

The genre effect

A science fiction (vs. realism) manipulation decreases inference effort, reading comprehension, and perceptions of literary merit

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Some purport that literary fiction is determined by high inference demands. The subgenre of science fiction is often defined by story-world tropes that may reduce inferential demands. However, science fiction with high inference demands may also constitute literary fiction. Instead of inferential demands, it may be readers' responses to setting that distinguishes science fiction and narrative realism. In two experiments, a story was manipulated for contemporary and science-fiction settings. Also, a version of each text with and without explanatory statements manipulated inference demand. Readers perceived the science-fiction text as lower in literary quality. For science fiction, readers also exerted less inference effort for theory of mind, but more for understanding the world. Regardless of inference effort, participants who read the story in the science-fiction world performed more poorly on comprehension. Readers' expectations triggered by setting tropes seem to be particularly potent determinants of literary quality perceptions, inference effort, and comprehension.

Keywords: literariness, fiction, genre, realism, theory of mind, inference

The term “literariness” dates to the 19th century but is most associated with the Russian Formalist critic Roman Jakobson who wrote in 1921 that “the object of literary science is not literature but literariness, that is, what makes a given work a literary work” (as cited in Steiner, 1984, p. 20). Nearly a century later, Miall (2011) described the ongoing challenges to such a scientific approach to literature, especially the need to define “literariness” so that it may be subjected to scientific study. Baldick (2015), in *The Oxford Dictionary of Literary Terms*, defined “literariness” as “the sum of special linguistic and formal properties that distinguish literary

texts from non-literary texts,” and Rice (2010), in *The Cambridge Encyclopedia of the Language Sciences*, as “the perceived distinctive quality of the language of literary, as opposed to nonliterary, texts” (p. 450). The nature of those defining “properties” and “qualities” remains open. Although, as Rice has noted, “[t]here is currently among scholars of literature, both linguists and literary critics alike, little agreement,” attempts to define literariness may be divided into two general approaches, intrinsic and extrinsic. If literariness is intrinsic, it is defined by the properties found within certain texts. If literariness is extrinsic, then it is defined by readers’ perception of a text as literary according to social constructs.

Alexandrov (2007) has lamented the rise of the extrinsic approach in literary criticism since the 1970s, arguing that “[i]f certain kinds of structured discourse are shown to engage the human brain in ways that others do not, then there may be justification for reestablishing a version of the differential conception of the ‘literary’” (p. 99). Jakobson, as representative of Russian Formalism, was a proponent of the intrinsic approach, identifying poetic devices such as rhyme and meter that foreground and defamiliarize language in ways that differentiates it from its nonliterary uses. Multiple publications of the past two decades have built on Formalism’s general claim that literariness may be understood as poetic deviations from ordinary language (Benthian, 2012; Koopman, 2016). One of the most studied qualities is “foregrounding,” which has expanded to include a range of figurative and stylistic devices that apply primarily to poetry (Hanauer, 1998; Miall, 2007; Shen, 2007; Van Peer, 1986). According to Van Peer (2007), “no other theory of literature has ever been put to the test on such an extensive scale” (p. 99). However, because poetry typically entails more poetic devices than literary prose, such studies produce evidence for defining the literariness of poetry but not necessarily the literariness of literary fiction. When narrative prose is studied, it is often only in relation to expository prose (Koopman & Hakemulder, 2015). Dixon and Bortolussi (2011) have identified the same gap in research but highlighted the importance of investigating the effects of genre on perceptions of literariness.

In addition to hypothesizing the literariness of “foregrounded” language, Miall (2009) identified “qualified empathy,” which involves a reader taking on “the feelings of a main character” and so applies primarily to prose. Kidd and Castano’s (2013) highly publicized study addressed Miall’s second feature by defining literary fiction as fiction “that forces the reader to engage in theory of mind (ToM) processes” and “uniquely engages the psychological processes needed to gain access to characters’ subjective experiences” (p. 377, 378). Other researchers have also investigated the relationship between theory of mind and fiction, finding that fiction can facilitate the development of empathy and that readers preferred texts with clearly embedded theory of mind perspectives (Djikic, Oatley, & Moldoveanu, 2013; Whalen, Zunshine, & Holquist, 2012).

In addition to expanding the exploration of literariness beyond the primarily poetry-focused elements of foregrounded language, theory of mind also potentially bridges the intrinsic-extrinsic divide. If understood intrinsically, the properties of a literary text that trigger theory of mind reading define literariness; if understood extrinsically, the act of theory of mind reading a text causes the reader to evaluate the text as literary defines literariness. However, theory of mind, which Kidd and Castano defined as “the inference and representation of others’ beliefs and intentions,” is a subset of the more general category of “inference,” “reasoning from something known or assumed to something else which follows from it” (*Oxford English Dictionary*). Literariness then might align with texts that require higher amounts of inference, whether theory of mind specifically or not.

While theory of mind might define literariness in literary fiction, Kidd and Castano’s (2013) methods for selecting texts involve other implicit categories and definitions that complicate their study. Following Barthes, they defined “literary fiction” in opposition to “popular fiction” or “popular genre fiction,” claiming that the second “tends to portray the world and characters as internally consistent and predictable” and so therefore “does not promote ToM” (p. 378). “Popular,” “genre,” and “readerly” are used synonymously and in opposition to theory of mind promotion and therefore to literariness. While it may be true that “prize-winning texts are more likely to embody general characteristics of literature than bestsellers of genre fiction” (Kidd & Castano, 2013, p. 378), it is not clear whether such texts are more likely to embody the specific characteristic of theory of mind promotion.

Kidd and Castano (2013) then selected texts representative of their two categories according to unrelated criteria. The first category was selected according to the expert opinion of literary prize jurors, and the second category was selected according to either high Amazon.com sales rankings or a text’s inclusion in, for example, a science fiction anthology. If the researchers intended the second category to represent nonliterary fiction, expert opinion should have been used in its selection also. Instead the second category combines two qualities, popularity and genre designation. Popularity is easily defined and was objectively selected. However, if the authors wished to test the implicit hypothesis that literariness is inversely correlated to popularity, the first category of texts would have to be selected according to the lowness of their Amazon.com rankings. The authors also chose works that had been previously designated as romance, detective, and science fiction. If the authors wished to test the implicit hypothesis that literariness is inversely correlated to the features of romance, detective, and science fiction, the first category of texts would have to be selected according to the absence of those designations. Instead the first category contains texts judged to be of high literary quality by experts, and the second category contains texts that either sold well or were identified as belonging to a subgenre. Moreover, other research has

explored differences between subgenres, finding that Romance and Suspense/Thriller genres predicted interpersonal sensitivity, while Science Fiction/Fantasy did not (Fong, Mullin, & Mar, 2013). If so, “genre fiction” is not an adequately unified category to be studied as a whole.

Kidd and Castano’s study contains four implicit assumptions: (a) a text cannot be literary and also popular; (b) a text cannot be literary and also belong to a subgenre; (c) because the literariness of literary fiction is theory of mind promotion, a text that is popular and/or belongs to a subgenre cannot also promote theory of mind – or at least not to the same degree as a text that is not popular and does not belong to a subgenre; and (d) all subgenres promote theory of mind to the same degree relative to literary fiction. None of these claims is accurate.

