Fact or fiction?

Clarifying the relationship between reading and the improvement of social skills

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Many studies have claimed to find that reading fiction leads to improvements in social cognition. But this work has left open the critical question of whether any type of narrative, fictional or nonfictional, might have similar effects. To address this question, as well as to test whether framing a narrative as fiction matters, the current studies presented participants ($N = 268$ in Study 1; $N = 362$ in Study 2) with literary fiction texts, narrative nonfiction texts, expository nonfiction texts, or no texts. We tested their theory-of-mind abilities using the picture-based Reading the Mind in the Eyes task and a text-based test of higher-order social cognition. Reading anything was associated with higher scores compared to reading nothing, but the effects of framing and text type were inconsistent. These results suggest that prior claims regarding positive effects of reading fiction on mentalizing should be seen as tenuous; other mechanisms may be driving previously published effects.

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What is the connection between reading fiction and social understanding? Because fictional narratives often include simulations of the social world (Mar & Oatley, 2008), many researchers have argued that engaging with fictional narratives activates the cognitive and affective processes of social understanding. As readers are emotionally transported into fictional stories, they may practice empathy by feeling the emotions of the characters. Due to this practice, reading fiction may then increase readers' social/emotional skills or prime readers to be more attuned to others' mental and emotional states (Keen, 2007; Nussbaum, 2003).

In support of these arguments, fictional stories do seem to have properties that can facilitate this effect. For example, fictional stories focus on interpersonal

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relationships and psychological states, giving readers the opportunity to practice a variety of mentalizing skills about the characters in the work (Oatley, 2012; Zunshine, 2006). Fictional narratives are also organized to manipulate the emotional responses of audience members, particularly their sympathy for characters (Coplan, 2006). When reading fictional works, the reader is theorized to take on the perspective of the characters and think about their mental and emotional states (J. B. Black, Turner, & Bower, 1979; Coplan, 2004; Mumper & Gerrig, 2017).

There is some empirical support for these arguments from correlational studies (see Djikic & Oatley, 2014; Djikic, Oatley, & Moldoveanu, 2013; Mar, Oatley, Hirsh, dela Paz, & Peterson, 2006; Mar, Oatley, & Peterson, 2009; Mumper & Gerrig, 2017). These studies have found that lifetime engagement with fiction, as measured by a test of how many authors of fiction an individual can correctly recognize, is positively related to theory of mind (Djikic et al., 2013; Mar et al., 2006), whereas lifetime engagement with nonfiction is negatively related to theory of mind (Mar et al., 2006). This relationship sometimes occurs even when controlling for other variables such as the personality trait openness to experience, gender, and immersion in fictional worlds (Mar et al., 2009). Exposure to storybooks and movies (but not television) is even correlated with theory of mind performance in 4–6 year old children (Mar, Tackett, & Moore, 2010).

In addition to these general effects of reading, some studies have found relationships between reading specific texts and social attitudes. For example, the number of Harry Potter books read and the degree of identification with Harry correlate positively with adolescents' self-reported attitudes towards a variety of social out-groups (e.g., immigrants; Vezzali, Stathi, Giovannini, Capozza, & Trifiletti, 2015). There is also neural evidence for this connection, since brain areas activated during theory of mind tasks also seem to be activated while processing fictional stories (Mar, 2011). However, given that all these studies are correlational, we cannot draw conclusions about the direction of causality. While reading might improve theory of mind, it is also possible that people who already have more advanced theory of mind abilities are attracted to narrative texts that focus on psychological states. An experimental design may help us to understand whether reading in fact improves social cognition in the way that these correlational studies suggest it might.

To address this issue, several recent studies have employed experimental interventions. These studies generally assign participants to read certain types of texts and then measure these participants' performance compared to individuals who read different types of texts or who did not read anything. For example, one study found that reading a passage from Harry Potter (versus Twilight) led individuals to associate themselves more with wizards (versus vampires) on an implicit association test. These results suggest that reading fulfills

needs for belongingness and assimilation through social affiliation with characters (Gabriel & Young, 2011). Other work has found that engaging with fiction as performed drama may increase theory of mind: After adolescents watched a fictional work of theatre, they had higher scores on measures of theory of mind than a control group who did not (Greene, Hitt, Kraybill, & Bogulski, 2015). Further, adolescents taking a year of acting classes were found to have higher levels of theory of mind and empathy than their peers who took music or art classes (Goldstein & Winner, 2012).

One direct test of the claim that reading fiction improves social-cognitive skills used a random-assignment experimental design (Kidd & Castano, 2013). These researchers found that reading short excerpts of literary fiction improved performance on measures of theory of mind and did so to a greater extent than reading genre fiction like romance, non-narrative nonfiction, or nothing at all. This paper provided some of the first evidence that there is an immediate causal connection between reading literature and social-cognitive abilities. Other work using similar designs confirmed this finding (J. Black & Barnes, 2015; Pino & Mazza, 2016), and a recent meta-analysis shows a small but statistically significant effect of reading literary fiction on mentalizing abilities (Dodell-Feder & Tamir, 2018).

Although these studies suggest that reading fiction (perhaps especially literary fiction) can improve one's theory of mind abilities, a closer look at this body of work reveals inconsistent effects. For example, Mar et al. (2006) found a significant correlation between lifetime reading of fiction and one measure of theory of mind (the Reading the Mind in the Eyes test, or RME, a common measure of adults' social abilities) but not another (the Interpersonal Perception Test-15). In contrast, Djikic et al. (2013) failed to find a positive effect of reading fiction on RME scores, but did find an effect on cognitive empathy. Similarly, Kidd and Castano (2013) found that reading literary fiction improved scores on the RME and the DANVA2-AF (a measure of nonverbal communication), but not on other measures of theory of mind abilities such as the Yoni test (Shamay-Tsoory & Aharon-Peretz, 2007) and a false-belief test (Converse, Lin, Keysar, & Epley, 2008). Crucially, several attempts to directly replicate Kidd and Castano's (2013) finding that literary fiction improves performance on the RME have failed to find this effect (Camerer et al., 2018; Kidd & Castano, 2019; Panero et al., 2016, 2017; Samur, Tops, & Koole, 2018). These findings paint a more complex picture of the potential relationship between reading fiction and social-cognitive abilities.

