theme park populated by creatures spawned from prehistoric DNA?” would likely result in a conversation referencing Steven Spielberg’s blockbuster *Jurassic Park* (or the original science fiction novel by Michael Crichton), rather than the response, “I have no idea. I have never been to a theme park with dinosaurs in it.”

### 5.1 Introduction

The U.S. Army released a 42-page report in 2019 examining emerging technologies that could augment human performance, such as “ocular enhancements” and “direct neural enhancement of the human brain for two-way data transfer” (Emanuel et al., 2019; Novak,

2019). One of the most curious recommendations highlights the need to “reverse cultural narratives of enhancement technologies”: “From Frankenstein to the Terminator, the message is often that technology’s integration with the human body robs the human spirit of its compassion and leads to violence and grave, unintended consequences” (p. vi, 11). The authors argue that understanding and overcoming existing negative perceptions of cyborg technologies, largely seeded by works of fiction, constitutes an important next step for the Department of Defense (DOD).

This report highlights a few things. For one, what we imagine about the future matters: these contents have the potential to shape not only personal futures, but our collective one. Second, this report describes a phenomenon currently under-studied by psychologists, but apparently understood by at least this corner of the DOD: the ingredients of our imaginations are not restricted to lived experience. Indeed, our cognitive systems appear to be fairly promiscuous when it comes to determining what events are available for serving as the raw material for what we imagine, perfectly willing to pull from implausible or impossible events, and even narratives that we *know* to be untrue (e.g., works of fiction). The phenomenon of recruiting from fiction was described in a qualitative study about first-time Flemish prison inmates relying on depictions of prisons from American television in imagining their sentences (Van den Bulck & Vandebosch, 2003). It has also been described anecdotally in popular media. For example, the *Rolling Stone* reported a story with the headline, “Arizona Man Who Learned CPR from ‘The Office’ Saves Woman’s Life” (Kreps, 2019). In the present work, we hypothesize that memories of fiction, given their vivacity and pseudo-episodic nature (see Chapter 2), can act as “extenders” of lived experience.



### 5.1.2 *Imagining the Future*

Thinking about the future, or prospection, can take many forms, from programming one's coffee pot the night before a busy morning to imagining how it feels to cross the finish line of a marathon. Szpunar, Spreng, and Schacter (2014) present a taxonomy of prospection that outlines four modes of future thinking (simulation, prediction, intention, planning) along the continuum ranging from semantic to episodic. The present work continues the tradition of studying *episodic future thought* (e.g., D'Argembeau & Van der Linden, 2012; Szpunar & McDermott, 2008).

There is high-level consensus among memory researchers that remembering the past and imagining the future are both constructive acts, relying on overlapping neural and psychological processes (Schacter & Addis, 2007). Understanding memory systems as fundamentally reconstructive answers an otherwise puzzling feature of human memory: why would cognitive processes meant for reproducing the past be so error-prone at this task (Schacter, 1999)? One suggestion is that our ability to vividly relive past events is not primarily concerned with faithful reproduction of an immutable past. Instead, episodic memory's adaptiveness is through providing the "raw material from which to construct and imagine possible futures" (Suddendorf & Corballis, 2007) in an effort to navigate towards desired outcomes (Baumeister et al., 2016). In this view, reliving a past experience is less like deploying a ready-to-go file on a computer, and more like sewing a quilt anew from existing scraps with each act of retrieval. Indeed, some scholars argue that planning and simulating for the *future* is the real, adaptive purpose of our memory systems (Baumeister et al., 2016; De Brigard, 2014; Schacter & Addis, 2007; Suddendorf & Corballis, 2007; Szpunar & McDermott, 2008).

One assumption of the framework above is that our imaginations of possible futures are built from past experiences e.g., the Constructive Episodic Simulation Hypothesis. Past work has focused on lived experiences and/or familiar situations. For example, Szpunar and Schacter (2013) ask participants to simulate events by combining familiar people, locations, and objects. They found that repeated simulation increased estimates of plausibility for emotional future events. Robin & Moscovitch (2014) ask participants to use real-world landmark cues previously visited by participants, and find that events based on more familiar cues are more detailed and vivid. De Brigard et al. (2016) compare the phenomenology of likely and unlikely counterfactuals, but do not delve into the contents of the simulations, beyond assessing phenomenology. And there is some suggestion that lived experience matters, in that simulation in unfamiliar locations were less vivid compared to simulations in familiar locations (Arnold et al., 2011).

These studies all work from the assumption that the “primary role of mental time travel into the past is to *provide raw material* from which to construct and imagine possible futures” (Suddendorf & Corballis, 2007) and that episodic future thinking relies on sampling from one’s past experiences. However, do the wells from which one samples need to be sourced from lived experience?

### **5.1.3 Present Studies**

In Study 5, we investigate the hypothesis that people spontaneously recruit memories of fiction when asked to simulate scenarios for which they have little lived experience to draw on e.g., a deserted island. As one of the scenarios described a global pandemic, we also inadvertently gathered data on a manipulation of direct experience, as data collection occurred concurrent with the arrival of COVID-19 in the world of our participant

population. In Study 6, we replicate the findings of Study 5 in a different population and with a new set of materials.

## **5.2 Study 5**

### **5.2.1 Methods**

#### **Participants**

We recruited 238 participants (150 women, 86 men, 1 non-binary gender, 1 non-disclosed gender) from the Duke University undergraduate participant pool between December 2019 and April 2020, who participated for course credit (**Figure 35** in **Appendix C**). The sample was 41.6% first-years, 40.8% second-years, 11.8% juniors, 5.5% seniors. No participants were excluded from analyses.

#### **Materials**

In the Fall of 2019, we developed four scenarios (**Table 9**) as pilot items. We intuited that our population of undergraduates would report low experience with the island, undercover, and pandemic scenarios, while reporting higher experience with the college scenario. During data collection, the COVID-19 global pandemic fundamentally disrupted everyday life for our participants, providing an unforeseen environmental manipulation for the pandemic item. We discuss this further in the results section.

**Table 9. Materials for Study 5**

<b>Item Name</b>	<b>Prompt for Imagination</b>
island	Imagine that you have been stranded on a deserted island alone, with only your backpack or book bag with you.
undercover	Imagine that you are spending a day undercover as a prison inmate. You are being processed as a new inmate, and very few people know about your undercover status.
pandemic	Imagine that a highly infectious disease is quickly ravaging the globe, inciting panic and destabilizing societies.
college	Imagine that it is next semester, and you have just transferred to another university on the West Coast. It is the first day of class.

### **Procedure**

There were three main phases to this study. In each phase, participants answered questions relating to each scenario. The order of the scenarios was randomized.

In the first phase, participants were asked to imagine each scenario. Then, they were asked to describe what the situation would be like or what they would do. We asked participants to imagine and describe all four scenarios before answering questions about what they imagined to reduce the chances that our questions (e.g., about source material or vivacity) would affect the contents of what participants imagined. This phase was introduced with the following set of instructions:

“In this first section, you will be asked to imagine a series of hypothetical situations. Then, you will be asked to describe what you think those situations would be like and/or what you would do in those situations. Try to imagine each hypothetical as vividly as you can.”

For data collection in the spring of 2020, the following text was added:

“These hypotheticals were not designed to touch on any specific current events, but you may see similarities between them and what is happening in the world. Simply follow the directions and imagine what comes to mind. Then, answer the questions

that follow as accurately as you can. Don't worry about what you're 'supposed' to do – there are no wrong answers!”

Then, the prompt for each scenario was presented. Participants were told to: “Take a minute or so to visualize what that experience would be like and what you would do, closing your eyes if that helps. Remember to imagine the situation as vividly as you can. When you are ready, press the button below to proceed.” On the next screen, participants were then asked to describe what they imagined about the scenario in 1 – 3 sentences. They were also told:

“*Note.* We are interested in the contents of what you imagined for this hypothetical; we are not looking for anything specific. You might discuss what the scene you imagined looked like, sounded like, what you were doing, what you were thinking, or anything else.”

In the second phase, participants answered questions about the phenomenology of what they imagined, with items selected from the Autobiographical Memory Questionnaire (AMQ; Rubin et al., 2003). Participants were reminded of what they wrote for each scenario, and answered questions relating to visual and auditory vivacity, a sense of reliving, emotional intensity, spatial layout, and visual perspective (field and observer).

In the third phase, participants reported the source of their memories. Participants reported this in two different ways: through open-ended text responses and using a multi-select checklist of possible sources. First, we described to participants what we meant by the ‘source’ of their memories, including an example: “For example, if you were to imagine what it would be like to eat lunch next week on campus with John Legend, your ‘material’ might be your previous experiences ordering from the Divinity Cafe and an ad you saw for the reality show, *The Voice*.” Then, participants were reminded again of what they wrote for each scenario, asked to describe what the “sources or material” were for what they imagined and to be as specific as possible. They were also told: “*Note.* You might have used one or

many sources. The sources could be from anywhere, including but not limited to: your past experiences, experiences from other people, works of fiction, videos you've seen, dreams, or anything else. It is likely you will not be able to remember all of the sources you used for your simulation. Just try your best!” Participants were able to provide responses in as much or little detail in the open-ended text response, including, “I’m not sure.”

On the next screen, participants selected all that applied from the following list: experience(s) you had yourself, experience(s) you heard about from someone else, work(s) of non-fiction you read, something you watched that was non-fiction, something you read that was fiction, something you watched that was fiction, or other. These labels correspond to lived experience, vicarious experience, nonfiction (watched or read), and fiction (watched or read), respectively. If “something you read that was fiction” was selected, the participant was asked to indicate whether the fictional work was a book, short story, or other. If “something you watched that was fiction” was selected, the participant was asked to indicate whether the fictional work was a movie, TV show, or other.

We note that while both operationalizations for simulation source material are limited by participants’ willingness and ability to self-report the source of their imaginations, the two items also present potential differences. Hence, we chose to include both. We reasoned that open-ended text responses may result in less thoroughness (with participants satisficing rather than reporting all of the sources that may come to mind through introspection) but may be less prone to demand characteristics. In contrast, the checklist of responses may suggest to participants what kinds of sources the experimenters were interested in but may also result in more thorough reporting.

Finally, after answering demographic questions, participants were asked to report how much “direct experience” they had with each scenario (1 = no experience, 6 = a great deal of experience).

### **Statistical Analyses**

Analyses were completed in RStudio (2018) running R version 4.0.3. Generalized linear mixed-effects models were run using the `lme4` software package (Bates et al., 2015). Significance for fixed effects was assessed using Satterthwaite approximations to degrees of freedom with the package `lmerTest` (Kuznetsova et al., 2017).

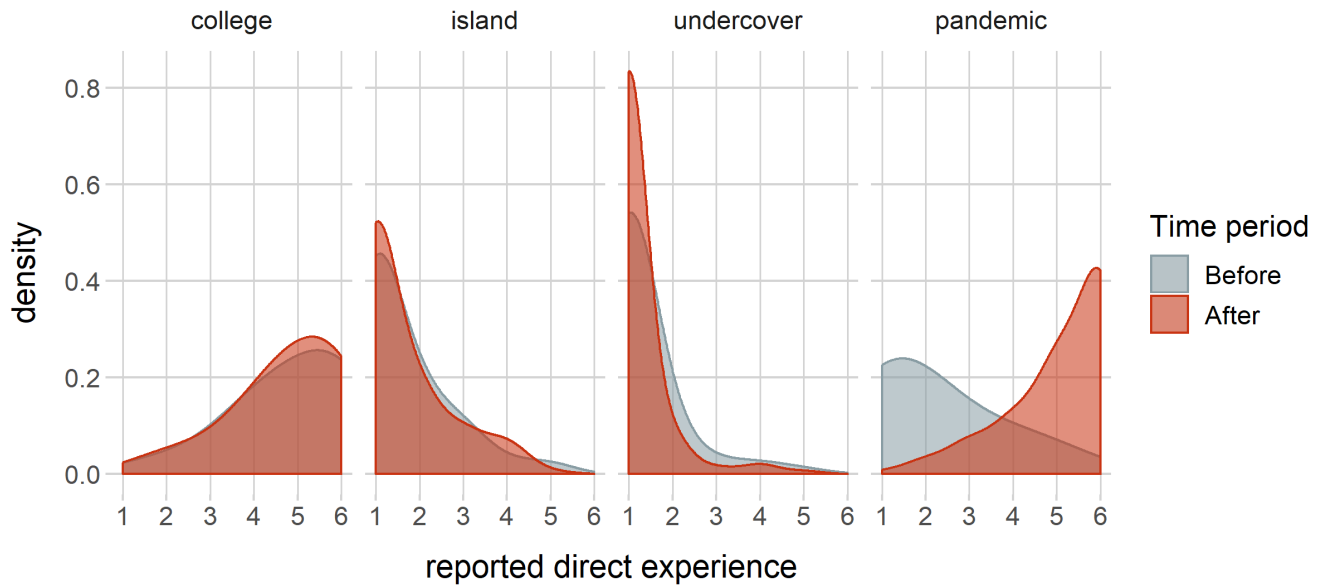
### **Coding of Responses**

Participants’ open-ended text responses in the third phase coded by the dissertation author and two research assistants for whether or not the response explicitly mentions a work of fiction (0 or 1) e.g., “Definitely books and movies I’ve read. It reminds me of *Lord of the Flies* and the movie *Castaway*.” Initial agreement among the three coders was high: Cronbach’s  $\alpha = .96$ , percentage agreement = 91%. Disagreements were resolved manually by the dissertation author e.g., by researching the piece of media described in the response to identify its status as fiction or not. If still unclear, the observation was coded by majority i.e., what 2 of the 3 coders provided.