In June 2012, *The New Yorker*, the most prestigious publication for short fiction and the most represented in the *O. Henry Prize Stories* series from which Kidd and Castano selected literary texts, published “The Science Fiction Issue,” which included science fiction stories by four acclaimed literary authors. The inclusion of such literary genre fiction was and continues to be common for the magazine, with, for example, Robert Coover’s “Invasion of the Martians” appearing in the September 12, 2016 issue. Also in 2016, Viet Thanh Ngyuyen was awarded the Pulitzer Prize for Fiction for *The Sympathizer*, which the Mystery Writers of America also awarded an Edgar Prize for Best First Novel, expert evidence of literary genre fiction in the subgenre of mystery. Donna Tartt’s *The Goldfinch*, which won the 2014 Pulitzer, spent seven months on the *New York Times* best-seller list, selling over a million and a half copies, demonstrating that literary acclaim and popularity are not oppositional qualities, prompting journalists to pose the same questions as cognitive psychologists, “What makes a work literature, and who gets to decide?” (Peretz, 2014). The categorical complexity is not new. Robert Heinlein, a renowned science-fiction author whose work Kidd and Castano include in their study, coined the term “speculative fiction” in 1947 to describe “non-realistic fiction, that attempted more than entertainment” (Keegan, 2006). Even Russian Formalists cited Jonathan Swift’s *Gulliver’s Travels* and Laurence Sterne’s *The Life and Opinions of Tristram Shandy, Gentleman*, prose works that merge the categories of literary, genre, and popular (Shklovksy, 1970; Tomashevksy, 1970). Finally, bracketing the question of literariness, even the division of literature into taxonomic subgenres has been shown to be multi-faceted, graded, subjective, and contested (Simerka, 2012).

By “literary fiction,” Kidd and Castano might have meant “so called ‘highbrow’ literature,” a category that Fong, Mullin, and Mar (2013) described as “typically drama with serious themes” and so one of potentially several genres “that depict human relationships in a complex and realistic fashion” (Fong, Mullin, and Mar, 2013, p. 371). And by “popular genre fiction” Kidd and Castano might have meant

“formula fiction.” Cawalti (1976) described “a literary formula” as “a structure of narrative or dramatic conventions employed in a great number of individual works” that includes “stereotypes” and “general plot patterns” (pp. 5–6). Similarly, in the subgenre of fantasy, Attebery (2004) distinguished the “sophisticated” works of the “fantasy mode” from those of “formula fantasy,” “a form of popular escapist literature that combines stock characters and devices ... into a predictable plot” (p. 293). Though a work of any subgenre then may or may not be formulaic, Cawalti (1976) acknowledged that “[t]here is bound to be a good deal of confusion about the terms ‘formula’ and ‘genre’ since they are occasionally used to designate the same thing” (p. 6).

Relabeling Kidd and Castano’s categories “formula fiction” and “highbrow fiction,” however, does not alter the problems in their selections, which include the non-formulaic mystery novel *Gone Girl* by Gillian Flynn, which *New York Times* reviewer Janet Maslin (2012) judged a “dazzling breakthrough ... wily, mercurial, subtly layered and populated by characters so well imagined that they’re hard to part with,” a description that appears to establish the reviewer’s high level of theory of mind engagement. Because a reader must assess the unreliability of two narrators, the novel would also produce Miall’s (2009) “qualified empathy” which requires “taking on the feelings of a main character while remaining alert to the character’s potential for error.” Because Kidd and Castano cannot account for the categories of “popular literary fiction,” “literary genre fiction,” and “popular literary genre fiction,” nor the qualities that would define those categories, their findings are of limited use. Moreover, three attempts to reproduce Kidd and Castano’s (2013) study failed (Panero et al., 2016).

If *Gone Girl* promotes theory of mind, then their study does not differentiate their two categories of texts according to theory of mind and so their results are measuring the effects of some other differentiating quality or qualities. As Panero et al. (2016) explained, “it remains unclear which aspects of literary fiction might be causally responsible” (p. 2). This inability to isolate a specific element of a text is a common flaw of studies that attempt to define and measure literariness. As Koopman (2016) noted of studies that measure empathy and reflection in literary and nonliterary texts, “it is often not specified which features make the literary texts literary” (p. 82). Emmott, Sanford and Dawydiak (2007) also observed that “[b]oth literary texts and popular fiction can make use of stylistic devices which appear to be used by writers with the intention of capturing the attention of readers at crucial points in stories” (p. 205). We address this challenge below.

Current studies

Rather than selecting different texts based on expert but unquantifiable impressions of literariness or nonliterariness, our study uses a single, short text that we manipulate to produce isolated and controlled differences. The text is less than a thousand words and depicts a main character entering a public eating area and interacting with acquaintances including a server after his negative opinion of the community has been made public. We designate the first version as “Narrative Realism,” the common designation for literary fiction that takes place in a contemporary setting but does not fit another subgenre, such as romance or mystery, that also takes place in contemporary settings. In the narrative realism version, the main character enters a diner after his letter to the editor has been published in the town newspaper. Rather than attempting to study multiple subgenres, we select one, designating the second version “Science Fiction,” the most common term for fiction that includes such “accessible, well known features” as “interplanetary travel and aliens,” “hypothetical advances in technology and science,” and being “set in the future” (Dixon & Bortolussi, 2005, p. 15). In the Science Fiction version, the main character enters a galley in a distant space station populated by humans, aliens, and androids. The Narrative Realism and Science Fiction versions are identical except for setting-creating words, such as “door” and “airlock.” Both versions, therefore, should promote identical levels of theory of mind, requiring a reader to draw inferences about the main character’s and other characters’ unstated thoughts and feelings.

Because Kidd and Castano (2013) identified theory of mind as the distinguishing quality of literary fiction, we also created two versions of Narrative Realism and Science Fiction. The first version of each included statements that directly state a character’s thoughts and feelings, for example, “Jim knows everyone in the diner will be angry at him.” The second version of each includes no theory of mind explaining statements. The versions of the texts that include theory of mind explaining statements should have lower theory of mind demands than the versions that do not include them, because the explanations state the inferences the text would otherwise only imply. If theory of mind is the defining quality of literary fiction, then the texts with theory of mind explanations would be comparatively nonliterary.

In addition to theory of mind, we address an additional form of inference, which we call theory of world. Where theory of mind requires the inference and representation of a character’s implicit thoughts and emotions, theory of world requires the inference and representation of a world’s implicit laws and systems, potentially including such things as laws of physics, systems of social organization, and public history. Both texts, for example, include a sentence that begins: “He

was awake in his bunk just a few hours ago, staring at ...”; the narrative realism version then continues: “... the shadows of his ceiling slowly ebbing to pink, when the delivery kid’s bicycle rattled onto the gravel of his driveway,” while the science fiction version continues: “... the gray of his sky-replicating ceiling slowly ebbing to pink, when the satellite dish mounted above his quarters started grinding into position to receive the day’s messages relayed from Earth.” Although theory of world would be present in both Narrative Realism and Science Fiction, because Narrative Realism’s world is a representation of the reader’s world, theory of world demands are minimal. Because science fiction often depicts worlds that differ significantly from a reader’s world, theory of world demands would be higher. The narrative-realism text then should promote theory of mind but not theory of world, and the science-fiction text should promote theory of mind to the same degree as the narrative-realism text and theory of world to a greater degree.