To investigate one aspect of these inconsistent findings, the current work focuses on the type of text that participants are asked to read. Several prior studies, especially work by Kidd and Castano (2013, 2016) specifically point to the effectiveness of literary fiction in boosting participants' social-cognitive abilities.

While some findings bear out this claim, other work finds that popular fiction (e.g., Sherlock Holmes, Harry Potter) can lead to the same effect (Bal & Veltkamp, 2013; Vezzali et al., 2015). Similarly, a correlational study found higher levels of theory of mind in readers of so-called genre fiction such as romance or suspense compared to other types of fiction (Fong, Mullin, & Mar, 2013). This body of work thus leaves open which types of fictional texts might be effective at improving theory-of-mind abilities – and even whether a text needs to be fictional at all in order to have this effect.

Kidd, Ongis, and Castano suggest that there are two reasons for why fiction, especially literary fiction, improves social cognition. First, literary fiction focuses on the complexities of the inner life of the characters, rather than complexities within the plot. Narratives with a character-centric focus may more effectively stimulate the neurological and cognitive processes related to ToM (Kidd et al., 2016). Second, literary fiction employs particular linguistic techniques, which may encourage readers to use advanced psychological processes related to social-cognitive skills while reading. This argument rests on the idea that narratives that make the reader work harder to puzzle out the nature of the character's emotions, intentions, and beliefs provide more "exercise" for readers' theory of mind abilities and hence lead to better social-cognitive functioning.

There is some experimental evidence to support the claim that linguistic features such as vivid imagery (Mar & Oatley, 2008), reflective function (Kidd et al., 2016), literary "gaps" (De Mulder, Hakemulder, van den Berghe, Klaassen, & van Berkum, 2017), and foregrounding (Koopman, 2016) have the ability to improve ToM abilities. However, there does not seem to be evidence to support the underlying assumption of these claims, which is that literary fiction is the only type of narrative text to use a character-centric focus and "writerly" linguistic features. Well-written narrative nonfictional texts such as biographies, historical fictions, and memoirs can also focus on the mental states of the characters and use devices like imagery, reflective function, and foregrounding. To the extent that they do, narrative nonfiction texts should be equally able to improve social cognitive skills as narrative fictional texts. This idea suggests that the narrative aspects of a text, regardless of its fictionality, are key to promoting social cognition, a claim supported by the Social Processes and Content Entrained by Narrative (SPaCEN) framework (Mar, 2018). In fact, Kidd and Castano (2016) point to a biographical account of Lee Harvey Oswald as an example of literary writing, even though it is from a nonfiction genre (i.e., True Crime).

In support of this analysis, some previous work has found that there is no difference in individuals' engagement with fictional and nonfictional texts. Work on stereotypes has found that, regardless of whether the stereotypes are presented as fiction or nonfiction, readers' previous knowledge is the strongest predictor of

accepting or believing stereotypic or counter-stereotypic information about individuals (Murphy, 1998). Other work found that transcripts of speeches labeled as fact or fiction were equally persuasive regardless of labeling (Green, Garst, Brock, & Chung, 2006). Further, individuals report feeling similar levels of sadness to movies presented as fictional versus fact-based (Goldstein, 2009). There is also an important role for participants' own judgments of a text's quality: Participants who judged a text as more artistic experienced greater changes in their self-reported personality traits, regardless of whether the text was fiction or nonfiction (Djikic, Oatley, & Carland, 2012). These findings support the view that either fiction or nonfiction could lead to increases in theory of mind abilities.

However, in addition to the arguments reviewed above about fiction's focus on interpersonal relationships and social situations, there is theoretical and empirical support for the view that fictional texts may confer unique advantages over other kinds of texts when it comes to improving empathy. One key difference between fiction and nonfiction is that, when engaging with fiction, individuals do not have to constantly appraise whether or not to believe what they are reading and seeing; they know that the information being presented does not accurately reflect reality. As a result, readers may be more likely to focus on meaning, plot, and character, rather than on decisions about what to believe and incorporate into their general knowledge base (Einstein, McDaniel, Owen, & Coté, 1990; Green et al., 2006). In support of this theory, participants' neural responses differ when they are reading the same text described as fiction as opposed to nonfiction. When reading a text labeled as fiction, regardless of its true nature, brain regions associated with mental imagery and imagination are activated. When reading a text labeled as nonfiction, again regardless of its true nature, brain regions associated with viewing actions or imitating them are activated (Altmann, Bohrn, Lubrich, Menninghaus, & Jacobs, 2014). Additionally, individuals pay more attention to surface details and less attention to causal structure when reading narratives that are labeled as fiction than when reading narratives that are labeled as nonfiction (Zwaan, 1994). Conversely, individuals remember more words and details about narratives that are labeled as fiction than about narratives labeled as nonfiction (Hendersen & Clark, 2007), possibly because fictional texts employ vivid mental imagery, which can make them more absorbing (Mar & Oatley, 2008). These differences between how people process fiction and nonfiction are also mediated by individual difference variables: One study found that individuals high in empathy evaluated narratives labeled as fiction more favorably than narratives labeled as nonfiction. Individuals low in empathy did not show this pattern unless they were highly transported into the narrative, in which case they showed the same response as individuals high in empathy (Argo, Zhu, & Dahl, 2008). This suggests that one's tendency to be transported into a narrative may

mediate the narrative's effectiveness at affecting one's empathy (Bal & Veltkamp, 2013; Johnson, 2012).