## **5.2.2 Results**

### **Examining Reported Experience**

First, we confirmed our intuitions that reported experience relating to the college scenario would be high ( $M = 4.88$ ), and that reported experience with the other scenarios would be low ( $M$ s ranged from 1.31 – 2.20). As a reminder, experience was reported on a 6-point scale.



**Figure 25. Density Plots Illustrating of Reported Direct Experience by Item (College, Island, Undercover, Pandemic) by Time Period (Before vs. After March 10, 2020) in Study 5**

However, we did not anticipate that participants' likelihood of experiencing a global pandemic would change dramatically during data collection (**Figure 25**). To account for this, we created the *time period* variable, separating participants who completed the study before March 10, 2020 or after (inclusive) this date. March 10 was chosen because it was when Duke University announced the remainder of the semester would be remote, serving as a clear boundary in time while the COVID-19 pandemic was escalating in the United States in general and North Carolina in particular. As anticipated, participants' reported experience for the pandemic scenario changed before and after March 10, 2020:  $M_{\text{before}} = 2.20$ ,  $M_{\text{after}} = 5.08$ ,  $t(206) = 15.40$ ,  $p < .0001$ <sup>2</sup>. Participants' experience for the other scenarios remained stable (**Table 10**).

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<sup>2</sup> Predicting reported experience for the pandemic scenario in a linear regression with date as continuous predictor yields the same conclusion:  $F(1,206) = 177.7$ ,  $p < .0001$ .



**Table 10. Means, Standard Deviations, and Ns of Experience by Item (College, Island, Undercover, Pandemic) and Time Period (Before vs. After) in Study 5**

	Before		After		Overall	
	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>
college	4.88 (1.28)	66	4.77 (1.26)	143	4.81 (1.27)	209
island	1.66 (1.02)	95	1.65 (0.99)	143	1.65 (1.00)	238
undercover	1.31 (0.81)	66	1.20 (0.63)	143	1.23 (0.69)	209
pandemic	2.20 (1.43)	95	5.08 (1.17)	143	4.16 (1.84)	238

*Note.* Experience was reported on a 1 (low) to 6 (high) scale.

### **Do People Recruit Fiction in Their Imaginations?**

We first examined in detail the claim that people spontaneously recruit memories of fiction when asked to simulate possible scenarios. To do, we examined the percentage of simulations in which participants self-report incorporating fiction into what they imagined in several different ways, in an effort to be thorough and conservative in providing an initial account of this phenomenon.

First, we examined the sources participants reported using the checklist, where they could select from lived experience, vicarious experience, nonfiction, and fiction<sup>3</sup>. These sources were not mutually exclusive: participants could select as many of the categories that applied. As shown in the “multi-select checklist” row of **Table 11**, people reported incorporating fiction as a source of their simulations often.

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<sup>3</sup> We collapsed across read/watched fiction and read/watched nonfiction due to low sample sizes in the “read” conditions.

**Table 11. Percentage of Participants Reporting Fiction as a Source in Study 5**

	overall	island	undercover	pandemic	college
multi-select checklist	<b>68.3%</b>	79.0%	92.3%	52.5%	50.2%
multi-select checklist (first block only)	<b>63.9</b>	68.3	92.9	46.5	60.0
open-ended text responses	<b>56.2</b>	72.7	76.1	49.2	25.4
open-ended text responses (first block only)	<b>50.8</b>	78.3	64.3	49.3	18.5

We found consistent evidence that people report incorporating fiction when simulating possible events, with percentages ranging from 50% to 92%. However, it is possible that this task—selecting sources from a checklist—suggested to participants that they should be selecting fictional sources (demand characteristics). Thus, we also examined the sources reported by participants via open-ended text responses, which were coded for whether or not they explicitly mentioned fiction. The percentage of participants who reported fiction in their open-text responses remained quite high (**Table 11**), especially for the island and the undercover scenarios.

As a final effort to characterize this phenomenon conservatively, we examined incorporations of fiction via both the multi-select checklist and open-ended text responses for only the *first* block presented ( $N = 238$  observations) to account for potential contamination across items. It is possible that seeing the “fiction” as an option in the checklist for earlier items inflated the extent to which people cited fiction as a source in subsequent items. Thus, we examined only the first block presented in the third (source) phase of the study, which captures most conservatively the spontaneous recruitment of

fiction in imagining these scenarios. These percentages are also listed in **Table 11**. These numbers remain high, with the exception of the college scenario.

In sum, we found consistent evidence that participants recruit fiction when asked to report the source or “material” of their imaginations. For subsequent analyses, unless otherwise specified, we use source as measured by the multi-select checklist.

### **When Do People Recruit Fiction in Their Imaginations?**

To assess the hypothesis that people recruit fiction when imagining in the absence of direct experience, we calculated binomial logistic regressions predicting the inclusion of fiction or lived experience, respectively, based on a participants’ experience with the scenario.

We first computed models predicting whether or not participants incorporate *fiction* in their simulation (0, 1) with direct experience with the scenario as the predictor. The mixed effects regression model was preferred to the fixed effects model by AIC (776.07 versus 783.88)<sup>4</sup>. The model was statistically significant (**Table 12**). Notably, the odds ratio was .50. In other words, for each one unit increase in reported experience on the 1 to 6 scale, there was a 50% decrease in the odds of reporting that a work of fiction was recruited as part of the simulation.

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<sup>4</sup> Model parameters for this and subsequent fixed effects-only models are provided in Appendix A. This model yields the same conclusions provided in the main text.

**Table 12. Logistic Mixed Effects Model Regressing Reported Experience (1:6) on Inclusion of Fiction (0,1) in Study 5**

Variables	OR (95% CI)	Coefficient (95% CI)	SE	<i>p</i> -value
(Intercept)	31.33 (17.98, 54.58)	3.44 (2.89, 4.00)	0.28	< .0001
Experience	0.50 (0.45, 0.57)	-0.68 (-0.81, -0.56)	0.06	< .0001

*Note.* ICC (adjusted) = 0.19, Conditional  $R^2$  = 0.44, Marginal  $R^2$  = 0.32. AIC = 776.07, BIC = 790.23.  $N_{\text{observations}}$  = 829,  $N_{\text{groups}}$  = 209.

Next, we computed a model predicting whether or not participants reported *lived experience* in their simulation (0, 1) with direct experience with the scenario as the predictor. Once again, the mixed effects regression model was preferred to the fixed effects model by AIC (767.50 vs 778.2). The model was statistically significant (**Table 13**). Notably, the odds ratio was 2.73. In other words, for each one unit increase in reported experience on the 1 to 6 scale, the odds of recruiting lived experience into one's simulation almost triples.

**Table 13. Logistic Mixed Effects Model Regressing Reported Experience (1:6) on Inclusion of Lived Experience (0,1) in Study 5**

Variables	OR (95% CI)	Coefficient (95% CI)	SE	<i>p</i> -value
(Intercept)	0.07 (0.04, 0.11)	2.64 (2.17, 3.12)	0.24	< .0001
Experience	2.73 (2.33, 3.20)	1.00 (0.84, 1.16)	0.08	< .0001

*Note.* ICC (adjusted) = 0.22, Conditional  $R^2$  = 0.60, Marginal  $R^2$  = 0.49. AIC = 767.50, BIC = 781.66.  $N_{\text{observations}}$  = 829,  $N_{\text{groups}}$  = 209.

Taken together, these models are consistent with the hypothesis that people recruit material from works of fiction into their simulations in the absence of relevant lived experience. This is illustrated in **Figure 26**, which depicts the proportion of simulations that

were reported as incorporating each source category (lived experience, works of fiction, vicarious experience, works of nonfiction) for each level of reported experience (1 – 6).



**Figure 26. Reported Experience by Likelihood of Recruiting from Lived Experience, Fiction, Vicarious Experience, and Nonfiction in Study 5**  
(1 = low experience, 6 = high experience)

### From Imagining to Living Through a Pandemic

Remarkably, we observed the world of our participants transform during data collection, observing a change in real time for the pandemic scenario. The right-most panel of **Figure 25** above shows how participants' reports of how much experience they had with the pandemic scenario ("Imagine that a highly infectious disease is quickly ravaging the globe, inciting panic and destabilizing societies") shifted. In this section, we investigate what insights we can glean from this case study. As a reminder, as data collection did not occur continuously across time, data are sometimes binned into two time periods: "Before" and "After" March 10, 2020.

***Qualitative Summary of Participant Responses.*** First, we examined how participants' open-ended text responses changed across time, with 15 representative responses shown in **Table 14**. In initial responses, participant descriptions are heavily and explicitly influenced by fiction, likely due in part to the dramatic nature of the prompt, as illustrated in examples #1 through #4. The scenes are sometimes detailed (“wearing white masks”) and rely on works of fiction like *Contagion*, *The Purge*, zombie movies, and even video games. Of note is a very practical response in January of 2020 (example #5): “I will keep my family from going to a public place. I am doing research online to see which countries are relatively safer and plan to move with my family.” This participant described lived experience with a previous pandemic: SARS.

As the year 2020 unfolded, participant responses became yoked to the details of their own lived experiences: “I am staying indoors all the time and feeling bored. My parents are panicking” (#14), “People are really scared, and everyone's told to stay home and inside, so I'm sitting on a couch in sweatpants and a big blanket worrying about people that I love” (#15). There are discussions of the empty aisles in the grocery store, washing one's hands frequently, and a feeling of panic combined with boredom. One participant, when asked to describe the source(s) of their imaginations, wrote: “What is happening currently. In fact, I can barely imagine this one because it's so real.”

One observation of note is participants' willingness to incorporate works of fiction in their simulations, even when their immediate lived experience mapped closely to the prompt provided. While some responses described drawing on lived experience primarily, other participants described imagining a scene more like a patchwork, stitched together from current events and works of fiction, from *Contagion* (#12, #16) to *World War Z* (#13).

**Table 14. Examples of Participant Responses for Pandemic Item in Study 5**

#	Date	Description of simulation	Description of source material(s)
1	12/02/2019	I imagined myself locked in my house with my family, watching the TV with the lights off. I am texting my boyfriend worriedly, as he is with his own family and not with me. I feel panicked and terrified in the scenario and am praying often that the disease does not touch anyone I love.	I watched a movie as a part of my eighth-grade science class, called <i>Contagion</i> , that was so harrowing it has stuck with me all these years. To this day, I am terrified of being patient zero. Most of the fear and hopelessness that the scenario dredged up for me has roots in this movie. Additionally, I am a huge fan of <i>The Walking Dead</i> , and the visualization I formed of the world outside my house was very similar to images of the world portrayed in this show.
2	12/02/2019	I imagined people running around with masks on boarding up their windows to stay safe from infection, similar to how people in the movie <i>The Purge</i> acted.	I got the material from a movie I had seen, specifically <i>The Purge</i> when everyone is running around trying to stay safe from death. There is also a movie, I cannot recall the name, that focuses on a disease where people are taken by the light if they see the outside and are not blindfolded [Bird Box].
3	12/3/2019	Total anarchy. Cities burning, people rioting in the streets, a total collapse of society. People dying everywhere from disease.	Disaster fiction like the movie <i>Pandemic</i> or the Book <i>World War Z</i> . The mobile game <i>Plague Inc</i> in which you infect the entire world as a disease.
4	01/14/2020	I imagined a greyish brownish picture where everybody also wore greyish clothes on the streets. Everybody including me are wearing white masks.	I think it might be from literature such as <i>Oliver Twist</i> where cities are depicted as being really sad.
5	01/24/2020	I'm worried for my family, especially for my son. I will keep my family from going to a public place. I am doing research online to see which countries are relatively safer and plan to move with my family.	I thought about what I would do. I would definitely put my family first. I've had a similar experience when SARS broke out in China.