Such an understanding, however, treats both theory of mind and theory of world as intrinsic qualities, while ignoring the role of extrinsic influences. The term “narrative realism” is sometimes conflated with the term “literary fiction” because narrative realism is a genre distinct from “genre fiction” and exists only in the sometimes mislabeled category of “literary fiction.” But if literary fiction is defined by theory of mind, a story’s setting, whether realistic or fantastical, indicates nothing about its literariness. However, while neither narrative realism nor science fiction then are more likely to be literary in terms of intrinsic qualities, we hypothesize that the narrative-realism text is more likely to be extrinsically identified as literary and that the science-fiction text is more likely to be extrinsically identified as nonliterary. Because theory of world is more prevalent in science fiction than in narrative realism, the promotion of theory of world processing is also more likely to be extrinsically identified as nonliterary.

Theory of world should also increase inference demands. Iza and Ezquerro (2000) explained, “world knowledge is often required in order to establish coherent links between sentences. Therefore, the content grasped from a text turns out to be strongly dependent upon the reader’s additional knowledge that allows a coherent interpretation of the text as a whole” (p. 227). In Science Fiction, theory of world requires readers to establish coherent links based on knowledge derived from the text rather than the real world. Higher inference demands could then lead to lower comprehension. Kintsch (1998) noted that “comprehension entails forming, on the basis of perceptual and conceptual features, coherent units with Gestalt-type characteristics” (p. 93). Those coherent units, because they involve the perception of a whole that is more than the sum of its parts, are forms of inference. Eason, Goldberg, Young, Geist, and Cutting (2012) explained that “[l]ess cohesive texts require readers to rely on skills such as making inferences and recalling previous knowledge in order to fill in the gaps” (p. 516). Because Science Fiction contains

both theory of mind and theory of world, its comprehension would be more challenging than Narrative Realism, which contains equal theory of mind but comparatively little theory of world. As a less cohesive text, Science Fiction could then be more difficult to comprehend, as Ozuru, Dempsey, and McNamara (2009) found with expository texts. McNamara, Kintsch, Songer and Kintsch (1996) also found that increasing a text's coherence increases comprehension and recall specifically for low-knowledge readers – a category that includes all Science Fiction readers because of the text's unfamiliar setting.

Walczyk et al. (2007) similarly noted that “unfamiliar texts” can create “confusions” or “instances of reader doubt over the meanings of a unit of text” due to “incomplete data needed for comprehension” which therefore “sometimes lowers comprehension” (p. 867). More specifically, “Knowledge-based confusions” occur “when readers do not possess knowledge or schemas for understanding text,” and “poorly integrated comprehension” may result from inefficiency in proposition encoding, when “word meanings are combined to form basic idea units,” or in proposition integration, “when idea units are combined to form an understanding of phrases and sentences” (Walczyk et al., 2007, p. 869). A comparatively high rate of knowledge-based and proposition-based confusions may be defining elements of the Science Fiction text and of the genre in general. In contrast to narrative realism, speculative fiction is a genre of the unfamiliar. Higher inference demands and lower comprehension may also be linked to lower transportation and empathy if readers are distracted by the text's initial difficulty.

We make the following hypotheses:

1. Science Fiction will be assessed as having lower literary merit than Narrative Realism.
2. Science Fiction and Narrative Realism readers will exert similar degrees of theory of mind effort.
3. Theory of mind effort will be higher in Science Fiction and Narrative Realism than in Science Fiction with theory of mind explanation and narrative realism with theory of mind explanations.
4. Theory of world will be higher in Science Fiction than in Narrative Realism, regardless of theory of mind explanations.
5. The inclusion of theory of mind explanations should increase comprehension in both Science Fiction and Narrative Realism.

We do not predict whether Science Fiction and Narrative Realism will vary in comprehension independent of theory of mind explanations, because there is not yet literature on which to base predictions.

Experiment 1

Method

Participants

A sample of 145 participants (67% female, 33% male) was recruited from Amazon's Mechanical Turk, where each participant received a \$0.50 payment for participation (age; $M = 34.97$, range 18–65). It is important to note that 158 participants were originally recruited but 13 were excluded because they spent less than 30 seconds reading the text – over eight times faster than the average reading time ($M = 241$ s, $SD = 212$ s).

Design and materials

All materials were delivered using Qualtrics software. Participants were randomly assigned to read one of four different texts: Narrative Realism (NR) without theory of mind explanations (Word Count = 800, Flesch-Kincaid = 6.8, $n = 39$), Narrative Realism with theory of mind explanations (NRT) (Word Count = 997, Flesch-Kincaid = 6.2, $n = 52$), Science Fiction (SF) without theory of mind explanations (Word Count = 815, Flesch-Kincaid = 7.3, $n = 28$), or Science Fiction with theory of mind explanations (SFT) (Word Count = 1013, Flesch-Kincaid = 6.4, $n = 26$). Examples of each text are provided in Appendix A. The full set of materials is available upon request to the first author. The unequal sample sizes across conditions is due to a programming error in Qualtrics.

Questionnaires

To assess reactions to reading the text, participants completed a measure of experience-taking that integrates perspective-taking and empathy (Kaufman & Libby, 2012). On a Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) participants rated how much they agreed with statements like, “*I felt like I could put myself in the shoes of the character in the story,*” and “*I found myself feeling what the character in the story was feeling.*” Participants also completed a measure of transportation that includes facets of imagery, empathy, and getting lost in the story on a 1 (*very little*) to 5 (*extremely*) Likert scale (Green & Brock, 2000).

To assess trait empathy and perspective-taking abilities, participants completed two subscales from the interpersonal reactivity index including empathic concern and perspective-taking (Davis, 1983). Both scales employ a 1 (*does not describe me well*) to 5 (*describes me very well*) scale.

A new scale was developed to assess participants' perceived effort in trying to figure out what the characters were thinking and feeling. We termed it, *inference effort – theory of mind* (*Theory of mind*). The scale consisted of the following four

items, rated on a 1 (*little to no effort*) to 5 (*a lot of effort*) Likert scale: *As you were reading, how much effort did you spend trying to figure out, (1) what Jim was feeling, (2) what people were feeling about Jim, (3) the reasons behind Jim's actions, (4) the reasons behind other people's actions toward Jim.*

A new 6-item scale was developed to assess perceived literature quality of the text. The scale asked whether participants thought it could be award-winning and whether they felt the text challenged them to think about the world differently. See Appendix B for the full scale.

Reading comprehension

A brief 3-item multiple-choice test of reading comprehension was given that asked how Jim knows one of the main characters, how a character lets Jim know she is upset, and how familiar Jim is with the location.

Procedure

To provide realistic reading conditions, participants were told to read the text as if they were reading for leisure; but to do so continuously in one sitting. They read the text in a self-paced manner in two sections of approximately equal length. Then, they completed the remaining questionnaires in the following order: experience-taking, transportation, inference effort, comprehension test, literary quality, interpersonal reactivity index. Also, just before completing the literary quality scale, they were asked, "*Briefly explain what it means for a story to be literary.*"

Results

For descriptive statistics for all measures across all four conditions, see Table 1.