The current studies

The existence of such differences in how people process fictional and nonfictional texts suggests that there may be differences in how these texts affect people's theory of mind skills. This is the question that we aimed to investigate in the current studies. To do so, we compared the effects of reading fiction with the effects of reading narrative nonfiction, which may also have some ability to boost individuals' mindreading capacities, as argued above. To more thoroughly tease out any effect of the nature of the text itself, we added a further manipulation (following Altmann et al., 2014): Half of the participants were told that their assigned text was fiction, and half of the participants were told that their assigned text was nonfiction. This means that participants in two conditions had a true belief about their nature of their text (i.e., they read a fiction story and were told that it was fiction; they read a nonfiction story and were told that it was nonfiction), and participants in two conditions had a false belief (i.e., they read a fiction story and were told that it was nonfiction; they read a nonfiction story and were told that it was fiction). This manipulation allows us to determine the source of any effect of literary fiction on theory of mind: people's beliefs and strategies for reading, or the nature of the texts themselves. To provide a basis for comparison for these four conditions, both Studies 1 and 2 included a no-reading control. Study 1 additionally included a comparison to a non-narrative nonfiction text (accurately described as such). In both studies, all participants engaged in two tests of mindreading abilities and we tested for differences on these measures across conditions. Participants in Study 1 additionally completed a measure of transportation to see if this differed across conditions or correlated with our theory of mind measures.

We predicted that reading narrative texts, regardless of whether they are fiction or nonfiction, will have a positive impact on participants' performance on our theory of mind measures. Participants in these conditions were expected to outperform participants in the control conditions. We did not predict a difference between the fictional and narrative nonfictional texts, since both were expected to provide an opportunity to practice empathizing and thinking about others' mental states. Finally, we predicted that participants who believed that they were reading a fiction text, regardless of what they actually read, would perform better on the theory of mind measures. Believing that one was reading fiction was expected to plausibly engage additional layers of theory of mind processing, as readers con-

sidered issues of how the narrative was constructed and the author's intentions, which may not be as relevant when one believes that one was reading nonfiction.

Study 1

Methods

Participants

The final sample included 268 participants (117 men, 149 women, 2 preferred not to answer; mean age = 34.5 years, range = 18–67). All participants were recruited from Amazon's Mechanical Turk system. They were asked to complete an online Qualtrics survey for which they received $2 for their participation. This study was conducted in the fall of 2014.

An additional 145 individuals were recruited but not included in the final analyses due to failing to complete the study ($n = 91$), failing a manipulation check ($n = 21$; see below for details), failing a memory check ($n = 32$; see below for details), or not selecting anything on the Author Recognition Test ($n = 1$).

Materials

Because we are interested in exploring the possibility that narrative nonfiction texts are capable of improving theory of mind abilities similar to the improvements reported for literary fiction in Kidd and Castano (2013), we used the same literary fiction and expository texts as in Experiment 5 of that paper in an attempt to replicate and extend those findings.

Fiction texts

All of these stories were chosen by Kidd and Castano (2013) because they were winners of the 2012 PEN/O. Henry Award for short literary fiction. These works were selected due to their "literariness," which was presented in contrast to genre fiction. "Corrie" by Alice Munro (5729 words, third person) tells the story of a woman who has a long-term affair with a married man. "Uncle Rock" by Dagberto Gilb (2703 words, third person) tells the story of a young Mexican boy whose attractive mother has a series of boyfriends. "The Vandercook" by Alice Mattinson (5563 words, first person) tells the story of a man who returns home to take over his father's printing business with his wife and sons.

Nonfiction texts

We selected three narrative, person-focused nonfiction texts to serve as a comparison to the literary fiction stories. We selected these texts because their character-centric and linguistic features closely resemble the literary fiction selected by Kidd

and Castano (2013). Because the literary fiction stories were not all the same length, we used excerpts from longer works of nonfiction that approximately matched the literary fiction stories for length. The first was an excerpt from the autobiographical book *The Kid* by Dan Savage (2786 words, first person), which describes a meeting between Dan and his partner with the woman who is pregnant with the child they plan to adopt. The second was an excerpt from a 1966 article in Esquire Magazine by Gay Talese, titled "Frank Sinatra Has a Cold" (5451 words, third person). We changed Sinatra's name to "James Michaels" to disguise the nonfictional nature of this text, which describes several incidents during the filming of a television special in which Sinatra is unable to sing properly due to a cold. The third was an excerpt from a 1966 article in Esquire Magazine by John Sack, titled "M Company" (6552 words, third person), which describes the experiences of several young soldiers in Army training before they deploy to Vietnam.

Non-narrative texts

As with the literary fiction texts, we used the same non-narrative texts as in the Control condition of Kidd and Castano (2013), Study 1, all of which were published in *Smithsonian Magazine*. These texts were "How the Potato Changed the World" by Charles C. Mann (4007 words), "Bamboo Steps Up" by Cathie Gandel (953 words), and "The Story of the Most Common Bird in the World" by Rob Dunn (1978 words). These articles describe various interesting facts about historical events involving potatoes, bamboo, and sparrows, respectively. Importantly, they do not include narratives about people.

Theory of mind measures

There were two main measures of theory of mind in this study, one perceptual and one cognitive (see Tager-Flusberg & Sullivan, 2000). The first was the Reading the Mind in the Eyes task (RME; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), which is commonly used in studies of adult social cognition. This task tests the ability to infer a mental state based on an individual's facial expression. It consists of 36 faces taken from pictures in a magazine and edited to reveal only the area between the eyebrows and the bridge of the nose. Each picture is accompanied by four adjectives (e.g., skeptical, joking). Participants are asked to choose which of these words best describes what the person in the picture is thinking or feeling. This test has been hypothesized to tap into both affective and cognitive theory of mind abilities, in that it requires participants to both observe an emotional expression and assign an explicit mental state to this expression.