6	03/5/2020	I am imagining what is going on now with the coronavirus. Some people are too worried, some not enough and some are making a joke about the whole thing.	This simulation came from what is actually happening right now. I think another source for this would be news outlets.
7	03/8/2020	I think it would be similar to the coronavirus. Mass panic followed by governments trying to unsuccessfully quarantine the disease. I can see and hear the news, always discussing it.	I got this from <i>Plague Inc</i> the video game, the current coronavirus scare, and movies.
8	03/12/2020	I imagine myself right now laying in my bed depressed about school getting canceled	From my real life
9	03/14/2020	I would imagine all the supermarket stores are empty, and people are just freaking out and running on the streets.	From what I just did (go to Whole Foods) and from movies
10	03/18/2020	I would be constantly cleaning my hands, taking showers and being very careful with everything I touch. I would avoid contact with other people as much as possible to decrease the probability of getting infected.	My resource for this scenario was from my personal experience now that we are experiencing a pandemic
11	03/20/2020	that everyone is stuck in their homes and is not allowed to leave their state or city. there is a shortage of every consumer item and food	I think about the movie <i>Contagion</i> and the hypothetical situations that people are making up about COVID-19
12	03/28/2020	Supermarkets are wiped out. Panic ensues on the streets as people do not greet each other and exchange formalities. Social interaction is almost non-existent.	This is from movies such as <i>World War Z</i>
13	03/28/2020	The streets are empty. I am staying indoors all the time and feeling bored. My parents are panicking.	What is happening currently. (In fact, I can barely imagine this one because it's so real)
14	04/8/2020	The first thing I imagine is scary news broadcasts with lots of maps and glowing red stuff. People are really scared, and everyone's told to stay home and inside, so I'm sitting on a couch in sweatpants and a big blanket worrying about people that I love.	TV shows/movies, video games, current experience



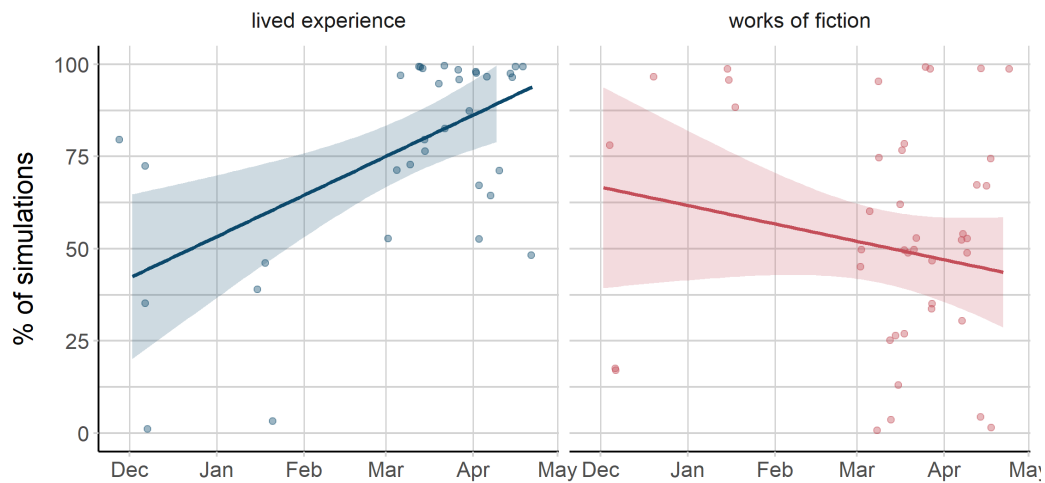
15	04/15/2020	I imagined news similar to that of today. I also imagined more violence breaking out and staying indoors.	I mainly used material from today's news outlets as well as how I've been acting currently. I also drew a bit from the movie <i>Contagion</i> .
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*Note.* Responses were minimally edited for grammar and spelling.

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**Observing the rise of lived experience.** Next, we examined the hypothesis that elements of fiction can act as an “extender” of lived experience when direct experience is not available. The present data allowed for the unique opportunity to observe a change in real time. **Figure 27** illustrates the percentage of imaginations that include lived experience and works of fiction, with each point representing a day for which data were available.

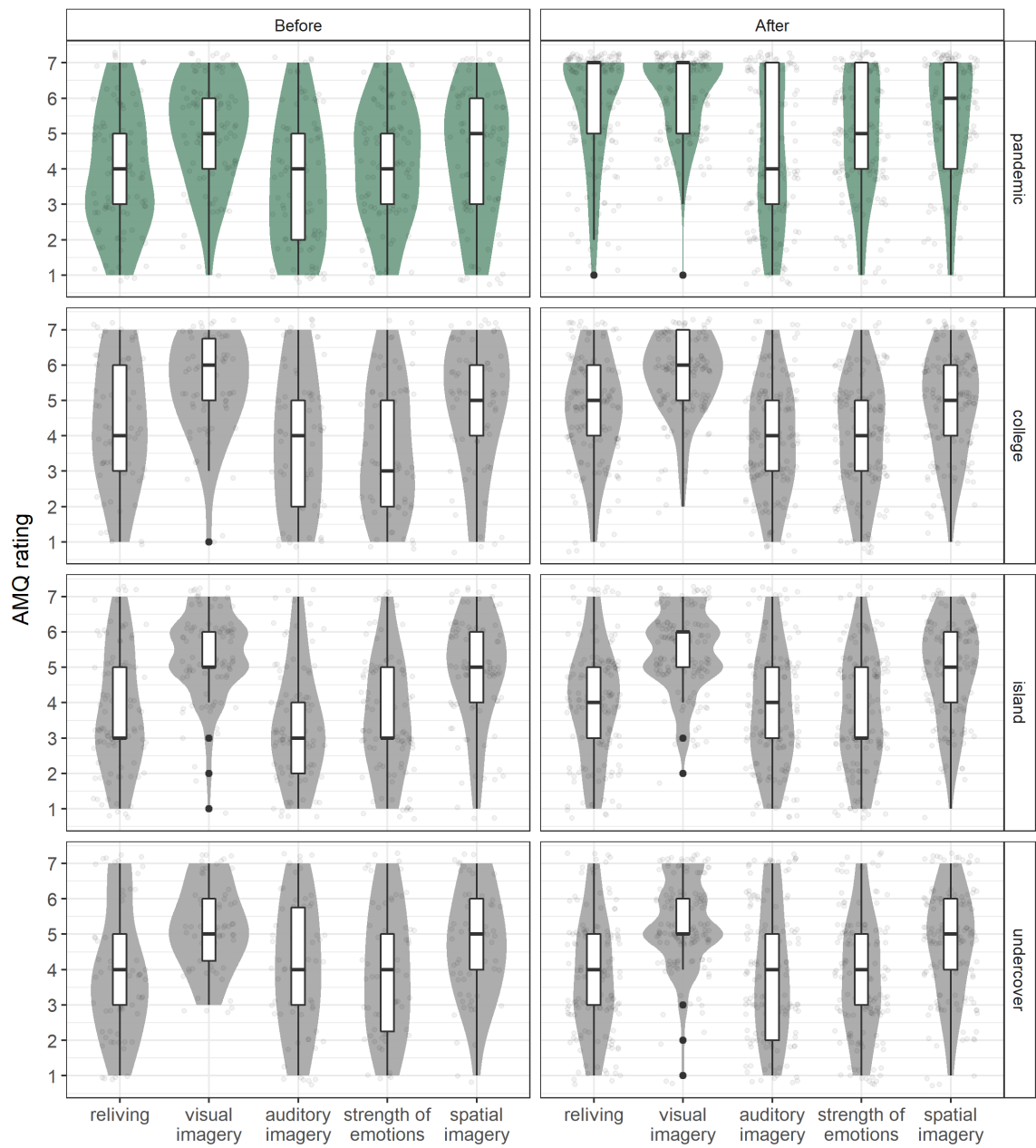


**Figure 27. Scatterplot of Simulations that Report Lived Experience (Left) and Works of Fiction (Right) as a Simulation Source by Date for the Pandemic Item in Study 5**

**Changes in phenomenology.** Finally, we asked how the subjective experience of an episodic simulation shifts as lived experience becomes available. To do this, we examined how participants’ Autobiographical Memory Questionnaire (AMQ) ratings for visual imagery, auditory imagery, spatial imagery, intensity of emotions, and sense of reliving changed by time period.

We computed a multivariate linear regression predicting a linear combination of AMQ items using time period (Before, After) and item (college, island, undercover, pandemic) as dummy-coded predictors. The model was statistically significant:  $F(7, 886) = 3.78, p = .0004$ , adjusted  $R^2 = .02$ . The interaction between time period and the pandemic

item was statistically significant: estimate = 0.94,  $SE = 0.31$ ,  $t = 3.00$ ,  $p = .003$ . To investigate this interaction, we computed a follow-up multivariate linear regression predicting AMQ item ratings with time period (Before, After), including only pandemic item observations. The model was statistically significant:  $F(1,236) = 18.95$ ,  $p < .0001$ , adjusted  $R^2 = .07$ . This model revealed that phenomenology in the time period after March 10, 2020 for pandemic items increased by an estimated 1.00 point (7-point scale),  $SE = 0.23$ ,  $t = 4.35$ ,  $p < .0001$ . In other words, as expected, episodic simulations of the pandemic became more vivid overall when lived experience became available as a source material. **Figure 28** illustrates the shift in overall AMQ ratings for the pandemic scenario across time (but not other items).



**Figure 28. Violin Plots of Phenomenology Items by Item (Pandemic, College, Island, Undercover) and Time Period (Before vs. After) in Study 5**

## 5.3 Study 6

Study 5 found a clear relationship between reported experience and the likelihood that participants would rely on lived experience or draw on works of fiction while simulating experiences. These results suggest that as people have more direct experience, they are likely to recruit it in their simulation. In the absence of direct experience, they are more likely to knowingly incorporate memories of fiction.

Study 6 seeks to conceptually replicate Study 5. In Study 5, most participants had similar and skewed levels of experience with each scenario (either quite high or quite low), with a naturalistic manipulation of experience with the infectious disease scenario. Here, participants were asked to imagine scenarios for which we expect them to vary in direct experience. We also used a more diverse set of items, to reduce the chances that this effect is tied to a particular set of stimuli. This study was pre-registered at [osf.io/xrbyg](https://osf.io/xrbyg).

### 5.3.1 Methods

#### Participants

A total of 248 participants ( $M_{\text{age}} = 33.78$  [18-80],  $SD_{\text{age}} = 12.69$ ; 135 women, 110 men, 3 gender unavailable) from Prolific's ([www.prolific.co](https://www.prolific.co)) online pool in January 2021. We pre-screened to select for workers who reported being fluent in English and currently resided in the United Kingdom, Canada, or the United States. Two additional participants were excluded from analyses due to failing at least one attention check and providing open-ended responses that are off-topic; exclusion decisions were made prior to data analysis. Participants were paid \$3.50 USD to complete the task, for an average hourly rate of \$10.10.

## Materials

We aimed to develop items for which participants would vary on lived experience. We piloted 28 items on Prolific, asking participants to rate 4 to 5 randomly assigned scenarios for direct experience on a scale of 1 - 6. We then examined variation among the items through data visualizations and descriptive statistics, curating a final set of 16 items for which participants were likely to vary on lived experience. **Table 15** shows five sample items. Density plots of reported lived experience for each item are shown in **Figure 36** in **Appendix C**. For example, an item relating to “Arctic research” was piloted but not used, because very few people reported experience with similar situations. The full set of items is provided at [osf.io/vnpgc](https://osf.io/vnpgc).

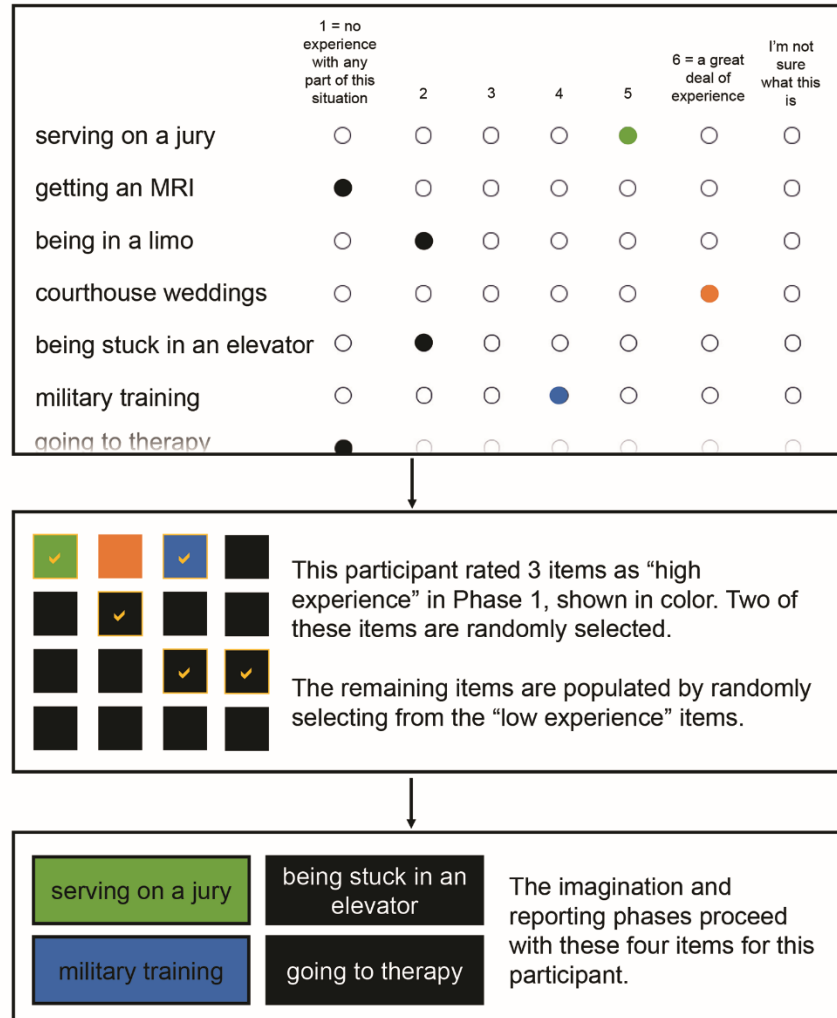
**Table 15. Sample of Items (5 of 16) for Study 6**

Item Name	Prompt
stuck in elevator	Imagine that while running errands, the elevator you are in gets stuck. You are in the elevator with two other strangers.
stuck jury	Imagine that you are serving on a jury. Your other jury members are having trouble agreeing on a verdict.
courthouse wedding	Imagine that a close friend asked you to be a witness at their courthouse wedding. You're arriving at the courthouse.
MRI	Imagine that you're at the hospital getting an MRI to help diagnose headaches.
surprise limo	Imagine you are getting picked up by a car service to go to the airport. When you go outside, you are surprised to see it is a limousine.