Literary quality

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects analysis of variance (ANOVA) was performed on literary quality ratings. It revealed a main effect of genre where Science Fiction ($M = 2.48$, $SD = 0.81$) was rated significantly lower than the Narrative Realism ($M = 3.14$, $SD = 0.82$), $F(1, 141) = 21.96$, $p < .001$, $\eta_p^2 = .14$. There was also a main effect of adding theory of mind explanations, where adding theory of mind explanations ($M = 3.01$, $SD = 0.86$) significantly increased literary quality ratings compared to the no theory of mind explanations condition ($M = 2.61$, $SD = 0.82$), $F(1, 141) = 8.28$, $p = .005$, $\eta_p^2 = .06$. These main effects were qualified by a significant interaction between genre condition and theory of mind condition, $F(1, 141) = 4.66$, $p = .033$, $\eta_p^2 = .03$. Follow-up t -tests indicated that without

theory of mind explanations, Science Fiction was rated substantially lower than Narrative Realism, $t(65) = 4.32$, $p < .001$, $d = 1.07$. There was a smaller effect of genre when theory of mind explanations were added, that $t(76) = 2.01$, $p = .048$, $d = 0.50$. See Figure 1 for a depiction of these results.

Inference effort – theory of mind

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on inference effort – Theory of mind ratings. It revealed a main effect of genre where Science Fiction ($M = 2.82$, $SD = 1.18$) was rated significantly lower than Narrative Realism ($M = 3.54$, $SD = 0.84$), $F(1, 137) = 18.03$, $p < .001$, $\eta_p^2 = .11$. This main effect was qualified by a significant interaction between genre condition and theory of mind condition, $F(1, 137) = 6.00$, $p = .016$, $\eta_p^2 = .04$. Follow-up t -tests indicated that without theory of mind explanations, Science Fiction was rated substantially lower than the narrative-realism text, $t(64) = 4.65$, $p < .001$, $d = 1.16$. There was no effect of genre with theory of mind explanations. See Figure 2 for a depiction of the results.

Experience-taking

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on experience-taking ratings. It revealed a main effect of genre where Science Fiction ($M = 2.75$, $SD = 0.81$) was rated significantly lower than Narrative Realism ($M = 3.42$, $SD = 0.82$), $F(1, 141) = 23.06$, $p < .001$, $\eta_p^2 = .14$. There was also a main effect of adding theory of mind explanations, where adding theory of mind explanations ($M = 3.48$, $SD = 0.86$) significantly increased literary quality ratings compared to the no theory of mind explanations condition ($M = 2.69$, $SD = 0.83$), $F(1, 141) = 31.31$, $p < .001$, $\eta_p^2 = .18$. These main effects were qualified by a significant interaction between genre condition and theory of mind condition, $F(1, 141) = 8.80$, $p = .004$, $\eta_p^2 = .06$. Follow-up t -tests indicated that without theory of mind explanations, Science Fiction was rated substantially lower than Narrative Realism, $t(65) = 5.05$, $p < .001$, $d = 1.25$. There was no effect of genre with theory of mind explanations.

Transportation

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on transportation ratings. It revealed a main effect of genre where Science Fiction ($M = 2.82$, $SD = 0.58$) was rated significantly lower than Narrative Realism ($M = 3.48$, $SD = 0.58$), $F(1, 141) = 44.42$, $p < .001$, $\eta_p^2 = .24$. There was also a main effect of adding

theory of mind explanations, where adding theory of mind explanations ($M = 3.29$, $SD = 0.62$) significantly increased transportation ratings compared to the no theory of mind explanations condition ($M = 3.00$, $SD = 0.60$), $F(1, 141) = 8.54$, $p = .004$, $\eta_p^2 = .06$. These main effects were qualified by a marginal interaction between genre condition and theory of mind condition, $F(1, 141) = 3.39$, $p = .068$, $\eta_p^2 = .02$. Follow-up t -tests indicated that without theory of mind explanations, Science Fiction was rated substantially lower than Narrative Realism, $t(65) = 5.19$, $p < .001$, $d = 1.29$. There was a smaller effect of genre with theory of mind explanations, $t(65) = 4.03$, $p < .001$, $d = 0.96$.

Reading comprehension

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading comprehension percent correct scores. It revealed a main effect of genre where participants reading Science Fiction ($M = 54.90\%$, $SD = 22.78\%$) scored significantly lower than participants reading Narrative Realism ($M = 62.10\%$, $SD = 22.89\%$), $F(1, 141) = 4.32$, $p = .039$, $\eta_p^2 = .03$. There was also a main effect of adding theory of mind explanations where adding theory of mind explanations ($M = 63.10\%$, $SD = 22.91\%$) significantly improved comprehension compared reading a text without theory of mind explanations ($M = 52.90\%$, $SD = 23.85$), $F(1, 141) = 6.89$, $p = .010$, $\eta_p^2 = .05$.

Trait empathic concern and perspective-taking

Each trait was added individually to each of the above ANOVAs as a random factor and they did not interact with genre or theory of mind condition effects. In addition, entering each trait simultaneously as covariates in an ANCOVA did not substantively change the above results.

Free response literary definition

71% of the participants defined “literary” according to intrinsic qualities of the text (“style,” “devices,” “well written,” etc.) and 27% according to extrinsic qualities focused on readers (“engaging,” “draws reader in,” “elicits emotional response,” etc.). One participant defined “literary” in opposition to genre fiction (“has no genre”), one by realism (“had to be like real life”), and one questioned the “differentiation” of literary fiction from fiction in general.

Reading speed

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading speed (words per second (wps)). There were no effects, (grand $M = 5.82$ wps, $SD = 6.71$ wps).

Discussion

The results of Experiment 1 demonstrated that converting the text's world to science fiction dramatically reduced perceptions of literary quality, despite the fact participants were reading the same story in terms of plot and character relationships. The science fiction genre manipulation also reduced experience-taking, transportation, inference effort, and reading comprehension. However, the genre effect was mitigated or eliminated completely by adding theory of mind explanations to the text. This suggests that the science fiction world affected the effort participants invested in theory of mind processes, unless Theory of mind explanations are added to minimize the effort needed to infer what characters are feeling and thinking.

It is also surprising that readers assessed the narrative-realism text with theory of mind explanations as having greater literary merit than the narrative-realism text without such explanations, since the inclusion of explanations would have reduced the effort required to interpret the character's inner experience. This is inconsistent with Kidd and Castano's (2013) and our proposal that increased inference effort should lead to increased perceptions of literary quality. However, the results indicated that adding the theory of mind explanation did not substantially (or significantly) increase inference effort for theory of mind information for the narrative-realism text. Therefore, we cannot conclude whether our proposal or Kidd and Castano's is supported; rather the results are equivocal.

What is clear is that the science-fiction genre manipulation substantially decreased readers' perceptions of literary quality and led them to exert less inference effort, particularly when theory of mind explanations were missing. There appeared to be something about the science-fiction setting that led readers to expect they would not need to work as hard, and this had negative consequences for their comprehension of the text. This is suggestive of a role for reader expectations, that is, extrinsic responses, that come along with particular genres.