We additionally used a higher-order theory of mind reasoning (HO-ToM) task, based on materials from Kinderman, Dunbar, and Bentall (1998). This task assesses the ability to reason through complicated belief states and intentions. In this test, participants read a brief story involving several characters and their

interactions and beliefs. For example, one story describes a couple going out to dinner for their anniversary. The husband is having trouble choosing what to order and the wife mistakes his hesitation as a sign that something is wrong. After reading the story, participants respond to 20 true/false questions about it without having access to the story text. Ten of these questions ask about matters of fact in the story (for example, "The expensive restaurant that Clive booked only sold seafood"), and the other ten ask about characters' beliefs (for example, "Clive thought Lucy was upset because he didn't like seafood"). These questions vary in their level of complexity, based on how many mental states needed to be considered, ranging from second-order to sixth-order (see Appendix for a full example). This test is more cognitive than the RME, since it measures participants' abilities to make inferences about mental states based on a text, with no pictures of bodies or faces.

Other measures

Three additional measures were included, as past work has found that they tend to correlate with measures of theory of mind abilities like the RME, so they are often included in tests of the effects of literary fiction (e.g., Kidd & Castano, 2013; Mar et al., 2006). The first of these was the Author Recognition Test (ART; Stanovich & West, 1989). This test presents a list of 130 names, half of which are authors of works of fiction, and half of which are foils. Participants are told to check only the ones that they know for sure are authors, since there is a penalty for guessing. This measure was included to control for the effects of lifetime exposure to fiction.

The second additional measure asked about current affect, as in Kidd and Castano (2013). This measure asked participants to report the extent to which they are currently feeling happy, sad, angry, scared, surprised, and disgusted (i.e., the six "basic" emotions) on a 5-point scale. The points on this scale were labeled "very slightly or not at all," "a little bit," "moderately," "quite a bit," and "extremely." This was included to measure participants' emotional reactions to the texts.

The third measure was a short measure of transportation (Appel, Gnambs, Richter, & Green, 2015). It consists of 5 questions asking readers to report the extent to which they became immersed in the text that they read (e.g., "While reading the text, I had a vivid image of the main character."). Participants responded to each question on a 7-point scale ranging from not at all (1) to very much (7). This measure was presented only to participants who read a narrative text. This was included because transportation has been previously found to be related to the effects of reading on empathy and theory of mind (e.g., Bal & Veltkamp, 2013).

Procedure

There were six between-subjects conditions in this study. Four of these conditions were constructed using a 2 (Actually Read: narrative fiction text, narrative nonfiction text) × 2 (Text Described As: fiction, nonfiction) design. There were 41 participants who read fictional texts that were accurately described as fiction (Fiction Accurate condition), 74 participants who read fictional texts that were inaccurately described as nonfiction (Read Fiction/Told Nonfiction condition), 39 participants who read narrative nonfictional texts that were accurately described as nonfiction (Nonfiction Accurate condition), and 43 participants who read narrative nonfictional texts that were inaccurately described as fiction (Read Nonfiction/Told Fiction condition). In a fifth condition, participants ($n = 31$) read an expository nonfiction text; this was always accurately described as nonfiction (Non-Narrative condition). The final condition (Control, $n = 40$) did not present any text, and participants simply completed the measures. Participants were randomly assigned to conditions. Within each of the five conditions that involved reading a text, participants were randomly assigned one of the three texts that fit their condition assignment (see Table 1).

Table 1. Number of participants per condition in Studies 1 and 2

Read:	Narrative fiction	Narrative nonfiction	Non-narrative	Nothing
Told Fiction	Study 1 $n = 41$ Study 2 $n = 53$	Study 1 $n = 43$ Study 2 $n = 53$	NA	Study 1 $n = 40$ Study 2 $n = 155$
Told Nonfiction	Study 1 $n = 74$ Study 2 $n = 47$	Study 1 $n = 39$ Study 2 $n = 51$	Study 1 $n = 31$	

After providing consent, participants in the control condition were simply told that they would be answering a series of questions. Participants in the other five conditions, which involved reading a text, were presented with a set of instructions describing their text. When participants were told that their text was fiction (Fiction Accurate condition and Read Nonfiction/Told Fiction condition), these instructions read, "In this study, you're first going to read an excerpt from a fiction text that was published as a story in a literary magazine. This excerpt could be a piece from a fictional narrative, or it could be an excerpt from a novel, or it may have been published as a short story. Then, you are going to answer a series of questions." When participants were told that their text was nonfiction (Nonfiction Accurate condition, Read Fiction/Told Nonfiction condition, and Non-Narrative condition), these instructions read, "In this study, you are first going to read an excerpt from a nonfiction text that was published as an article in a news magazine. This excerpt could be a piece from a biography, or it could be an excerpt from a

memoir, or it may have been published as an article in a scientific journal. Then, you are going to answer a series of questions." In both cases, the word "fiction" or "nonfiction" in the first sentence was bolded and colored red.

Following these instructions, participants in these five conditions completed an initial manipulation check asking them to report whether the text they were about to read is fiction or nonfiction. This check was included because a pilot study revealed that participants had poor memory for the type of text they read when asked at the end of the study and tended to misreport that all of the narrative texts were fiction. Participants who answered this question incorrectly ($n = 21$) were eliminated from the sample. Participants in these five conditions then read their assigned story.

The measures for all participants were presented in two blocks: theory of mind measures (RME and HO-ToM) and covariates (ART, Affect, and Transportation). These blocks were presented in a fixed order, with the theory of mind tasks always appearing first. Within each block, the tests appeared in a random order. There were five HO-ToM stories total, and each participant received a randomly selected set of two.

Following these measures, participants who had read a text responded to a manipulation-checking question, asking whether the text they had read was fiction or nonfiction (as in the beginning of the survey) and asking them for a certainty judgment on a 5-point scale.