## Procedure

Participants were asked to imagine and answer questions about four scenarios. Study 6 consisted of three main phases: the selection phase (1), the imagination phase (2), and the

reporting phase (3). The overall procedure of Study 6 was very similar to Study 5, with the exception of the selection phase (depicted in **Figure 29** and explained in detail below).



**Figure 29. Illustration of the Selection Phase in Study 6.** Colors are shown to help depict item selection and were not represented in the study itself.

**Selection Phase.** In the initial selection phase (1), the items assigned to each participant were selected pseudo-randomly. We chose this strategy to increase our sampling of high experience scenarios. In piloting, we observed that while an individual participant's chance of having high experience with any one scenario was low, chances were high that a

participant would have experience with one or two of the total set of scenarios. Thus, our randomization strategy increases the chance that participants who do have lived experience with a given scenario (e.g., serving on a jury) are assigned that item, rather than one they do not have experience with (e.g., being stuck in an elevator).

Participants first rated their experience from 1 to 6 with a primary element of all 16 scenarios. For example, in this first phase participants rated “getting an MRI,” which mapped to the longer prompt, “Imagine that you're at the hospital getting an MRI to help diagnose headaches.” These items were presented in a random order. This step is shown in the top panel of **Figure 29**, which depicts a hypothetical selection process for one participant. In this example, the participant rated three items (“serving on a jury,” “courthouse weddings”, and “military training”) a four or higher, and they rated the remaining 13 items as lower in experience.

Then, we utilized internal logic within the study platform (Qualtrics) to assign a total of four pseudo-randomly chosen items to each participant for the subsequent imagination and reporting phases. First, up to two of the items participants rated as four or higher were chosen. If participants rated more than two scenarios a four or higher, as in the example depicted in **Figure 29**, two were chosen randomly. The remaining items were randomly selected from the pool of remaining scenarios. In this way, most participants were assigned two scenarios they had relatively high experience with and two scenarios they had relatively low experience with.

If participants did not rate any of the items four or higher in the selection phase, all four items were chosen randomly. If participants rated only one item as four or higher in this phase, that item was chosen; the remaining three items were selected randomly from the



remaining pool. Items that met a study-wide quota (i.e., items for which many participants had previously already been assigned) were removed from the selection pool. This phase contained one attention check. While somewhat complex procedurally, we iterate the goal of the selection phase was relatively simple: to increase the chances that our final dataset would represent scenarios in which participants would report a wide range of experience.

***Imagination Phase.*** In the imagination phase (2), participants were asked to imagine what they would do in the four selected scenarios. To help ensure participants imagined the prompt, participants were also asked to describe what they imagined in at least two sentences.

***Reporting Phase.*** In the reporting phase (3), participants answered questions about the source and phenomenology of each of the four scenarios they imagined in the second phase, similar to the second and third phases of the previous study. Then, participants were reminded of what they wrote in the imagination phase for each scenario and asked to describe the sources of what they wrote in the imagination phase. As in Study 5, they did so in two ways: via an open-ended text response and with a multi-select checklist. As before, participants also answered AMQ questions relating to visual imagery, auditory imagery, reliving, emotional intensity, and spatial layout. Each of the reporting phase scenario blocks contained an attention check question. Questions for each scenario were presented in blocks, and each block was presented in a random order. Finally, participants rated their experience with each of the four scenarios they answered questions about and answered a final attention check question. Participants then provided their age in years and

were offered the opportunity to provide comments or feedback. Demographic information was downloaded from Prolific.

### **Statistical Analyses**

Analyses were completed in RStudio (2018) running R version 4.0.3. Generalized linear mixed-effects models were run using the ``lme4`` software package (Bates et al., 2015). Significance for fixed effects was assessed using Satterthwaite approximations to degrees of freedom with the package ``lmerTest`` (Kuznetsova et al., 2017).

### **Coding of Responses**

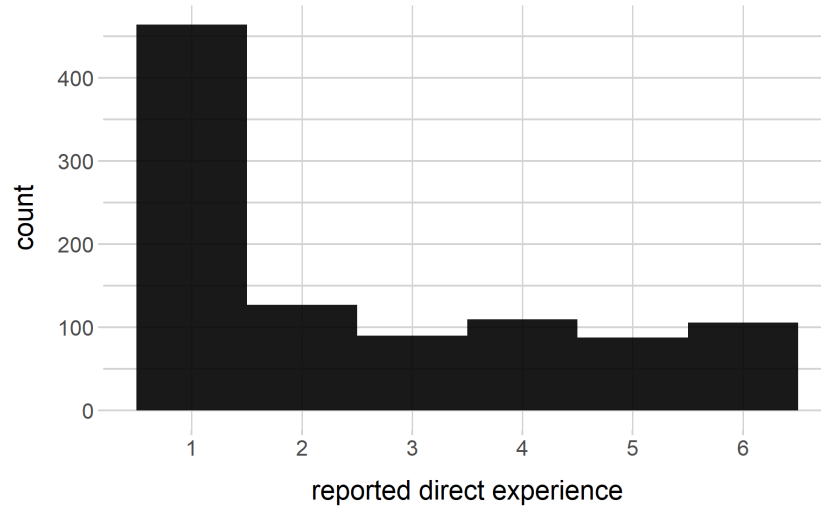
Participants' open-ended text responses about source collected in the reporting phase of the study were coded by three research assistants for whether or not the response explicitly mentions a work of fiction (0 or 1) using the same procedure as Study 5. Initial agreement among the three coders was high: Cronbach's  $\alpha = .96$ , percent agreement = 92%. Disagreements were resolved by the first author, as in Study 5.

## **5.3.2 Results**

### **Examining Reported Experience**

We first examined the results of our pseudo-randomization. Most participants (73.8%) were assigned two scenarios they had relatively high experience with and two scenarios they had relatively low experience with. The remaining participants who did not have relatively high experience with at least two of the 16 prompts were assigned one familiar scenario and three unfamiliar scenarios (15.7%) or 4 unfamiliar scenarios (10.5%). This suggests that pseudo-randomization was fairly successful in assigning participants to scenarios they would be likely to report high lived experience with. As a reminder, our goal

was to collect data representing a wide range of experiences; we did not aim to implement a clean two-cell design.



**Figure 30. Histogram of Experience Ratings in Study 6**

Next, we examined the distribution of experience ratings across items. The mean experience rating was 2.54 (on a 6-point scale;  $SD = 1.80$ ). While the distribution is skewed to low levels of experience, as expected, **Figure 30** reveals that overall a range of experience levels for the collected scenarios are represented in this sample, as anticipated.

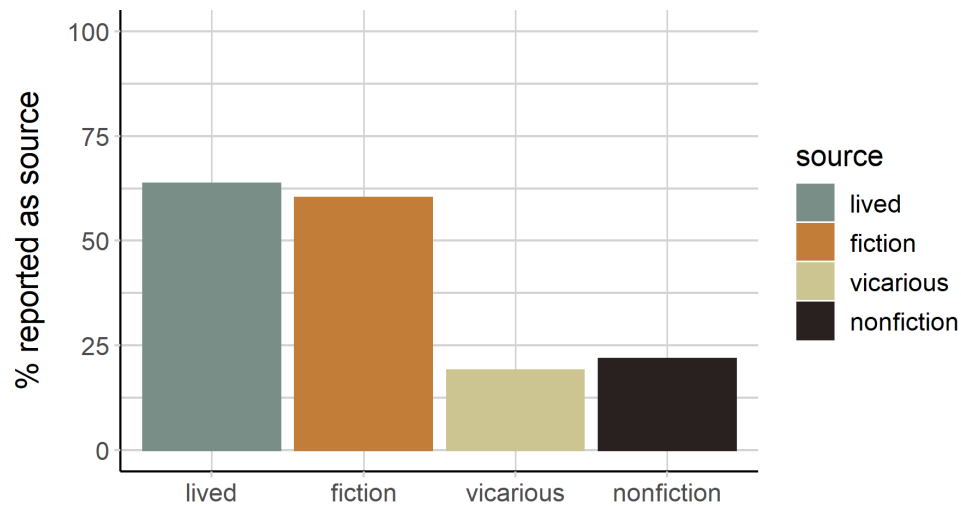
### Examining Recruitment of Fiction in Simulations

As in Study 5, we first examined the number of participants who reported fiction as a source using both the multi-select checklist and the open-ended text responses for all blocks as well as only the first block shown in the third reporting phase.

**Table 16. Percentage of Participants Reporting Fiction as a Source in Study 6**

	Total	First block only
multi-select checklist	60.2%	61.29%
open-ended text responses	48.38%	42.34%

We found consistent evidence that participants do report works of fiction frequently in their episodic simulations, with 42% to 61% of simulations containing fiction. This range is similar to Study 1 (50.8% - 68.3%). **Figure 31** illustrates the percentage of simulations that include each source (lived, fiction, vicarious, nonfiction); categories are not mutually exclusive.



**Figure 31. Bar Graph: Percentage of Simulations Reporting Recruitment of Each Source**

### When Do People Recruit Fiction in Their Imaginations?

To replicate the previous finding that people recruit fiction when imagining in the absence of direct experience, we calculated two binomial logistic regressions.

We first computed models predicting whether or not participants incorporate *fiction* in their simulation (0, 1) with reported experience with the scenario as the predictor. The mixed effects regression model was preferred to the fixed effects model by AIC (1167.90 vs. 1204.10). We found experience to be significantly predictive, with an odds ratio of .60 (Table 17).

**Table 17. Logistic Mixed Effects Model Regressing Reported Experience (1:6) on Inclusion of Fiction (0,1) in Study 6**

	OR (95% CI)	Coefficient (95% CI)	SE	p-value
(Intercept)	6.33 (4.14, 9.68)	1.84 (1.42, 2.27)	0.22	< .0001
Experience	0.60 (0.54, 0.67)	-0.42 (-0.63, -0.41)	0.06	< .0001

*Note.* ICC (adjusted) = 0.27, Conditional  $R^2$  = 0.39, Marginal  $R^2$  = 0.16. AIC = 1167.90, BIC = 1187.50.  $N_{\text{observations}}$  = 985,  $N_{\text{groups}}$  = 247 (participant), 16 (item).

Next, we computed models predicting whether or not participants incorporate *lived* experience in their simulation (0, 1) with reported experience with the scenario as the predictor. Once again, the mixed effects regression model was preferred to the fixed effects model by AIC (1036.20 vs. 1077.29). We found experience to be significantly predictive, with an odds ratio of 2.51 (**Table 18**).