While these results are suggestive of an interesting interplay between the theory of world required in the science-fiction genre and the effort participants dedicate to the theory of mind processes a follow-up study is needed. To examine the interplay of inferential processes while reading, we need to ask participants directly about how hard they worked to build the world, follow the plot, and figure out why the characters were feeling and acting the way they did. Consequently, in Experiment 2, we will assess inference effort for theory of world, following the plot, and theory of mind processes. In addition, the reading comprehension assessment will be lengthened and carefully constructed to test comprehension of theory of world, plot, and theory of mind processes. This will allow a more direct assessment of the interplay between different types of inferential processes and the subsequent effect this interplay has on reading comprehension.

Experiment 2

Method

Participants

A sample of 197 participants (53% female, 47% male) was recruited from Amazon's Mechanical Turk, where each participant received a \$0.50 payment for participation (age; $M = 37.51$, range 20–71). It is important to note that 211 participants were originally recruited but 14 were excluded because they spent less than 30 seconds reading the text – nearly eight times faster than the average reading time ($M = 237$ s, $SD = 209$ s).

Design and materials

All materials were delivered using Qualtrics software. Participants were randomly assigned to read one of four different texts – the same texts from Experiment 1: Narrative Realism ($n = 50$), Narrative Realism with theory of mind explanations ($n = 51$), Science Fiction ($n = 45$), Science Fiction with theory of mind explanations ($n = 51$).

Questionnaires

To isolate participants' reactions on affective empathy, participants took a six-item measure of affective empathy on a Likert scale (1 = *very little*, 5 = *extremely*) on how much they felt the following adjectives for the main character: compassionate, sympathetic, soft-hearted, tender, moved, and warm (Batson, Early, & Salvarni, 1997). Participants completed the same measure of transportation from Experiment 1 (Green & Brock, 2000).

Three new scales were developed to assess participants' perceived effort in trying to figure out what the characters were thinking and feeling, perceived effort in theory of world, and perceived effort in following the plot. We termed it, *inference effort – theory of mind*, *inference effort – world*, and *inference effort – plot*. See Appendix C for the scales.

A new 4-item scale was developed to assess perceived literature quality of the text, to determine which kinds of items are more sensitive to differences in perception of literary quality. The scale had participants rate the text's artistic merit and whether it was written for sophisticated readers. See Appendix B for the full scale.

Reading comprehension

A multiple-choice test of reading comprehension assessed the three inference effort dimensions including theory of mind (4 items), theory of world (2 items), and plot (4 items). Only two items were given for theory of world to match for

difficulty across the narrative-realism and science-fiction texts. Every effort was made to match items for difficulty across the narrative-realism and science-fiction texts. See Appendix D for the test.

Procedure

To provide realistic reading conditions, participants were told to read the text as if they were reading for leisure; but to do so continuously in one sitting. They read the text in a self-paced manner in six sections of approximately equal length. Then, they completed the remaining questionnaires in the following order: affective empathy, transportation, inference effort, comprehension test, literary quality.

Results

For descriptive statistics for all measures across all four conditions, see Table 2.

Literary quality

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on literary quality ratings. It revealed a marginal main effect of genre where Science Fiction ($M = 3.01$, $SD = 0.83$) was rated marginally lower than Narrative Realism ($M = 3.14$, $SD = 0.83$), $F(1, 193) = 3.53$, $p = .062$, $\eta_p^2 = .02$. The dramatic drop in effect size from Experiment 1 suggests the literary scale from Experiment 1 was more sensitive to difference in perceptions of literary quality.

Inference effort – theory of mind

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on inference effort – theory of mind ratings. It revealed a main effect of genre where Science Fiction ($M = 3.09$, $SD = 0.98$) was rated significantly lower than Narrative Realism ($M = 3.44$, $SD = 0.98$), $F(1, 193) = 6.56$, $p = .011$, $\eta_p^2 = .03$. See Figure 3 for graphical depiction.

Inference effort – world

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on inference effort – world ratings. It revealed a main effect of genre where Science Fiction ($M = 2.97$, $SD = 0.92$) was rated significantly higher than Narrative Realism ($M = 2.27$, $SD = 0.91$), $F(1, 193) = 28.88$, $p < .001$, $\eta_p^2 = .13$. This main effect was qualified by a significant interaction between genre condition and theory of mind condition,

$F(1, 193) = 7.77, p = .006, \eta_p^2 = .04$. Follow-up t -tests indicated that without theory of mind explanations, Science Fiction was rated substantially higher than Narrative Realism, $t(93) = 6.42, p < .001, d = 1.32$. There was no effect of genre with theory of mind explanations. See Figure 3 for graphical depiction.

Inference effort – plot

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on inference effort – world ratings. There were no effects for inference effort – plot.

Affective empathy

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on affective empathy. There was a marginal main effect of adding theory of mind explanations, where adding theory of mind explanations ($M = 2.64, SD = 0.96$) marginally increased literary quality ratings compared to the no theory of mind explanations condition ($M = 2.37, SD = 1.03$), $F(1, 193) = 3.81, p = .052, \eta_p^2 = .02$.

Transportation

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on transportation ratings. It revealed a main effect of genre where the Science Fiction ($M = 2.95, SD = 0.61$) was rated significantly lower than Narrative Realism ($M = 3.31, SD = 0.61$), $F(1, 193) = 16.65, p < .001, \eta_p^2 = .08$. There was also a marginal main effect of adding theory of mind explanations, where adding theory of mind explanations ($M = 3.21, SD = 0.12$) significantly increased literary quality ratings compared to the no theory of mind explanations condition ($M = 3.05, SD = 0.61$), $F(1, 193) = 3.76, p = .054, \eta_p^2 = .02$.

Reading comprehension – theory of mind

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading comprehension percent correct scores for theory of mind content. It revealed a main effect of genre where participants reading Science Fiction ($M = 58.10\%, SD = 42.13\%$) scored significantly lower than participants reading Narrative Realism ($M = 69.70\%, SD = 43.21\%$), $F(1, 193) = 7.11, p = .008, \eta_p^2 = .04$. There was also a main effect of adding theory of mind explanations where adding theory of mind explanations ($M = 73\%, SD = 45.45\%$) significantly improved comprehension compared to reading a text without theory of mind explanations condition

($M = 54.80\%$, $SD = 41.91\%$), $F(1, 193) = 17.51$, $p < .001$, $\eta_p^2 = .08$. See Figure 4 for a graphical depiction.

Reading comprehension – world

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading comprehension percent correct scores for theory of world content. It revealed a main effect of genre where participants reading the Science Fiction ($M = 66.50\%$, $SD = 32.32\%$) scored significantly lower than participants reading Narrative Realism ($M = 84.10\%$, $SD = 30.22\%$), $F(1, 193) = 15.44$, $p < .001$, $\eta_p^2 = .07$. See Figure 4 for a graphical depiction.