Participants who read texts then responded to three multiple choice memory questions about their text. Each question had three response options. As noted above, participants who responded incorrectly to two or three out of three memory questions ($n = 36$) were not included in the final sample.

Finally, all participants provided demographic information: age, gender, race, state of current residence, highest level of education, and area of current employment. At the end of the survey, we told them the purpose of the study and the true nature of the text they had read for the five conditions that involved reading.

Results

Coding and preliminary analyses

To score the RME, we took the sum of the number of correct answers provided (maximum = 36). To score the HO-ToM, we took the sum of the number of correct answers provided (maximum = 40). Scores on the ART were calculated by subtracting the number of foils selected from the number of real authors selected (maximum = 65). Following the exclusion practices of Kidd and Castano (2013, 2019) as well as similar replication attempts (Panero et al., 2016), we removed

from the sample one participant who failed to select anything on the ART, based on the assumption that not selecting even a single name on the ART suggests that this measure had been skipped.

We first tested for differences by condition for any of our additional measures: current sadness (following Kidd & Castano, 2013, who only included this emotion in their analyses), transportation, and ART. Reported sadness differed marginally by condition, $F(5, 209) = 2.18$, $p = .06$. Transportation (which was measured only for the 4 conditions in which participants read a narrative story) did not differ by condition, $p = .94$. ART different marginally by condition, $F(5, 262) = 2.04$, $p = .07$.

Next, we tested for correlations between our main dependent measures (RME and HO-ToM) and the additional measures. Transportation was not significantly correlated with either of the dependent measures. However, sadness was significantly negatively correlated with both (both rs < -0.15, both ps $< .025$), and ART was significantly positively correlated with both (both rs > 0.23, both ps $< .001$). The correlation held across all conditions for ART, but sadness was only significantly correlated when the control condition was included in the analysis. For these reasons, ART was included as a covariate in all further analyses and sadness was included as a covariate only in analyses involving the control condition.

We additionally conducted a post-hoc power analysis. We estimated effect sizes based on Panero et al.'s (2016) analysis of Kidd and Castano (2013): $d = 0.24$ for the comparison between literary fiction and the no-reading control; $d = 0.37$ for the comparison between literary fiction and narrative nonfiction (based on Kidd and Castano's comparison of literary versus popular fiction); and $d = 0.51$ for the comparison between narrative fiction and expository nonfiction. Assuming a power of 80% (based on Kidd & Castano, 2013, 2019) and a standard alpha of 0.05, these analyses show that we need 69 subjects per condition for the comparison between literary fiction and the no-reading control (we have 40), 30 subjects for the comparison between literary fiction and narrative nonfiction (we have 82), and 16 subjects for the comparison between narrative fiction and expository nonfiction (we have 31). We thus have enough power to detect effects for all comparisons except for the comparison between reading and no-reading. We address this concern in Study Two by including a larger sample size in our control condition.

Reading something vs. nothing

First, we considered the differences between those who read any text, regardless of content (fiction, nonfiction, or expository, $n = 228$) and the control condition, in which participants read no text at all ($n = 40$). ANCOVAs with ART score and sadness as covariates revealed that participants who read a text did not perform better on the RME ($M = 26.62$, 95% CI [25.86, 27.35]) than participants who read no text ($M = 26.02$, 95% CI [24.43, 27.61]; $F(1, 211) = 0.44$, $p = .51$, $\eta^2 = 0.002$). However,

participants who read any text performed significantly better on the HO-ToM ($M = 31.64$, 95% CI [31.10, 32.17]) than participants who read no text ($M = 30.18$, 95% CI [29.03, 31.34]; $F(1, 211) = 4.98$, $p = .027$, $\eta^2 = 0.022$).

Reading narrative vs. non-narrative texts

We next ran an ANCOVA to examine whether reading a narrative text ($n = 197$) compared to reading a non-narrative text ($n = 31$) enhanced task performance on either of the two theory of mind measures, controlling for ART scores. On the RME, there was no effect of reading narrative texts ($M = 26.41$, 95% CI [25.74, 27.08]) as opposed to non-narrative texts ($M = 27.59$, 95% CI [25.90, 29.27]; $F(1, 225) = 1.64$, $p = .202$, $\eta^2 = 0.007$). Likewise, on the HO-ToM, there was no effect of reading narrative texts ($M = 31.44$, 95% CI [30.93, 31.96]) as opposed to non-narrative texts ($M = 31.57$, 95% CI [30.26, 32.87]; $F(1, 225) = 0.030$, $p = .86$, $\eta^2 = 0.000$).

Effects of both story type and presentation type

Four of our conditions presented a 2 (Actually Read: fiction, nonfiction) × 2 (Text Presented As: fiction, nonfiction) design, allowing us to test for main effects of what participants actually read and what they were told, as well as for interaction effects between the type of text and the type of framing. ART scores were again included as a covariate in these two ANCOVAs.

We found no main effects or interactions for the RME; participants' scores did not differ depending on either what they read or how the text was framed (all p-values > .12, η^2 between 0.001 and 0.011). For the HO-ToM, there was a significant effect of what participants actually read ($F(1, 192) = 4.84$, $p = .029$, $\eta^2 = 0.024$), whereby participants who actually read nonfiction ($M = 32.14$, 95% CI[31.32, 32.96]) scored significantly higher than participants who actually read fiction ($M = 30.94$, 95% CI[30.25, 31.64]). There was no effect on the HO-ToM of how the text was presented, and there was no interaction effect (both p-values > .10, η^2 between 0.001 and 0.013).