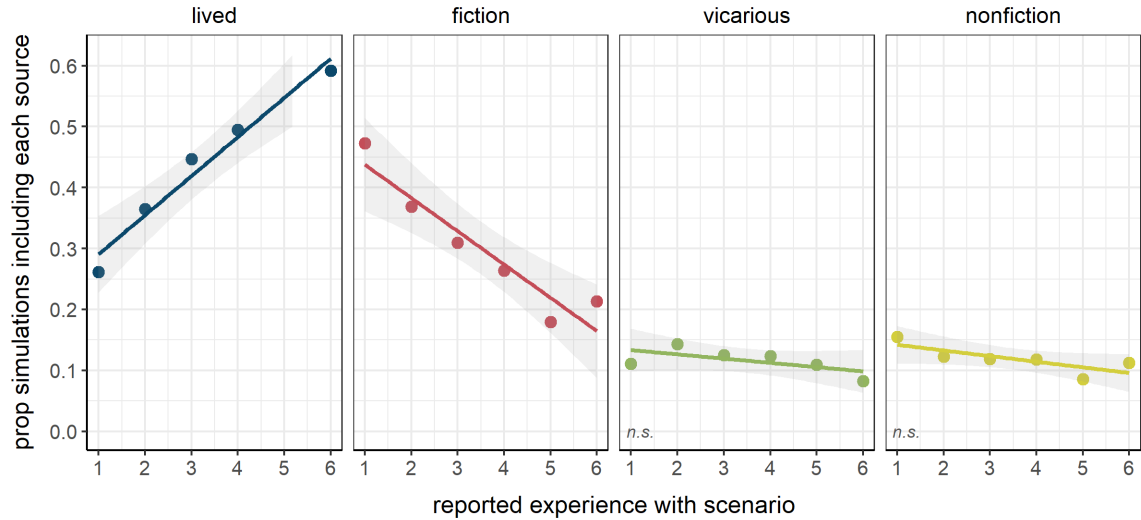
**Table 18. Logistic Mixed Effects Model Regressing Reported Experience (1:6) on Inclusion of Lived Experience (0,1) in Study 6**

	OR (95% CI)	Coefficient (95% CI)	SE	p-value
(Intercept)	0.28 (0.18, 0.44)	-1.27 (-1.73, -0.81)	0.23	< .0001
Experience	2.51 (2.10, 3.00)	0.92 (0.74, 1.10)	0.09	< .0001

*Note.* ICC (adjusted) = 0.33, Conditional  $R^2$  = 0.57, Marginal  $R^2$  = 0.36. AIC = 1036.20, BIC = 1055.77.  $N_{\text{observations}}$  = 985,  $N_{\text{groups}}$  = 247 (participant), 16 (item).

Taken together, these models replicate the results of Study 5 and are consistent with the hypothesis that people recruit material from works of fiction into their simulations in the absence of relevant lived experience. **Figure 32** depicts the proportion of simulations that

were reported as incorporating each source category (lived experience, works of fiction, vicarious experience, works of nonfiction) for each level of reported experience (1 – 6).

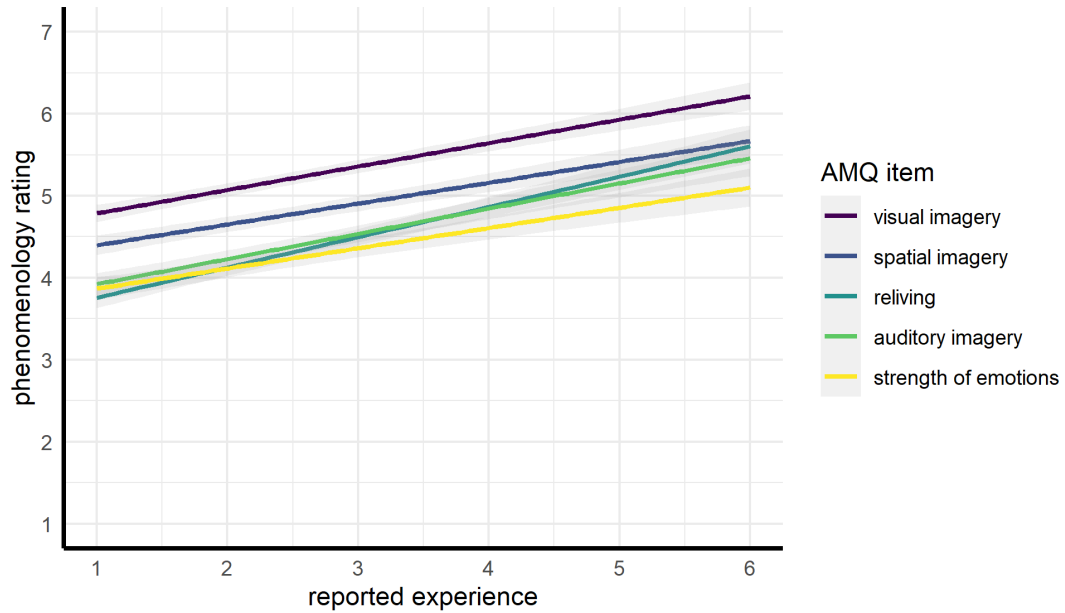


**Figure 32. Reported Experience by Likelihood of Recruiting from Lived Experience, Fiction, Vicarious Experience, and Nonfiction in Study 6**  
(1 = low experience, 6 = high experience)

## Changes in Phenomenology

The results of Study 5 suggested that as episodic simulations become more vivid – as measured by higher average AMQ ratings – as experience with a given situation increases. We first sought to replicate this finding, using more everyday scenarios. To this end, we computed a multivariate linear regression predicting participants ratings of AMQ items using reported experience (1-6), with participant and scenario as crossed random effects. This model predicted a 0.27 increase in phenomenological vivacity (1-7 scale) for each 1-unit increase in reported experience (1-6 scale;  $SE = 0.01$ ,  $p < .0001$ ; conditional  $R^2 = 0.51$ , marginal  $R^2 = 0.09$ , ICC = 0.46). **Figure 33** provides visual confirmation that this positive relationship between reported experience and phenomenology ratings holds for individual items (visual imagery, spatial imagery, reliving, auditory imagery, strength of emotions). This

was further reinforced in follow-up models predicting individual AMQ items with reported experience ( $t$ -values  $> 3.72$ ,  $p$ -values  $< .0001$ ).



**Figure 33. Phenomenology by Experience for Study 6**

Does the recruitment of fiction affect this relationship between experience and phenomenology? To address this, we computed the following exploratory analyses. First, we added an inclusion of fiction variable to the model described above. Thus, we computed a multivariate linear regression predicting AMQ item ratings with two variables: reported experience (1-6) and the reported recruitment of fiction (dummy-coded: 0 or 1), including participant and item as crossed random effects. In addition to the main effect regressing experience on AMQ ratings, we also found a statistically significant interaction between experience and the inclusion of fiction ( $estimate = -0.09$ ,  $p = .0002$ ; **Table 19**).

**Table 19. Multilevel Model Regressing Experience and Inclusion of Fiction on Phenomenology Ratings (AMQ) in Study 6**

Predictors	Estimate	[95% CI]	SE
(Intercept)	3.89****	[3.49, 4.32]	0.21
Experience	0.30****	[0.27, 0.33]	0.02
Inclusion of Fiction	0.08	[-0.07, 0.22]	0.07
Interaction (Experience x Fiction)	-0.09***	[-0.13, -0.04]	0.02

*Note.* Marginal  $R^2 = .09$ , conditional  $R^2 = 0.51$ , ICC = 0.46. Number of observations = 4,864. Number of participant groups = 247. Number of scenario groups = 16. Significance codes: `\*`  $p < .05$ , `\*\*`  $p < 0.01$ , `\*\*\*`  $p < .001$ , `\*\*\*\*`  $p < .0001$ .

To explore the interaction, we computed a difference test of the simple slopes (Lenth, 2021; Robinson et al., 2013). This examined the relationship between reported experience and phenomenology by whether or not a given simulation included fiction. We found a statistically significant difference in slopes:  $estimate_{no\ fiction} = 0.35$  [0.29, 0.41];  $estimate_{fiction} = 0.24$  [0.18, 0.31]; simple slopes difference = 0.11,  $SE = 0.05$ ,  $p = .02$ . In other words, the slope for simulations that did *not* include fiction was steeper than the slope for simulations that included fiction (Error! Reference source not found.).

While we did not predict this pattern, we offer a handful of speculations. These results suggest that when there is no lived experience to draw on, incorporating works of fiction into one's simulation can boost vivacity. However, lived experience as a simulation ingredient is likely more potent than those derived from fiction, given that memories of lived experience have stronger phenomenal characteristics than works of fiction on average (Chapter 2 of this dissertation; Johnson et al., 1988). Thus, we observe here that incorporating fiction dampens the phenomenology as direct experience rises. One possible explanation for this pattern is that memories of lived experience for scenarios that are rated



as high in direct experience may nevertheless vary in how accessible they are to the rememberer. For example, a tenured cognitive neuroscience professor may have very high levels of experience with a PET scanner or fMRI machine, rating a 6 out of 6 on this study's experience scale. However, the bulk of these memories may not be from recent experience, but instead be sourced in events years prior. In this case, a scene from a recently watched hospital drama on television may have been cued and recruited in an episodic simulation involving an MRI machine, even though lived experience is available. This might lead to the dampening effect observed in Error! Reference source not found.. Another possibility is that the incorporation of multiple sources "muddies" the waters of the episodic simulation. However, we urge caution interpreting this preliminary finding without further evidence and replication.

## 5.4 Discussion for Chapter 5

We draw on past experiences as the raw material to construct and imagine possible futures. In Studies 5 and 6, we show that this raw material is not limited to lived experience: people consistently draw from works of fiction in their episodic simulations and the extent to which people rely on works of fiction is predicted by people's lived experience with the situation. These results were quite consistent across the two studies (e.g., **Figure 26** and **Figure 32**), despite drawing from two different populations and including distinct sets of materials.

This work underscores the flexibility of cognitive processes for thinking about episodic possibilities. Our willingness to knowingly and fluently incorporate works of fiction into simulations reflects a foundational claim in Chapter 1: fictionality is not a deeply coded

psychological property. Our mental systems are promiscuous when it comes to encoding, reliving, and re-combining event memories, a property which allows us to imagine and thus to be prepared for scenarios both likely and improbable (a “matrix of possibilities” Baumeister et al., 2016, p. 7). Of course, people do not engage in fiction with the explicit goal of readying themselves for possible futures—any more than they do so when moving through the physical world. But these studies suggest that the information we glean from fiction is readily incorporated into one’s mental database of material for understanding the world, and that people are quite willing to draw on the database.

The present work is limited by participants’ ability to self-report the sources of their simulations, which at best is incomplete. We believe self-report to be an adequate methodology for the present questions under investigation. However, such reports are likely inference rather than direct report: people are not directly accessing the true sources of their episodic simulation, but rather playing detectives within their own minds, reporting the likely sources of what they imagined.

For the purposes of this work, we draw a line in the sand between *lived experiences* and *fictional experiences* and provide evidence that episodic simulations draw on both categories of raw ingredients. However, this distinction is not necessarily a straightforward one. Empiricist philosophers (Locke, Hume) would suggest that even objects and events we did not experience directly ultimately resolve into components derived from sensory experience (Uzgalis, 2020). Writer Samuel R. Delay describes a similar idea (2013):

“However much, as readers, we lose ourselves in a novel or story, fiction itself is an experience on the order of memory—not on the order of actual occurrence. It looks like the writer is telling you a story. What the writer is actually doing, however, is using words to evoke a series of micro-memories from your own experience that

inmix, join, and connect in your mind in an order the writer controls, so that, in effect, you have a sustained memory of something that never happened to you. That false memory is what a story is.”

Relatedly, the components of episodic simulations may themselves be derived from previous simulations: an imagination based on a dream, a prospective plan based on a previous simulation, and so on. While it is not within the scope of the present work to wrestle with the complex topology of how imaginations are constructed or distinguish between the philosophical traditions of rationalism vs. empiricism, we make note of the necessary simplifications in service of operationalizing our present questions, and suggest that future work might explore these complexities.

Overall, extending what we can imagine beyond the narrow band of our own lived experiences is useful. Much of our semantic knowledge base, after all, is gathered secondhand. However, the ability to encode, store, retrieve, and recombine elements of secondhand episodic memories in our personal future thinking is a unique property of our cognitive systems. This computationally costly ability, likely unique to humans, holds great adaptive value in terms of population-level survival and reproduction (Suddendorf & Corballis, 2007). But our willingness to draw on event memories in constructing simulations, collapsing over truth status, holds value and significance in our modern world, too. As the DOD intuited in their 2019 report on cyborg technologies, the vocabulary we learn from existing narratives, fictional or otherwise, are what we use to construct the future. The contents of fictional narratives we consume are what we use to imagine possibilities, which can both constrain and transform what we believe to be possible.

## **Chapter 6. General Discussion**

### **6.1 Summary of Studies**

This dissertation delineates and characterizes the rich phenomenon of remembering events from works of fiction, such as books, films, and television shows, by situating the study of these memories within the broader landscape of empirical memory research. In Chapter 1, I described prior theoretical work that provided the foundation for understanding memories of fiction as event memories which are part of the autobiographical record. In Chapters 2 and 3, I examined qualities (including subjective experience and function) of memories of fiction as they compare to memories of lived experience. In Chapter 4, I investigated how these properties shift in response to a cuing manipulation, in which participants retrieve and describe memories from childhood as well as the recent past. In Chapter 5, I, moved from characterizing personal and fictional event memories from one's past to exploring how memories of fiction are recruited to fill in episodic simulations, an expansion of the directive function of autobiographical memory.