Reading comprehension – plot

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading comprehension percent correct scores for plot content. It revealed a main effect of genre where participants reading Science Fiction ($M = 58.60\%$, $SD = 31.31\%$) scored significantly lower than participants reading the Narrative Realism ($M = 81.60\%$, $SD = 29.24\%$), $F(1, 193) = 28.40$, $p < .001$, $\eta_p^2 = .13$. See Figure 4 for a graphical depiction.

Reading speed

A 2 (with vs. without theory of mind explanations) \times 2 (Narrative Realism vs. Science Fiction) between-subjects ANOVA was performed on reading speed (words per second (wps)). There were no effects, (grand $M = 9.26$ wps, $SD = 15.96$ wps).

Discussion

The results of Experiment 2 expand on the findings of Experiment 1 in important ways. First, we were able to isolate the effects of genre on different aspects of inference effort, namely theory of mind and theory of world inference effort. Like Experiment 1, we found that Science Fiction consistently reduced inference effort for theory of mind processing. In contrast, Science Fiction substantially increased inference effort for theory of world processing, especially when additional theory of mind statements were not provided. Despite these differential effects of genre on inference effort, Science Fiction consistently reduced reading comprehension for both theory of mind questions and theory of world questions. We expand on why this may be in the general discussion.

General discussion

Addressing the effects of genre first, in comparison to Narrative Realism readers, Science Fiction readers reported lower transportation, experience taking, and empathy. Science Fiction readers also reported exerting greater effort to understand the world of the story, but less effort to understand the minds of the characters. Science Fiction readers scored lower in comprehension, generally and in the sub-categories of theory of mind, world, and plot. The last finding is striking because Science Fiction readers reported exerting the same level of effort for understanding plot as Narrative Realism readers, but their actual comprehension of plot was weaker. Science Fiction readers reported exerting a lower level of effort for understanding theory of mind than Narrative Realism readers, and scored comparatively lower in theory of mind comprehension. Science Fiction readers even scored lower in theory of world comprehension, the one area they reported higher inference effort than for Narrative Realism readers.

Comparatively higher theory of world effort and lower theory of world comprehension, however, should be expected because a narratively realistic setting is understood to be a representation of the reader's own world, allowing high comprehension with little effort. The science-fiction setting demanded far more inference and so greater effort to achieve comprehension. As discussed, we hypothesized this difference in theory of world to be a defining difference between science fiction and narrative realism.

The Science Fiction's lower plot and theory of mind scores, however, are not a result of intrinsic qualities, unless the theory of world features influenced theory of mind processes. Because the science-fiction and narrative-realism texts differ according to theory of world but are essentially identical for plot and theory of mind, effort reports and comprehension of plot and theory of mind should be statistically the same. Therefore we conclude that the difference is a product of the readers' prior social constructs regarding texts like Science Fiction and Narrative Realism. Since science fiction is "characterized as being focused on settings and content, with comparatively less emphasis on interpersonal relationships" (Fong, Mullin, & Mar, 2013, p. 371), that expectation may produce an assumption of nonliterariness for readers who also experience theory of mind-promotion as a primary quality of literariness. Science fiction story details would therefore produce a lower perception of literary quality. Based on their low theory of mind effort scores, the Science Fiction readers expected a story that involved less theory of mind. This expectation, or a subsequent exertion of less theory of mind effort, would also account for the low theory of mind comprehension. Though readers were neutral regarding plot effort, lower plot comprehension suggests a generally lower exertion in reading effort. The Science Fiction readers appear to have expected an overall simpler

story to comprehend, an expectation that overrode the actual qualities of the story itself. The science fiction setting triggered poorer overall reading.

Since reading rates were the same for all four groups, lower comprehension for Science Fiction was not a result of readers spending less time reading. It may instead be a result of the science-fiction setting containing more unfamiliar elements than the narrative-realism setting, which reduces readers' ability to draw on real-world knowledge to aid comprehension. Because of these genre-related challenges, we may say that the science-fiction setting made readers "poor comprehenders," who Mahapatra, Das, Stack-Cutler, and Parrila (2010) defined as readers "who experience difficulties in comprehension while their word-reading performance remains close to the norm" and who "also experience difficulties on higher level tasks including ... generating inferences while reading [and] being less aware of when they do not understand what they read" (p. 429). We have already discussed generating inferences, and, though not conclusive, the reporting of low inference effort by Science Fiction readers coupled with lower comprehension scores may be interpreted as difficulty in the higher-level task of awareness of not understanding what they read.

Lower comprehension also correlates with lower transportation, experience taking, and empathy, but the direction of causation, if any, is unclear. Lower comprehension may be a result of lower transportation, or vice-versa. Does being transported into a text allow readers to understand it better, or does understanding a text allow readers to be transported? Regardless, Science Fiction scored lower in all areas. Rather than generalizing to differences in the genres of science fiction and narrative realism, we interpret this as evidence of Science Fiction's comparative difficulty. Where Narrative Realism readers needed to attend to theory of mind and plot, Science Fiction readers needed to attend to theory of mind, plot, and theory of world – an effect potentially increased by an expectation of relative simplicity. Increased theory of world might also complicate theory of mind, making readers hesitant to assume the mental states of characters with different social norms and physiology. Difficulty produces frustration and limits transportation. We also note that the texts were each about 800 words, the equivalent of only the first two or three pages of a longer work of fiction. Openings, because readers have no prior basis for establishing basic facts of world, characters, and plot, may be less transportive and more difficult to comprehend than an equivalent-length passage from elsewhere in the same work of fiction.

The inclusion of theory of mind explanations complicates these genre findings. Texts with theory of mind explanations scored higher for experience taking, transportation, empathy, and enjoyment, than texts without theory of mind explanations. While the last three categories were higher regardless of genre, theory of mind explanations increased experience taking for Science Fiction to a level

reported by Narrative Realism readers generally. To the degree that these measurements describe a reader's overall preference, the theory of mind explaining texts might be said to be more "popular" than texts without explanations. This would appear to correlate with difficulty, with the explanations making a text easier to understand by directly stating information that would otherwise have to be inferred. Regarding perceived effort, the inclusion of theory of mind explanations had no effect on reports of plot effort, reduced reports of theory of world effort in both genres, and reduced reports of theory of mind effort in Narrative Realism. Because the explanations made the texts less difficult, reductions in effort should be expected. Lower effort also correlated with "popularity." The theory of mind explanations also made the texts objectively less difficult, increasing theory of mind and plot comprehension. Though this is not the sense of "popular" used by Kidd and Castano (2013) and defined by sales, the parallel is suggestive. If theory of mind-promoting texts are less popular, this could be related to the increased difficulty that theory of mind requires. Popularity as defined by high sales, however, is the product of many factors not addressed here, and so the relative popularity of our theory of mind-explaining texts should not be overgeneralized.