Discussion

The current study investigated whether narrative nonfiction, due to its focus on internal psychological states and interpersonal relationships, could have a similar effect on participants' mentalizing abilities as literary fiction. We found a general effect of reading on one of our two measures of mentalizing (the HO-ToM), such that participants who read something had higher scores than those who read nothing. But there were no differences in scores on either measure for partici-

pants who read a narrative text as opposed to a non-narrative text. This tentatively suggests that the mere act of reading, regardless of narrative structure, may have a positive effect on cognitive theory of mind abilities. However, our sample was slightly under-powered relative to earlier work (Kidd & Castano, 2019; Panero et al., 2016), and the effect size of this test was extremely small ($\eta^2 = 0.018$). We are thus not able to draw a firm conclusion regarding the general effect of reading on theory of mind abilities based this study alone. In Study 2, we address the power issue with the goal of being able test the effect of narrative nonfiction more robustly.

We also found an effect of content on performance on the HO-ToM, such that participants who read narrative nonfiction performed better than participants who read narrative fiction on this test, regardless of how the text was framed. This result runs contrary to previous work, which found positive effects of literary fiction (e.g., Kidd & Castano, 2013). Together with other studies finding positive effects of genre fiction (Bal & Veltkamp, 2013; Fong et al., 2013; Vezzali, Stathi, & Giovannini, 2012) or null effects when comparing literary fiction to other types of texts (Bal & Veltkamp, 2013; Fong et al., 2013; Vezzali et al., 2015), this result suggests that literary fiction as defined by previous studies is not unique in its ability to improve theory of mind abilities. Indeed, although participants in our narrative fiction condition read the same stories as used in Kidd and Castano (2013), they did not perform any better than participants assigned to read narrative nonfiction. However, as the current study is the only one to our knowledge to present narrative nonfiction texts, we conducted Study 2 to attempt to replicate this result.

Finally, we tested whether participants' beliefs about the nature of their assigned text would matter. We had predicted an effect of belief, such that participants who read texts that were labeled as fiction would have higher scores on our theory of mind measures than participants reading texts that were labeled as nonfiction. Contrary to our prediction, we did not find any significant effects of story framing for either theory of mind measures. It is possible that this result may be an effect of a larger sample of participants who saw the nonfiction faming ($n = 113$) as opposed to the fiction framing ($n = 84$), an issue that we address in Study 2.

Study 2 replicates the 2×2 design used in Study 1 and again includes a no-reading control condition to test for effects of reading something vs. nothing. We also used different texts in Study 2. Study 1 used the same literary and expository texts as in Kidd and Castano (2013) in an attempt to replicate those results. However, those materials were inconsistent in their length, complexity, and theme. This variability among texts does not allow us to conclude definitively that the effects or lack of effects observed in this study are a result of the literariness manipulation of the experimental design rather than additional factors relating to

the texts themselves. In Study 2, therefore, we selected a pair of texts that were much more well-matched between the fiction and nonfiction conditions.

Study 2

Methods

Participants

The final sample included 362 participants (187 men, 174 women, 1 preferred not to answer; mean age = 36.32 years, range = 19–74). All participants were recruited from Amazon's Mechanical Turk system and engaged in the tasks online, via a survey administered on Qualtrics. They received $2 for their participation. This study was conducted in the summer of 2018.

An additional 201 individuals were recruited but not included in the final analyses due to exiting the survey before completion ($n = 109$), failing a manipulation check ($n = 37$; see below for details), failing a memory check ($n = 37$; see below for details), having prior exposure to the texts ($n = 8$), or not selecting any authors on the ART, implying that they had simply skipped this measure ($n = 10$).

Materials

Texts

Both the narrative fiction and the narrative nonfiction texts were chosen from *The Medium*, an online publishing platform. They both depict a personal experience and a parent-child relationship through a first-person perspective. The fictional text, "The Day I Was Diagnosed" by Dan Moore, focuses on the way a man and his wife and daughter tackle the obstacle of his descent into Alzheimer's. The nonfiction text, "His First Dress" by Yuvi Zalkow, captures the struggles of a father whose son rejects normative gender roles. These stories were matched for both length (approximately 7–10 reading minutes), word count (2799 and 2697 respectively) and difficulty (82.8 and 79.4, respectively, using a Flesch-Kincaid readability test). These texts were specifically chosen due to their human-interest perspective. The fiction and nonfiction text both engage the reader both cognitively and affectively, pulling the reader into the narrator's dilemma, thus offering an opportunity for the social simulation and empathizing that has been argued to be necessary to exercise social cognition skills (see Kidd & Castano, 2013; Mar & Oatley, 2008).

Measures

We used the same measures of social cognition as in Study 1: the RME test and the HO-ToM test. We again used the ART as a covariate. We decided not to include measures of transportation or affect in Study 2 because neither construct was significantly correlated with the dependent variables in the reading conditions of Study 1.

Procedure

There were five between-subjects conditions in this study. Four of these conditions were constructed using a 2 (Actually Read: narrative fiction text, narrative nonfiction text) × 2 (Text Described As: fiction, nonfiction) design (see Table 1). There were 103 participants who read the fictional text. Of these, 56 were accurately told that the text they read was fiction while 47 were inaccurately told that they were reading nonfiction. There were 104 participants who read the narrative nonfiction story. Of these, 51 participants were accurately told that the text they read was nonfiction, and 53 were inaccurately told that they were reading fiction. In the final condition (Control, $n = 155$), participants were not presented with any text. Participants were randomly assigned to conditions.

The procedure was identical to Study 1, with several small exceptions: Participants in this study responded to four multiple choice memory questions about their text (Study 1 only presented three memory questions). Participants who responded incorrectly to two or more out of four memory questions ($n = 37$) were not included in the final sample. Additionally, participants in this study did not respond to questions about current affect or transportation, as Study 1 found no relation between those measures and our main measures of social cognition. Finally, participants in this study responded to an additional question about whether they had read their assigned text before this study. Those who responded positively ($n = 8$) were removed from the final sample.