Taken together, this work suggests that memories of fiction and autobiographical memories of lived experience are of the same natural kind. While the claim that events we experienced and believe to be true and stories we consumed that we know to be inventions are of the same fundamental cognitive category may sound unintuitive, it is consistent with a conception of episodic memory as adaptively oriented towards an uncertain future. Indeed, understanding how “remembering the past” and “imagining the future” share psychological processes and neural mechanisms has shaped much of memory research in the last two decades (e.g., Atance & O'Neill, 2001; De Brigard et al., 2013; Schacter & Addis, 2007; Szpunar & McDermott, 2008, 2008). And, just as scholarship is shifting from understanding

“memory” as a process concerned with veridical events that happened in the past to conceiving of memory as a constructive act that also governs how we imagine the future, memories of fiction can help broaden how we conceptualize event memories still further. For example, autobiographical memory and future thinking research assume the self as the agent of the event; memories of fiction and vicarious memories (Pillemer et al., 2015; Thomsen & Pillemer, 2017) challenge the assumption that this is necessarily the case. Similarly, past research examines events that the rememberer believes to have truly occurred i.e., personal memories (or false memories if they are mistaken); memories of fiction and non-believed memories help illuminate this dimension of *belief* in the occurrence of the (Chapter 1 of this dissertation; Marsh & Yang, 2020). And while existing research often places event memories at a point in time (i.e., remembering the past, imagining the future), memories of fiction underscore that an episodic simulation does not need to exist at a particular point in time: the “future” part of episodic thinking is optional for a simulation. Indeed, even in event memories that do contain time as a key element, the property of time is likely inferred rather than directly stored in memory (De Brigard et al., 2020; Larsen et al., 1996).

The brush I used to paint these findings is deliberately coarse. There are many nuances within the questions presented, some of which have been explored in previous work in media psychology, discourse processes, communication, and other fields. For example, there are differences in medium: events derived from prose likely exhibit different phenomenal characteristics from events derived from screen-based media, which has consequences for processes like reality-monitoring (Gordon et al., 2009; Johnson, 1988). People also vary across multiple dimensions in what and how much media they consume,

which affects what memories of fiction are available to them. The categories of fiction and non-fiction are often fuzzy, both in practice as well as in people's minds: historical fiction and reality television, for example, blur these lines. And the visual perspective with which people experience and remember memories of fiction may have downstream consequences (e.g., Marchlewska & Cichocka, 2017; Segal et al., 1997; Vella & Moulds, 2014). My aim has been to give form and structure to the overall category of *memories of fiction*, and in particular to bring them into the established autobiographical family of personal memories, false memories, vicarious memories, and non-believed memories. This step is foundational, and distinct from work exploring differences *within* memories of fiction. However, many interesting questions remain.

## **6.2 Future Directions: Differences Between Memories of Fiction and Lived Experience**

Much of this dissertation aims to align memories of fiction within the broader experimental tradition of autobiographical remembering. However, exploring *differences* between the two holds perhaps even greater promise. **Table 20** lists proposed differences between memories of fiction and memories of lived experience, and a discussion follows of a handful of these listed differences. However, this list is not intended to be exhaustive, but rather motivational—there is much ground left to be covered.

**Table 20. Proposed Differences Between Memories of Fiction and Memories of Lived Experience**

<b>Memories of Fiction</b>	<b>Memories of Lived Experience</b>
can be re-experienced	only happen once
can be shared	unique to a single perspective
direct access to mental states of others	no access to mental states of others
already packaged as narrative/events	continuous stream requiring active event segmentation
impossible events can occur	constrained by natural laws
time is not constrained	time moves linearly
aesthetics is a factor	aesthetics is not a factor
no personal responsibility/distancing possible	higher personal stakes
not subject to standards of correspondence truth	subject to standards of correspondence truth
may be less scrutinized	may be more scrutinized
event is potentially nested within personal memories	memories are not nested

### ***6.2.1 Fictional Formats Allow for Re-Experiencing and Sharing***

Motivational posters encourage people to “seize the day” because moments in life are ephemeral: they cannot be re-experienced outside of the domains of our imperfect memories. Works of fiction, on the other hand, come in packages that can be relived in their original form, as many times as one cares to re-engage in the experience. What are the cognitive consequences of this difference? Study 4 explored one: works of fiction that are repeatedly read or watched can maintain phenomenological vivacity, even when they were first experienced in childhood. Thus, memories of fiction can be both grounded in the distant past as well as experientially vivid. This property is not unique to fiction, but the processes that underly this property may be distinct from cases like flashbulb memories.

Another possible consequence not explored in this dissertation is that people may be more accurate in their memories for fiction compared to their personal memories when they have been exposed to the fictional experience repeatedly. This comparison is experimentally difficult, as evaluations of people's accuracy for remembering their own lives can be difficult to capture, but it is not impossible: diary studies and experiments in which participants wear cameras throughout the day are a couple of approaches that have been used in the past.

The fact that fiction comes packaged also leads to another property: a fictional experience can be directly shared with others, from a few people to millions. Of course, people share experiences all the time, such as attending a rock concert together. However, even standing side by side, two people might still have slightly different experiences: a chatty and distracting stranger might stand next to one person but not the other, or a tall individual might block only one person's view of the stage. Moreover, written texts in particular describe not only the outside world, but also characters' internal states and experiences, simulating how fictional people attend to and perceive the world, whereas the internal thoughts of two concertgoers may vary quite a bit. While people's participatory responses to fiction are not identical, works of fiction do elicit predictable responses in people, such as empathy for a relatable character or suspense at a crucial plot point (Allbritton & Gerrig, 1991). Might people's experiences of events in fiction be more similar because these internal worlds are more structured? Neuroimaging work shows synchrony in brain activity between people watching movies and when they recount the events that happened in films (Chen et al., 2017; Hasson et al., 2012; Kauppi et al., 2010). This work shows that people share neural patterns when engaged in films, but it remains to be seen how such patterns of synchrony compare between lived and fictional experiences.



The fact that works of fiction are widely sharable might mean that fictional events can play particularly meaningful roles in social contexts. Indeed, fiction is often the most visible when it brings people together, from *Game of Thrones* watching parties to fandoms for Marvel comic books to award ceremonies, such as Academy Awards. Two strangers who otherwise share few experiences or commonalities can nevertheless have memories of the same fictional event if they have read the same book or watched the same television show. As discussing and sharing events is a way of maintaining social bonds (Jolly, Tamir, Burum, & Mitchell, 2018) and a key function of autobiographical memory (Alea & Bluck, 2007), fiction may play a unique role in fostering social intimacy. While Chapter 5 examines how memories of fiction may serve a directive function, future work might examine fiction's intensely social purpose as well by expanding on the findings in Chapter 3.

### **6.2.2 Others' Mental States**

In the physical world, we do not have access to others' mental states. This is reflected in the fact that proving other humans are truly conscious beings and not automatons (i.e., how do I know that I am not the only conscious person on Earth?) remains a thorny philosophical problem with no consensus solution (Hyslop, 2016). Our knowledge of others' mental lives occurs by generalizing from knowledge of our own cognition (i.e., others' minds work like my own) and making inferences through skills such as theory of mind (Koster-Hale & Saxe, 2013; Leslie, 1987). However, in fiction, we have veridical access to the mental states of other people. In a first-person narrative, we are invited to the narrator's mind; in an omniscient style, we move between the mental lives of multiple characters. The reader's attention is guided not by salience cues in the world, but by the attention of an author/narrator.

One possible consequence of having access to mental states is that reading works of fiction may be a “bootcamp” for improving social cognition, more so than experience in the real world. Some have argued that practice following others’ minds is the true “function” of fiction (Mar & Oatley, 2008; Oatley, 1999). A lively and ongoing literature supports this idea on two scales. One line of research shows that reading literary fiction compared to non-fiction or non-literary fiction improves immediate theory of mind performance, such as the “Reading the Mind in the Eyes” task (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Kidd & Castano, 2013). A second line of work makes the developmental argument that people who have read more fiction exhibit improvements in social cognition, and that this association is not just correlational, but causal; a recent meta-analysis gathers evidence for this claim (Dodell-Feder & Tamir, 2017).

More precise formulations of the link between fiction consumption and social cognition is ongoing. For example, Kidd & Costano argue that it is only “literary” fiction which will improve social cognition (2013). While such a designation is admittedly a fuzzy quality, K&C argue that this is nevertheless a consequential construct. One way that literariness may be captured is in increased ambiguity: perhaps works of literary fiction tend to depict events that can be interpreted in multiple meaningful ways, when compared to both the real world and genre fiction. This interpretability may translate to particularly powerful training for skills of social cognition. Another open question in this line of research is whether improvements in social cognition are limited to written texts, or whether it extends to visual media. For example, Black and Barnes find participants who watched award-winning television such as *Mad Men* or *West Wing* compared to substantial

documentary television shows (e.g., *NOVA Colosseum* or *How the Universe Works*) did better on the Reading the Mind in the Eyes test (2015).

### **6.2.3 Impossible Events**

The world we live in is constrained by natural, physical laws. Not so in narrative fiction, where genres such as science fiction and fantasy are built on undoing the possible and supposing, “What if?” From Harry Potter to Star Wars, many of the most popular media franchises are based on impossible, or at least highly implausible, premises. What follows from the arguments in this document is that people form mental models of such impossible events described in works of fiction, which can become part of people’s autobiographical records. And if people do rely on works of fiction to make decisions in their lives, as is suggested by past work, this means—remarkably—that people can and do rely on events that never happened, are known to have never happened, and moreover, could never happen in this world.

This allowance for the impossible into autobiographical reasoning has interesting implications. Chapter 5 provided evidence that people preferentially draw on works of fiction when reasoning about unfamiliar contexts. More broadly, in fiction, we can have access to worlds removed from our experience in at least three ways. One, we have contact with realistic situations that are distant from our own lives, such as the intimate worlds of physicians or political machinations that take place in the White House, which are popular topics for television programs. Two, we can have fictionalized access to realistic situations that are temporally inaccessible (i.e., the past), such as Victorian England or the French Revolution. And three, we can have access to impossible worlds, which includes imaginations of what the future may look like.

Thus, fiction may have a particular role to play in people's decision-making about policies for the future, including those which involve technologies such as cloning, artificial intelligence, and nanotechnology, as suggested in Chapter 5. The last case serves as a useful case study (Gordon, 2009). People are generally ignorant about the specifics of nanotechnology, but one survey found that fewer than 30% of Americans viewed it as morally acceptable, although current applications of this technology relate to mundane advances such as odor-resistant socks and coatings for hair straighteners (Vance et al., 2015). People also hold strong and negative beliefs about biotechnological advances, such as cloning embryos, based on misleading information; these views persist when people become better informed about the facts (Nisbet, 2005). Gordon argues that a significant source of negative attitudes about these advancements is science fiction: "Although depictions of emerging technologies in science fiction run the gamut from apocalyptic (e.g., Jeff Carlson's *Plague Year*, 2007) to optimistic (e.g., William Gibson's *All Tomorrow's Parties*, 1999), those that receive the most wide-spread attention are almost uniformly negative (see Collins, 2007, for an overview)." Past work establishes that misinformation is generally quite difficult to correct (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Marsh & Yang, 2018), and that fiction is one potential source of misinformation (Butler, Dennis, & Marsh, 2012; Fazio, Dolan, & Marsh, 2015). The present work hints that people may be particularly prone to relying on fiction about unfamiliar or future scenarios. To speculate, the vivacity of event memories derived from works of fiction can be particularly hard to uproot in favor of what are often dry facts about topics like biotechnology. Public opinion can be important for determining policy and funding. Misconceptions about the dangers of genetically modified foods or embryonic cloning have consequences for how people eat and the future of

biomedical research. In combatting false information spread by memories of fiction, a strategy of “fighting fire with fire” may be needed—could narratives, even fictional ones, be more effective in combatting information than fact-based approaches?

#### **6.2.4 Nested Structure**

A notable characteristic of memories of fiction is their nested nature. In this dissertation, I investigated memories of fiction in their own right, as events that have taken place in their own worlds. However, one can hold a memory *of* consuming a work of fiction. For example, consider the following personal memory reported by a participant in Study 1: “Watching Star Wars episode 1 with my family because it was the last movie that my mom had went to see with us as a family.” We presume the participant is reliving aspects of their personal memory: getting in the car to visit the movie theater, sitting in cushioned seats, ordering popcorn, and the like. We also assume that nested within this personal memory are the fictional events of *The Phantom Menace*, whether it is a vague impression of the movie or specific events from the film. Each memory of fiction has the potential to have this nested structure e.g., flipping the pages of a book on a Sunday morning (level 1) *and* the events which unfolded in the world of said book (level 2). However, one can certainly remember one level but not the other. For example, some readers may remember vividly the time and place they read their favorite book, but many others will have divorced the personal circumstances from fictional events. The present work focuses on characterizing the second level, but we note that this structure of memories is potentially unique and is a candidate for future work.