The interaction of genre and theory of mind explanations further complicates these categories. While Narrative Realism was more popular than Science Fiction, and theory of mind explaining texts were more popular than texts without explanations, theory of mind explanations increased the popularity of Science Fiction. Science Fiction with theory of mind explanations scored within the same statistical range as Narrative Realism without explanations. We also observed that the inclusion of theory of mind explanations in Science Fiction either increased or had no effect on reports of theory of mind effort. This finding is counterintuitive. Since the explanations provide the information that readers would otherwise need to infer, the text should require lower effort. We theorize that the higher effort is a result of expectations. If narrative realism is associated with high theory of mind and low theory of world, and science fiction is associated with low theory of mind and high theory of world, the presence of theory of mind explanations in the Science Fiction text could alert readers to the unexpected need to attend to theory of mind. Reports of theory of mind effort then would be high because of an expectation of theory of mind effort being low. This also suggests that speculative fiction, the science fiction subgenre of literary genre fiction, is the most inference-demanding form of fiction. If inference in general, rather than the subcategory of theory of mind only, defines literariness, then speculative fiction is the most literary form of fiction because it requires both theory of mind and theory of world.

Future research and limitations

Because Science Fiction was under 1000 words, transportation and related experiences may be low due to the relative difficulty of beginning a text that takes place in a non-realistic setting requiring readers to exert greater theory of world effort. Further, a continuing text would also likely provide additional descriptions of its world, giving a reader a more substantive basis for theory of world processing. We predict that difficulty would decrease and transportation, reported effort, and comprehension would increase with longer texts, a possible direction for future research. However, because Narrative Realism was also under 1000 words, any differences in transportation, etc. can be linked to the single manipulated factor of genre. While a virtue in terms of controls, because all other intrinsic qualities of the texts (such as sentence length, syntactic structure, presence of passive voice, use of negations, number of subordinate clauses and linking particles, etc.) are identical, our results might be less general if they reflect idiosyncrasies of the manipulated text. Therefore, future research might duplicate our methods while using a range of manipulated texts. We also only measured inference effort through self-reporting. While this is the only way to document reader perception and so is an essential first step, future studies could expand to include additional measurements such as reading time and fMRI or psychophysiological measures. Also, it is extraordinarily difficult to match reading comprehension difficulty across two different texts, even if they share the same characters and plot points. Therefore, while closely matched for difficulty, differences between texts in comprehension could still be due to inferential processes while reading or to the inherent difficulty of the questions. However, given the substantial magnitude of the effects on reading comprehension, it seems unlikely that subtle differences in test difficulty could explain the current results. Finally, findings specific to science fiction should not be generalized to other genres. While fantasy is similarly characterized by theory of world, other genres, including detective, romance, and western, are not. Future studies should explore the processing of different genres separately. Conversely, theory of world processing is not unique to science fiction and fantasy and will likely be produced by any text set in any cultural or historical context that is unfamiliar to a reader. Finally, science fiction and fantasy texts that rely on common tropes should produce less theory of mind processing for readers familiar with those tropes from similar texts.

Conclusion

Two experiments examined the roles of genre and theory of mind explanations. A science-fiction setting, in contrast to a realistic setting, decreased all extrinsic measurements but plot effort reporting, which was unaffected, and theory of world effort reporting, which was either unaffected or increased. Results also showed that theory of mind explanations increased theory of mind comprehension, and decreased or made no difference for theory of mind effort. While setting is not an intrinsic quality of literariness, setting can be a distinguishing quality of the subgenre science fiction, and it appears to predispose readers to a less effortful and comprehending mode of reading – or what we might term nonliterary reading – regardless of the actual intrinsic difficulty of the text. The low comprehension of science fiction is ameliorated by theory of mind explanations, which reduce difficulty by reducing inference demands and so arguably make the text less “literary.” Future research should further examine the role of genre elements and inference in defining literariness.

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Appendix A. Sample of NR, NRT, SE, and SFT Texts

Opening paragraphs of NR:

Jim takes a deep breath, bracing himself before pushing open the glass door. Mrs. Moyers glances at him once and then drops her eyes to her menu, which she continues reading with improbable intensity as Jim walks past her booth. Sally – a woman Jim dated back in high school – squeaks the heel of her sneaker as she pivots and vanishes into the shadows of the kitchen. An older waitress Jim doesn't know by name eventually plods over to his table, slaps a menu on his placemat without a word or glance, and then continues to the next booth where she chats and giggles a full minute before taking orders.

Jim's letter to the editor appeared that morning. It isn't a long piece, barely a half column, a fraction of the other *Braxton Herald* opinion page contributors. He was awake in bed just a few hours ago, staring at the shadows of his ceiling slowly ebbing to pink, when the delivery kid's bicycle rattled onto the gravel of his driveway. The paper thunked against the screen door and skidded to the porch step where Jim leaned to pluck it up minutes later. There was no going back to sleep.

Opening paragraphs of SF:

Corporal Jones takes a deep breath, bracing himself before stepping through the airlock. Engineer Grady glances at him once and then drops her eyes to her mobile screen, which she continues reading with improbable intensity as Jones walks past her booth. Sally – a four-armed Alpha-Centarian Jones dated back at the Academy – squeaks the heel of her anti-gravity boot as she pivots and vanishes into the shadows of the galley. An ensign on server duty who Jim doesn't know by name eventually plods over to his table, grudgingly projects a holographic menu over his placemat without a word or glance, and then continues to the next booth where she chats and giggles a full minute before taking orders.

Jones' message to Command appeared that morning. It isn't a long piece, barely a full screen, a fraction of the other Colony Morale Survey respondents. He was awake in his bunk just a few hours ago, staring at the gray of his sky-replicating ceiling slowly ebbing to pink, when the satellite dish mounted above his quarters started grinding into position to receive the day's messages relayed from Earth. The download light on his mobile screen plinked as Jim logged on seconds later. There was no going back to sleep.

Opening paragraphs of NRT:

Jim knows everyone in the diner will be angry at him. He takes a deep breath, bracing himself before pushing open the glass door. Mrs. Moyers glances at him once and then drops her eyes to her menu, which she continues reading with improbable intensity as Jim walks past her booth. Sally – a woman Jim dated back in high school – squeaks the heel of her sneaker as she pivots and vanishes into the shadows of the kitchen. An older waitress Jim doesn't know by name eventually plods over to his table, slaps a menu on his placemat without a word or glance, and then continues to the next booth where she chats and giggles a full minute before taking orders.

He knows why they're mad. They consider him a traitor for insulting the town in their local newspaper. He called them all "parochial" and "small minded." Jim's letter to the editor appeared that morning. It isn't a long piece, barely a half column, a fraction of the other *Braxton Herald* opinion page contributors. He was awake in bed just a few hours ago, staring at the shadows of his ceiling slowly ebbing to pink, when the delivery kid's bicycle rattled onto the gravel of his driveway. The paper thunked against the screen door and skidded to the porch step where Jim leaned to pluck it up minutes later. He was too anxious. There was no going back to sleep.

Opening paragraphs of SFT:

Corporal Jones knows everyone in the space station mess hall will be angry at him. He takes a deep breath, bracing himself before stepping through the airlock. Engineer Grady glances at him once and then drops her eyes to her mobile screen, which she continues reading with improbable intensity as Jones walks past her booth. Sally – a four-armed Alpha-Centarian Jones dated back at the Academy – squeaks the heel of her anti-gravity boot as she pivots and vanishes into the shadows of the galley. An ensign on server duty who Jim doesn't know by name eventually plods over to his table, grudgingly projects a holographic menu over his placemat without a word or glance, and then continues to the next booth where she chats and giggles a full minute before taking orders.