Results

A preliminary examination of ART scores revealed no differences by condition, $p = .18$. As in Study 1, ART was significantly correlated with both measures of theory of mind, both rs > 0.29, both ps < .001. We thus decided to retain ART as a co-variate in our analyses.

Reading something vs. nothing

We first used ANCOVA tests to consider differences in performance on the two theory of mind measures between the four conditions where texts were presented

($n = 207$) and the control condition, where participants did not read anything ($n = 155$), with ART score as a covariate.

On the RME, participants who read a text ($M = 26.04$, 95% CI [25.21, 26.87]) performed significantly better than participants who read nothing ($M = 24.37$, 95% CI [23.41, 25.33]; $F(1, 359) = 6.64$, $p = .01$, $\eta^2 = 0.015$). Similarly, on the HO-ToM, participants who read a text ($M = 31.44$, 95% CI [30.76, 32.12]) performed significantly better than participants who read nothing ($M = 29.92$, 95% CI [29.14, 30.71]; $F(1, 359) = 8.19$, $p = 0.004$, $\eta^2 = 0.02$).

Effects of both story type and presentation type

We conducted two 2 (Actually Read: fiction, nonfiction) × 2 (Text Presented As: fiction, nonfiction) ANCOVAs on RME performance and HO-ToM performance to examine any interaction effects between story type and presentation type. ART scores were included as a covariate.

For the RME, we found no main effects or interactions (all p-values > .31, η^2 between 0.001 and 0.005). For the HO-ToM, we found no main effects, but there was a significant interaction effect between framing and text type ($F(1, 202) = 7.72$, $p = 0.006$, $\eta^2 = 0.035$). To investigate this effect further, we conducted separate ANCOVAs comparing the effect of framing within the two text conditions separately, controlling for ART scores. We found that, when participants actually read fiction, they performed significantly better when they were inaccurately told they were reading nonfiction ($M = 32.79$, 95% CI [31.59, 34.00]) than when they were accurately told that they were reading fiction ($M = 30.41$, 95% CI[29.30, 31.51], $F(1, 100) = 8.37$, $p = .005$, $\eta^2 = 0.071$). But when participants actually read nonfiction, there was no significant effect of framing; performance did not differ regardless of whether participants were told they were reading nonfiction ($M = 31.28$, 95% CI [30.10, 32.45]) or fiction ($M = 32.00$, 95% CI [30.85, 33.15], $F(1, 101) = 0.76$, $p = 0.39$, $\eta^2 = 007$).

Discussion

Study 2 found that participants who read a text outperformed participants who did not read a text. Unlike in Study 1, this held true for both of our measures. This result suggests that fictional stories do not uniquely impact mentalizing abilities. Rather, the act of reading itself, regardless of content, seems to have a positive effect.

Although Study 1 found that participants who read nonfiction outperformed participants who read fiction on the HO-ToM, we did not directly replicate that effect here. Instead, we found a significant interaction effect between framing and

content: Participants who actually read fiction but were told they were reading nonfiction outperformed participants who actually read fiction and were told that they were reading fiction on the HO-ToM task. But there was no effect of framing on participants who actually read nonfiction. Put another way, scores were generally equivalent when participants read nonfiction and when they read fiction that they believed was nonfiction; scores were lowest when participants read fiction and accurately believed that it was fiction.

General discussion

These studies were designed to test the claim that reading fiction improves social understanding. Exercising one's mindreading capacities in the context of fictional stories, which tend to focus on interpersonal relationships and psychological states, could plausibly lead one to become more empathetic and more skilled at mindreading. Previous work, both correlational and experimental, supports this argument, finding connections between reading fictional texts and various types of cognitive and affective mindreading abilities (e.g., Bal & Veltkamp, 2013; Djikic et al., 2013; Fong et al., 2013; Kidd & Castano, 2013; Mar et al., 2006, 2009; Vezzali et al., 2015).

However, effect sizes for this relationship are typically small, including in the studies presented here. Further, not all studies find positive effects, and other work suggests that the effect varies depending on the type of text, the dependent measures, and individual characteristics of the participants (Djikic et al., 2013; Mar et al., 2006, 2009; Mumper & Gerrig, 2017). To further examine the basis for the proposed connection between stories and social cognition, the current studies tested whether a psychologically rich narrative nonfiction story could have similar effects of participants' theory of mind abilities when compared to a fictional story. We initially predicted that (1) reading a narrative text would improve scores on tests of theory of mind, compared to reading nothing, (2) the nature of the narrative itself (i.e., fictional or nonfictional) would not affect participant's responses, and (3) framing a story as fiction would improve performance.

Across our two studies, we found support for the first hypothesis: Reading any kind of text – fictional or not, literary or not, narrative or not – was associated with better performance. This finding was consistent in both studies for our measure of higher-order theory-of-mind thinking and occurred for the Reading the Mind in the Eyes test in Study 2. This finding about the benefits of any kind of reading is surprising, because the prevailing theory of why reading might improve social cognition claim that this effect stems from readers' engagement in the simulation of social worlds (e.g., Mar & Oatley, 2008). But the non-narrative texts used in Study 1, which gave brief histories of plants and non-human animals, did

not contain any social interactions or even any human characters, hence did not invite readers to simulate others' mental states. If social simulation was truly the mechanism by which stories engage social cognitive skills, then we should have found differences in performance on our measures at least between those who read narrative stories (which were social) and those who read non-narrative texts (which were not social). That was not the case, however. Participants reading texts devoid of any characters or social worlds still outperformed participants who did not read anything on our measure of cognitive theory of mind.