## 6.3 Conclusion

"There's a lot of beauty in ordinary things. Isn't that kind of the point?"

— Pam Beesly, *The Office*

This dissertation is rooted in a deeply familiar phenomenon for most: remembering, thinking about, and talking about things that happened in narrative fiction. Like the air we breathe, this phenomenon is easy to take for granted. We discuss what movies we watched over the weekend, show up to book clubs with pages dog-eared with discussion-ready excerpts, feel nostalgic for stories we consumed in childhood. We ask hopefully on first dates, “What’s your favorite movie?”, looking to learn, connect, and maybe for the opportunity to joyfully reply, “That’s mine too!”. We shed tears for the tragedies and disappointments of fictional characters and are buoyed by their courage during our own trials. And in the tradition of science fiction from authors like Octavia Butler, Margaret Atwood, and Ursula K. Le Guin, fiction helps us expand the boundaries of what kinds of futures are conceivable.

Experimental psychology can thrive when studying the quotidian. Examining assumptions and using empirical evidence to describe how people work is the bread-and-butter of empirical psychology. The present dissertation characterizes memories of fiction in this tradition: as an ordinary phenomenon that reveals a great deal about the nature, properties, and function of memory.

## Appendix A. Supplemental Figures and Tables for Chapter 2

**Table 21. Statistically Significant AMQ items for Study 2 (Appendix A)**

Item	Personal (SD)	Fictional (SD)	<i>t</i>	Cohen's <i>d</i> [95% CI]
Rehearsal	3.48 (0.99)	2.81 (0.93)	3.57**	0.70 [0.30, 1.10]
Visual imagery	5.23 (1.01)	4.58 (0.84)	3.59**	0.70 [0.30, 1.11]
Spatial layout	5.33 (1.07)	4.37 (1.05)	4.63***	0.91 [0.50, 1.32]
Reliving	4.75 (1.19)	3.68 (1.18)	4.60***	0.90 [0.49, 1.31]
Strength of emotions	4.23 (1.24)	3.46 (1.15)	3.33*	0.65 [0.25, 1.05]
Same feelings again	4.50 (1.26)	3.53 (1.14)	4.12***	0.81 [0.40, 1.21]
Intensity of emotions	3.91 (1.09)	3.20 (1.22)	3.12*	0.61 [0.21, 1.01]
Belief (Accuracy)	5.33 (1.07)	4.82 (1.10)	2.38	0.47 [0.07, 0.86]
Belief (Real/Testify)	5.32 (1.48)	4.38 (1.62)	6.79***	0.61 [0.43, 0.78]

*Note.* † < .10, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001 after Bonferroni correction. Standard deviations are shown in parentheses. These analyses were conducted by averaging personal memories and memories of fiction for each participant.

**Table 22. Function Items in Study 1 and 2 (Appendix A)**

Subscale	Question for personal memories	Question for fictional memories	Anchors
Self	My memory of this event helps me to better understand myself.	--	1 = totally disagree; 5 = totally agree
Self	My memory of this event makes me feel better about myself.	--	1 = totally disagree; 5 = totally agree
Social	My memory of this event influences the relationships I have with others.	--	1 = totally disagree; 5 = totally agree
Directive	My memory of this event helps me to solve problems in my life.	--	1 = totally disagree; 5 = totally agree
Directive	My memory of this event impacts my life decisions.	--	1 = totally disagree; 5 = totally agree

*Note.* Adaptation of TALE items from Pillemer et al., 2015

**Table 23. Function Results by Subscale for Study 1 and 2 (Appendix A)**

	Study 1 Mean ( <i>SD</i> )	Study 2 Mean ( <i>SD</i> )
<b>Directive</b>		
Personal	2.71 (1.29)	1.81 (1.07)
Fictional	1.73 (1.08)	1.37 (0.82)
<b>Self</b>		
Personal	3.05 (1.25)	2.06 (1.22)
Fictional	2.06 (1.17)	1.35 (0.77)
<b>Social</b>		
Personal	2.95 (1.36)	2.37 (1.31)
Fictional	1.93 (1.17)	1.46 (0.90)

*Note.* These items, adapted from the TALE, are on a 5-point scale. Differences between personal memories and memories of fiction within each study are statistically significant ( $ps < .001$ ).



## Appendix B. Factor Analysis Details for Chapter 4

Based on previous literature and analyses, we hypothesized factors for belief (e.g., belief in the accuracy of event and willingness to testify about the events in a court of law), emotionality (e.g., strength of emotions, positivity of memory), recollection (e.g., sense of reliving, visual imagery), frequency of retrieval (e.g., frequency the event is thought or talked about), visual perspective (e.g., field and/or observer perspective), and impact/significance (TALE and CES items). We predicted the items would be organized as follows:

<b>Belief/ Accuracy</b>	<b>Emotionality</b>	<b>Recollection</b>	<b>Retrieval</b>	<b>Visual Perspective</b>	<b>Impact/ Significance</b>
Belief 1	Emotions	See	Thought	Field	4 Function
Belief 2	Intense	Hear	Talked	Observer	items
Accurate	Positive	Layout	Voluntary	Switch	4 CES items
	Negative	Reliving	Involunta		
		Same Feelings	ry		

### Exploratory Factor Analysis

To explore the factorial structure of personal and fictional event memories, all 27 items of the AMQ, TALE, and CES were used to compute a maximum likelihood factor analysis with oblique rotation (oblimin). Measures of retrieval, recollection, visual perspective, and significance are theoretically correlated and were found to be so in our previous studies; thus, we allowed the factors to correlate with each other with an oblique rotation. The Kaiser-Meyer Olkin measure verified the sampling adequacy for the analysis,  $KMO = .90$ . Bartlett's test of sphericity  $\chi^2(351) = 1757.4, p < .0001$ , indicated the correlation structure is adequate for factor analyses. We hypothesized a 6-factor solution, which was confirmed with parallel analysis as implemented in the `psych` package in RStudio.

Overall, the factor analysis confirmed our hypothesized structure (**Table 24, Table 25**), with the following exceptions. The “strength of emotions” item (“When remembering the event, I feel the emotions as strongly as when I originally experienced it.”) and intensity of emotions item (“The emotions I feel are intense”) loaded onto recollection, rather than the hypothesized “emotions”, most strongly. When we examined the items, we found that recollection is perhaps a better fit than the one initially hypothesized, as these items are more about the strength or vivacity of recollecting the event memory. The factor analysis also put the function: social item with the *retrieval* factor, rather than the other function items. Upon inspection of the item, we found this was logical: “I have often shared this memory with other people.”

**Table 24. Standardized Loadings (Pattern Matrix) for EFA in Study 4 (Appendix B)**

Items	Factor						Dimension
	1 ML3	2 ML5	3 ML6	4 ML4	5 ML1	6 ML2	
CES1	<b>.88</b>	.01	-.01	.05	-.06	.00	impact
CES2	<b>.92</b>	-.04	-0.01	.00	.04	.80	
CES3	<b>.83</b>	.05	-.01	.01	.02	.04	
CES4	<b>.86</b>	-.04	.08	-.05	.06	.03	
function: directive	<b>.69</b>	.14	-.07	.00	.04	-.03	
function: self	<b>.81</b>	.04	.05	.02	-.02	-.07	
function: belong	<b>.76</b>	.07	.02	.05	-.16	-.05	
talked	-.08	<b>.96</b>	-.03	-.01	.00	-.01	retrieval
function: social	.15	<b>.79</b>	-.12	.08	-.03	-.01	
voluntary retrieval	.05	<b>.75</b>	.09	-.01	.01	.03	
thought	.02	<b>.70</b>	.17	-.05	.06	.01	
involuntary retrieval	.21	<b>.49</b>	.17	-.02	.06	.06	
strength of emotions	.11	-.03	<b>.75</b>	.00	-.01	-.04	recollection
same feelings	.10	.03	<b>.75</b>	.02	-.06	.01	
reliving	-.02	.07	<b>.70</b>	.17	.00	-.05	
auditory imagery	-.10	.09	<b>.60</b>	.21	-.05	.09	

visual imagery	-.09	.06	<b>.56</b>	.26	.06	-.01	
intense	.18	.14	<b>.54</b>	-.20	.19	.01	
accurate	.04	-.03	-.01	<b>.89</b>	.01	.07	belief
belief: testify	.08	-.01	.05	<b>.84</b>	.00	-.03	
belief: real/imagined	-.07	.05	.04	<b>.83</b>	.02	-.05	
negative	.02	.04	.06	.01	<b>.99</b>	.02	valence
positive	.07	.06	.18	-.03	<b>-.76</b>	.06	
perspective: observer	.02	.01	.03	.02	.00	<b>1.00</b>	visual
perspective: field	.123	.12	.03	.25	.11	<b>.04</b>	perspective
spatial layout	-.02	.01	.27	.29	.07	-.05	NA
perspective: switch	.09	-.13	.23	.01	.03	.24	NA
SS loadings	4.95	2.94	2.9	2.48	1.66	1.41	
Proportion Var	.183	.109	.11	.09	.06	.05	
Cumulative Var	.183	.292	.40	.49	.55	.61	

*Notes.* Extraction method: maximum likelihood. Rotation method: oblimin. Loadings larger than .40 are in bold. Layout and switch did not have factor loadings above .40 and are not mapped onto a factor.

**Table 25. Within Factor Correlations for EFA in Study 4 (Appendix B)**

	Factors					
	1 significance	2 retrieval	3 recollection	4 belief	5 valence	6 perspective
1	1.00	<b>0.60</b>	0.13	0.13	0.05	0.01
2	<b>0.60</b>	1.00	<b>0.46</b>	0.18	0.07	0.01
3	<b>0.45</b>	<b>0.46</b>	1.00	<b>0.53</b>	-0.02	-0.02
4	0.13	0.18	<b>0.53</b>	1.00	-0.10	-0.09
5	0.05	0.07	-0.02	-0.10	1.00	-0.06
6	0.01	0.01	-0.02	-0.09	-.06	1.00

*Note.* Correlations larger than .40 are in bold. Layout and switch did not have factor loadings above .40 are not mapped onto a factor.

### Confirmatory Factor Analysis

The model that emerged in the exploratory factor analysis described above was further examined using confirmatory factor analysis. The model that included the *perspective* factor did not converge, so this factor was removed; results involving visual perspective is examined further below. Thus, maximum likelihood extraction was used to estimate the model with the five remaining factors. We ran two models: one with and one without the `intense` variable in the *recollection* factor, due to its irregular behavior. We found that the model without the intense variable performed slightly better on multiple fit measures, and to reduce unnecessary complexity, removed it from the model. Including the `intense` variable does not alter conclusions drawn from this model and subsequent results. The final model showed an acceptable fit: CFI = .92, TLI = .91, RMSEA = .08, SRMR = .07, AIC = 23,564.14, BIC = 23,753.39,  $\chi^2(183) = 650.56$ ,  $p < .001$  (Schreiber et al., 2006).