He knows why they're mad. He called the crew "parochial" and "small minded." They consider him a traitor for insulting the base in an official report. Jones' message to Command appeared that morning. It isn't a long piece, barely a full screen, a fraction of the other Colony Morale Survey respondents. He was awake in his bunk just a few hours ago, staring at the gray of his sky-replicating ceiling slowly ebbing to pink, when the satellite dish mounted above his quarters started grinding into position to receive the day's messages relayed from Earth. The download light on his mobile screen plinked as Jim logged on seconds later. He was too anxious. There was no going back to sleep.

Appendix B. Literary quality scales

All items in both experiments used a 1–5 Likert scale

Experiment 1

1. How would you rate the literary quality of the scenes?
anchors on 1 (very low quality), 5 (very high quality)
2. How would you rate the literary quality of the individual sentences?
anchors on 1 (very low quality), 5 (very high quality)
3. To what degree did the story read like an excerpt from a work of high quality literature?
anchors on 1 (barely), 5 (strongly)
4. To what degree would you expect to find this story in a collection of prize-winning stories?
anchors on 1 (very unlikely), 5 (very likely)
5. To what degree did the story challenge you to think differently about people?
anchors on 1 (barely), 5 (strongly)
6. To what degree did the story challenge you to think differently about the world around you?
anchors on 1 (barely), 5 (strongly)

Experiment 2

1. Rate the story's artistic merit
anchors on 1 (very low in artistic merit), 3 (moderate in artistic merit), and 5 (very high in artistic merit)
2. Is this story written for sophisticated readers?
anchors on 1 (No, this story is definitely not for sophisticated readers), 4 (This is for readers somewhere between unsophisticated and sophisticated), 5 (Yes, this story is for very sophisticated readers)
3. Was the story thought-provoking?
on 1 (No, it was not thought-provoking at all), 3 (It was moderately thought-provoking), 5 (Yes, it was extremely thought-provoking)
4. Was the story well-crafted and artistically effective?
anchors on 1 (No, not at all), 3 (Moderately so), 5 (Yes, extremely so)

Appendix C. Inference questionnaire

On a 1 (Little to no effort) to 5 (A lot of effort) Likert scale

Theory of World effort:

As you were reading, how much effort did you spend trying to figure out where the story took place?

how the world of the story differed from the real world?

the technology that existed in the story?

the government and culture shaping the world of the story?

Plot effort:

As you were reading, how much effort did you spend trying to figure out the chronology of events?

the movement of characters in and out of the setting?

the physical actions of the characters as they interacted with each other?

the movement of time through the story?

Theory of Mind effort:

As you were reading, how much effort did you spend trying to figure out what the main character was thinking and feeling?

what other people were thinking and feeling about the main character?

the reasons behind the characters' actions?

the main character's opinion of the people around him?

Appendix D. Comprehension questionnaire

For NR

Theory of world:

1. The story takes place in a
 - a. small town where most people are strangers.
 - b. large city where most people are strangers.
 - c. small town where most people know each other.
 - d. large city where most people know each other.
2. The story takes place in
 - a. the United States during a remote historical period.
 - b. the United States in the present.
 - c. a country other than the United States during a remote historical period.
 - d. a country other than the United States in the present.
3. The story takes place in a
 - a. diner.
 - b. movie theater lobby.
 - c. ice cream shop.
 - d. bar.

4. The characters include people who are
 - a. locals.
 - b. locals and commuters.
 - c. locals and tourists.
 - d. locals, commuters, and tourists.

Plot:

5. The main character sits
 - a. at a table by himself for the entire story.
 - b. at a table with other characters for the entire story.
 - c. at first at a table with other characters and then at a table by himself.
 - d. at first at a table by himself and then at a table with other characters.
6. The story ends with the main character
 - a. leaving with his food.
 - b. leaving without his food.
 - c. remaining and eating his food.
 - d. remaining and waiting for his food.
7. Before the story begins the main character wrote a letter to the editor
 - a. but did not send it.
 - b. but does not know if it will be printed.
 - c. and is waiting for it to be printed in today's paper.
 - d. and it was already printed this morning.
8. The other patrons in the diner
 - a. greet him and then talk with him.
 - b. greet him but don't talk with him.
 - c. don't greet but do talk with him.
 - d. don't greet and don't talk with him.

Theory of mind:

9. At the beginning of the story the main character
 - a. feels emotionally isolated from the other characters and is at ease with that.
 - b. feels emotionally isolated from the other characters and is agitated about that.
 - c. feels close to the other characters and is at ease with that.
 - d. feels close to the other characters is agitated about that.
10. At the end of the story the main character
 - a. feels emotionally isolated from the other characters and is at ease with that.
 - b. feels emotionally isolated from the other characters and is agitated about that.
 - c. feels close to the other characters and is at ease with that.
 - d. feels close to the other characters is agitated about that.
11. The other characters feel that the main character
 - a. betrayed them by pointing out their flaws.
 - b. helped them by pointing out their flaws.
 - c. betrayed them by pointing out their good traits.
 - d. helped them by pointing out their good traits.
12. As he wrote the letter, the main character had felt
 - a. angry.
 - b. sad.
 - c. anxious.
 - d. happy.

For SF

Theory of world:

1. The story takes place in a
 - a. future world with technology that does not currently exist.
 - b. past world with technology that does not currently exist.
 - c. future world with technology that currently exists.
 - d. present world with technology that currently exists.
2. The story takes place in a
 - a. mess hall.
 - b. loading dock.
 - c. command center.
 - d. dormitory.

Plot:

3. The main character sits
 - a. at a table by himself for the entire story.
 - b. at a table with other character for the entire story.
 - c. at first at a table with other character and then at a table by himself.
 - d. at first at a table by himself and then at a table with other characters.
4. The story ends with the main character
 - a. leaving with his food.
 - b. leaving without his food.
 - c. remaining and eating his food.
 - d. remaining and waiting for his food.
5. Before the scene begins the main character wrote a Survey response to Command
 - a. but did not send it.
 - b. but does not know if it will be included in the published survey results.
 - c. and is waiting for it to be published today.
 - d. and it has already been published this morning.
6. The other patrons in the diner
 - a. greet him and then talk with him.
 - b. greet him but don't talk with him.
 - c. don't greet but do talk with him.
 - d. don't greet and don't talk with him.

Theory of mind:

7. At the beginning of the story the main character
 - a. feels emotionally isolated from the other characters and is at ease with that.
 - b. feels emotionally isolated from the other characters and is agitated about that.
 - c. feels close to the other characters and is at ease with that.
 - d. feels close to the other characters is agitated about that.
8. At the end of the story the main character
 - a. feels emotionally isolated from the other characters and is at ease with that.
 - b. feels emotionally isolated from the other characters and is agitated about that.
 - c. feels close to the other characters and is at ease with that.
 - d. feels close to the other characters is agitated about that.

9. The other characters feel that the main character
 - a. betrayed them by pointing out their flaws.
 - b. helped them by pointing out their flaws.
 - c. betrayed them by pointing out their good traits.
 - d. helped them by pointing out their good traits.
10. As he wrote the Survey response, the main character had felt
 - a. angry.
 - b. sad.
 - c. anxious.
 - d. happy.

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