Our results thus call into question whether social simulation is the mechanism by which fictional stories improve social cognition. Instead, these results suggest that something about the act of reading may have focused participants' attention (see Weisberg, Hirsh-Pasek, Golinkoff, & McCandliss, 2014) or engaged their verbal abilities, leading to better performance. Indeed, prior work has found a strong correlation between verbal ability and performance on the RME (Peterson & Miller, 2012), suggesting that any kind of verbal stimulation might be equally effective at increasing scores on this task. Future work should attempt to control for these factors, whether by employing a nonverbal test of social cognition or by using a measure of participants' linguistic skills as an additional covariate. At the very least, the current results suggest that we should be wary of claims that reading only a particular kind of text is the best way to improve theory of mind.

Contrary to our second prediction, we did find an effect of story type, at least on our text-based test of higher-order theory-of-mind abilities. In Study 1, reading narrative nonfiction was associated with higher scores on this test than reading fiction, and in Study 2, we found no effect of framing on performance after reading narrative nonfiction, even though framing a fictional story as fiction yielded lower scores. Given that these findings were inconsistent between studies and only occurred for one of our dependent measures, we hesitate to strongly conclude that reading nonfiction is superior to reading fiction in its effects on theory of mind. It is possible that the results found in Study 2 are the result of other features of the texts that we did not measure or control, such as their content (parent-child relationships) or their linguistic devices (e.g., De Mulder et al., 2017; Koopman, 2016). Nevertheless, the variability of this result casts doubt on the conclusion that fiction is uniquely able to improve social cognition. Although this null effect fails to replicate earlier work that shows an effect of reading fiction – especially literary fiction – on measures like the RME (Dodell-Feder & Tamir, 2018; Kidd & Castano, 2013), it does align with a small body of studies that similarly show null effects of fiction relative to other types of texts on participants' performance on theory of mind measures (Camerer et al., 2018; Kidd & Castano, 2019; Panero et al., 2016, 2017; Samur et al., 2018).

Finally, we failed to find support for our third prediction. Study 1 found no effect of framing, and Study 2 found no effect of framing for participants who read a nonfictional text. However, Study 2 did find an effect of framing for participants who read fiction, but only on the HO-ToM task: Participants who read a fictional text and were accurately told that it was fiction performed less well than participants who read a fictional text and were inaccurately told that it was nonfiction. These latter participants showed the best performance out of the four conditions. Again, we do not wish to place much weight on these findings, given that they were inconsistent between studies and between dependent measures. One possible reason for these inconsistent effects is that information about the story's true nature generally takes a back seat to its content once a reader is absorbed in the story, particularly in psychologically rich, narrative works (Green, Chatham, & Sestir, 2012; Oatley, 1999). The stories we used in Study 2 may have provided a more emotionally rich narrative experience than the stories in Study 1, reducing the power of the framing information. The effect of framing may also be simply weak or inconsistent, or it may interact with other variables such as personality traits or ability to be transported into a story (Djikic et al., 2012). Future studies should further investigate the role of framing for content-rich narratives to explore the impact that paratextual information may have on reading and social cognition.

Regardless, the main finding of the current studies is that both fictional and nonfictional texts, whether narrative or not, can have a significant impact on participants' social-cognitive abilities. In light of recent work claiming that only fiction (or only literary fiction) has such an impact, because it allows readers to practice empathy and related abilities, these results provide evidence that a different mechanism is at play. Future work should continue to examine whether, for whom, and why reading might affect people's abilities to think about others.

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Appendix. Sample story from the higher-order theory of mind measure

Sam wanted to find a mailbox so he could mail the registration for his car. He was already late mailing it, as his registration had run out the week before. Because the police regularly patrolled the street where he lived, he was worried about being caught with an expired registration. As Sam was new to the area, he asked his colleague Henry if he could tell him where to find a mailbox. Henry told him that he thought there was a post office on Elm Street. When Sam got to Elm Street, he found it was closed. A notice on the door said that the post office had moved to new premises on Bold Street. So Sam went to Bold Street, but by the time he got there, the post office had already closed. Sam wondered if Henry, who was the office prankster, had deliberately sent him on a wild goose chase. When he got back to the office, he asked another colleague, Pete, whether he thought it likely that Henry had deliberately misled him. Pete thought that, since Sam had been anxious about the registration, it was unlikely that Henry would have deliberately tried to get him into trouble.

Statement	Type	Level	Answer
Sam left Bold Street, then went to the office and spoke to Pete	Fact	3+1	True
Pete, who worked at the same place as Henry the office prankster, was Sam's cousin, which is why Sam asked Pete how to find the post office	Fact	5+1	False
Henry thought that Sam knew he was a prankster	Ment	3	False
Henry knew Sam believed he knew the Post Office's location	Ment	3	True
Sam thought that Henry knew the Post Office was in Bold Street and hence that Henry must have intended to mislead Sam	Ment	5	True
Sam believed that Pete thought the Post Office was in Elm Street and hence that Pete must not have intended to mislead Sam	Ment	5	True
Sam needed to buy a stamp	Fact	1+1	False
Pete wanted Sam to know that Henry believed that the Post Office was on Elm Street and hence did not intend to mislead him	Ment	6	True
The Post Office was closed and Sam's insurance had run out	Fact	2+1	False
Pete wanted Sam to know that he believed that Henry had intended not to mislead him	Ment	6	True
Sam mailed his registration from the post office	Fact	1+1	False
The post office was closed	Fact	1+1	True
Henry wanted to play a trick	Ment	2	False
Sam asked Henry, and did not ask Pete where the Post Office was in order to mail his registration	Fact	4+1	True
Sam found the Post Office closed and couldn't mail the registration for Pete	Fact	3+1	False
Sam thought Henry knew he wanted to mail his registration	Ment	4	False
Sam who worked with Pete and Henry did not know where to mail his registration because he was new to the area	Fact	4+1	True
Henry, the man that Sam, who was new to the area, spoke to about where to mail his registration because his had run out, was a colleague of Pete's	Fact	5	True
The Post Office in Elm St. had a notice on the door	Fact	2+1	True
Pete suspected that Henry intended to play a prank on Sam	Ment	3	False

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