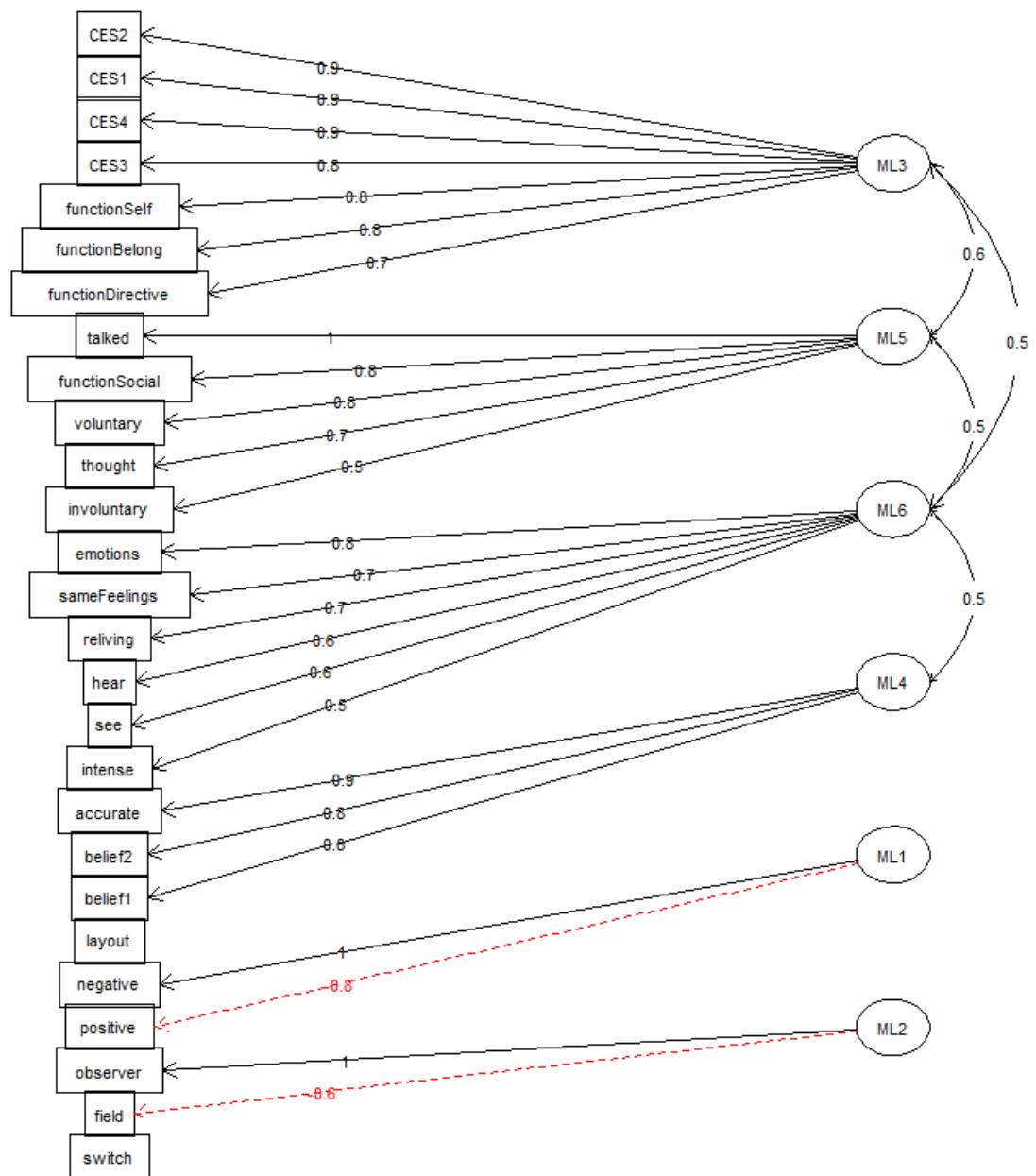


Figure 34. Results of EFA in Study 4 (Appendix B)

## Appendix C. Supplemental Figures and Tables for Chapter 5

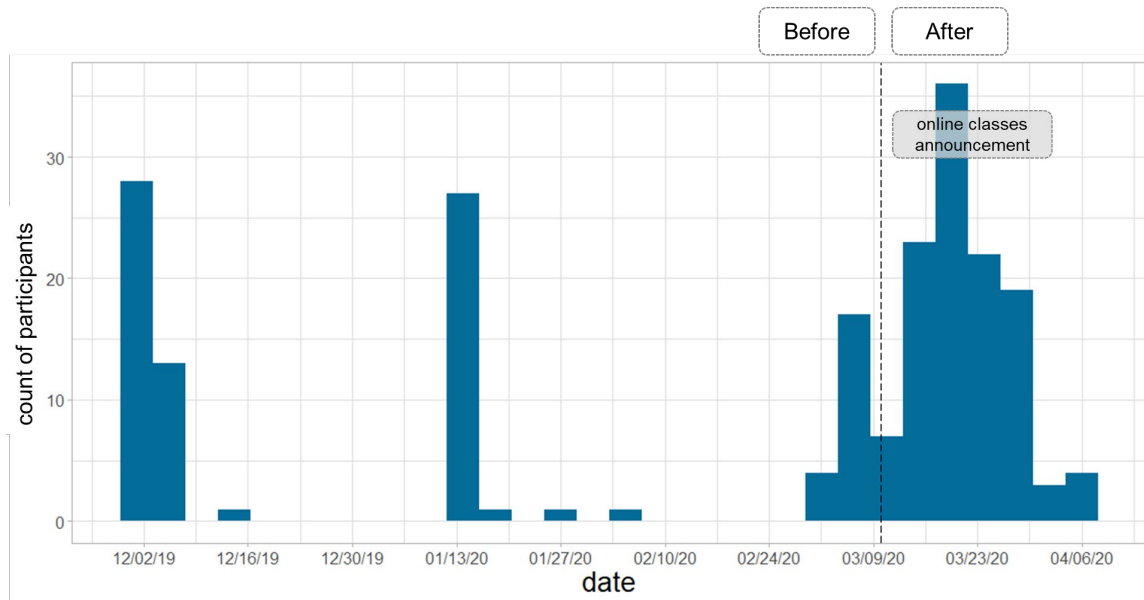
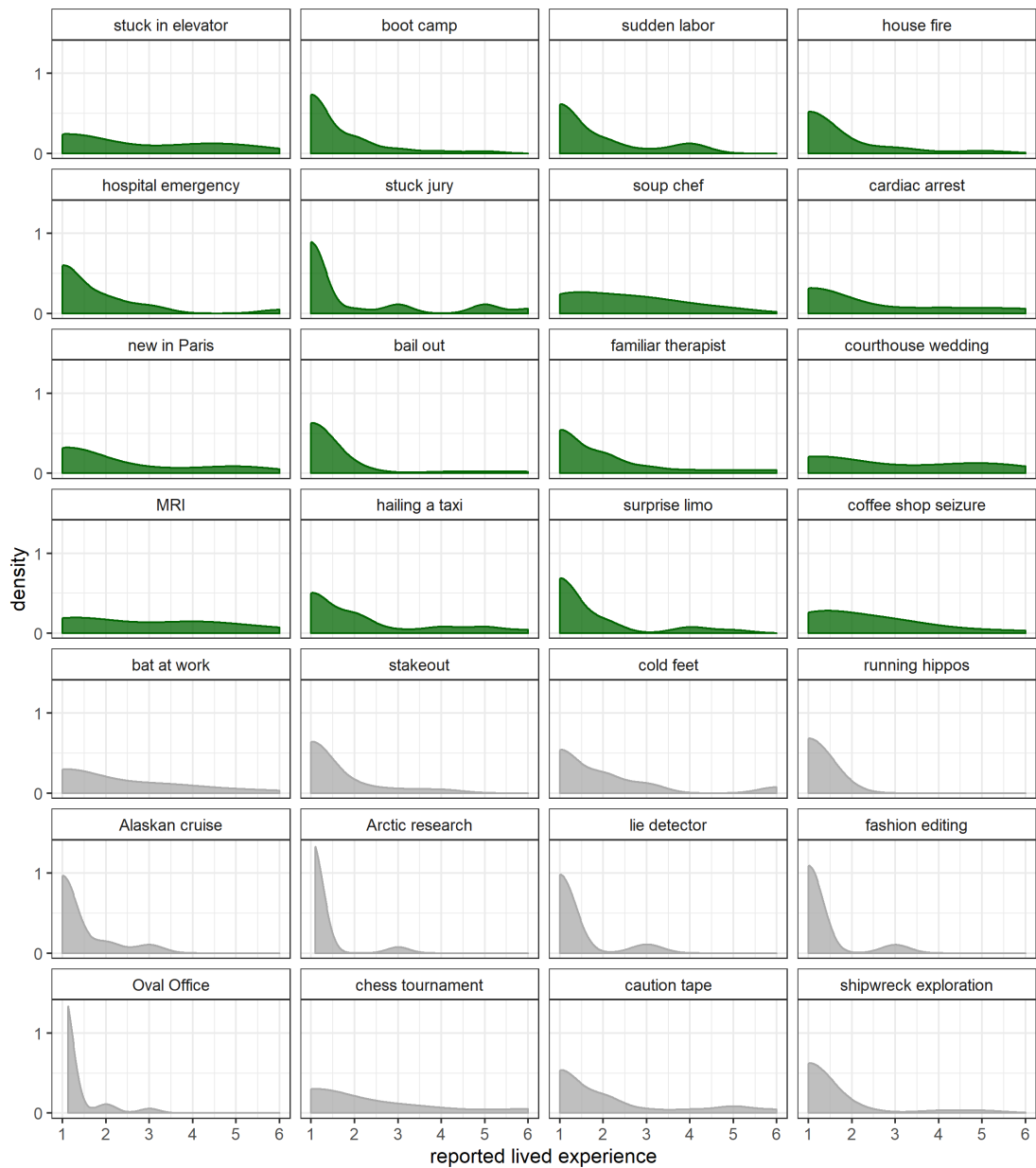


Figure 35. Histogram of Data Collection for Study 5 (Appendix C)



**Figure 36. Distribution of Reported Experience for the 28 Piloted Items in Study 6 (Appendix C).**

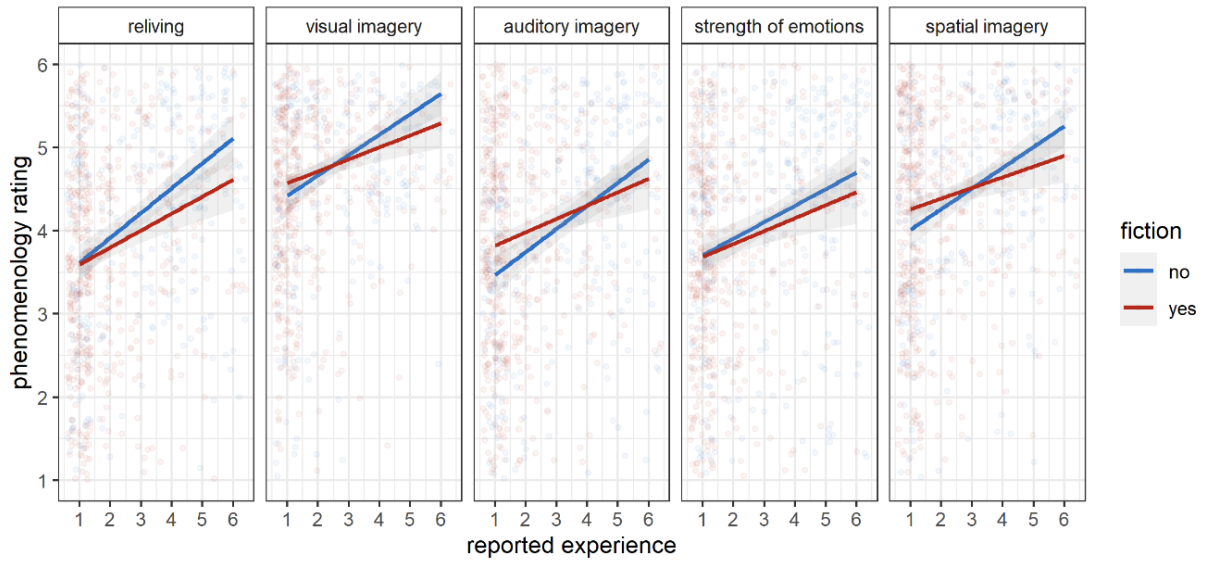
Items shown in green were used in Study 6; items shown in gray were not used.



**Table 26. Multivariate Model Regressing Experience on Phenomenology (AMQ Measures) for Study 6 (Appendix C)**

	Estimate	<i>SE</i>	<i>t</i> -value	<i>p</i> -value
Intercept	4.14	0.08	51.56	< .0001
Reported Experience	0.26	0.03	10.00	< .0001

*Note.*  $F(1, 992) = 100.1, p < .0001$ , adjusted  $R^2 = .10$ .



**Figure 37. Phenomenology and Experience in Study 6 (Appendix C)**

## References

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## Biography

Brenda W. Yang was born in Portsmouth, Ohio on August 1, 1990 and raised in San Antonio, Texas. She received a B.S. in Neuroscience and a B.A. in Interdisciplinary Studies from the University of Southern California in May of 2012. She was a high school science teacher at PUC Community Charter Early College High School in Lake View Terrace, CA until 2015. She earned a master's degree in Psychology and Neuroscience from Duke University in September of 2018.

Yang has authored or co-authored eleven articles and book chapters, which include: A Call to Think Broadly about Information Literacy; Believing Things That Are Not True: A Cognitive Science Perspective on Misinformation; Testing as a Learning Tool; Broadening the Autobiographical Record: The Roles of Borrowed Memories and Memories of Fictional Events; Remembering Possible Times: Memory for Details of Episodic Past, Future, and Counterfactual Simulations; Truncating Bar Graphs Persistently Misleads Viewers; Reasons Probably Won't Change Your Mind: The Role of Reasons in Revising Moral Decisions; No Evidence for Unethical Amnesia for Imagined Actions: A Failed Replication and Extension.

A selection of honors Yang has received since obtaining her Bachelor's degree include: National Science Foundation's Graduate Research Fellowship, Duke University's James B. Duke Fellowship, Richard Merritt Jr. Science Journalism Award, Society for Neuroscience's Trainee Professional Development Award, Duke University's Dean's Award for Excellence in Teaching, LaFitte Foundation Graduate Research and Travel Awards, P.E.O. Sisterhood's Scholar Award, the Preparing Future Faculty Fellowship, and Duke University's Program of Advanced Research in the Social Sciences Fellowship.