

Strange New Worlds: Social Content in Popular *Star Trek* Fanfiction Versus Commercial Novels

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Previous literature has suggested that social cognition benefits of fiction may be related to emotional investment and imaginative engagement with the narrative. Fanfiction, works written by highly invested fans of existing media franchises, might thus demonstrate themes of social cognition, but no studies have yet systematically contrasted the characteristics of fanfiction with comparable commercial works of literature. The present study compares published, commercial *Star Trek* novels ($n = 363$) with works of popular *Star Trek* fanfiction ($n = 500$) of similar length using 2 methods of language analysis: Linguistic Inquiry and Word Count software and the Meaning Extraction Method. Together, results showed that fanfiction, compared with commercial novels, are characterized by greater prominence of internal character processes (including emotion and cognitive processes) and social relationships (including romantic, familial, and platonic relationships). This study constitutes the largest to-date study on the characteristics of fanfiction and offers insights into how individuals interact with fiction.

Public Policy Relevance Statement

Compared with licensed *Star Trek* novels, unofficial *Star Trek* fanfiction tends to use more language related to relationships, emotions, and cognitive processes. In line with previous literature that has suggested fiction may simulate social situations, the present findings suggest that fanfiction may offer individuals an opportunity to explore social, emotional, and other introspective skills and that the social cognition benefits of fiction may not be limited to literary fiction.

Keywords: language analyses, popular culture, fiction, fan culture, fanfiction

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Fiction has previously been described as a “social simulation” by which understanding fictional characters through narratives allows individuals to practice social cognition and other relational skills (Mar & Oatley, 2008; Mar et al., 2006; Oatley, 2016), but research on this topic has been constrained. Previous literature has often focused on social–cognitive benefits associated with literary fiction specifically (Koopman & Hakemulder, 2015), and some work has argued that it is *literary* fiction rather than *genre* fiction, such as science fiction, that yields benefits in skills such as emotional recognition (Kidd & Castano, 2017). A recent review challenged this view; Barnes (2018) concluded that the influence of fiction on social cognition is likely moderated by how individuals

engage with the text, such as level of emotional investment or imaginative engagement. Imaginative engagement is defined as the degree to which a reader contributes creatively and imaginatively to the text, and literary fiction, which often contains complex characters and metaphors, may lend naturally to deep, imaginative engagement.

Nevertheless, individuals do have the potential to engage deeply with popular and genre fiction as well (Barnes, 2015; Jenkins, 2013). For instance, “fanfiction” are stories written by fans of an existing media franchise based on the characters, settings, or plotlines of that franchise. These stories are typically noncommercial and are distributed to fellow fans; since the advent of the Internet, fanfiction communities have exploded in size (Barnes, 2015). Fanfiction writers have been described as engaging with popular books, movies, and TV shows with high levels of scrutiny and critical analysis (Jenkins, 2013; Thomas, 2011) at the extreme ends of imaginative and emotional engagement in narratives (Barnes, 2015). Barnes has argued that fanfiction may also constitute a form of imaginary play, and the themes of this play may offer insight into the processes enacted by engaging with fanfiction. Thus, if imaginative engagement in fiction is a key moderator of links between fiction and social cognition, fanfiction based on genre fiction is likely to demonstrate stronger social–cognitive themes comparable with commercial literature of the same genre.

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Yet, despite the size of these fanfiction communities and the wealth of information they might provide regarding popular media engagement, fanfiction has been sorely understudied, and no research to our knowledge has systematically assessed how fanfiction is similar or different from other licensed, commercial works of fiction.

Extant Research on Fanfiction

Most research on fanfiction has been conducted using narrative strategies in such humanities fields as literary theory, ethnography, feminism and queer theory, and cultural studies (Thomas, 2011) or, alternately, even by fans themselves in nonacademic settings (Barnes, 2015). These investigations have offered preliminary evidence supporting the prominence of social-cognitive processes in fanfiction. For instance, previous literature has suggested that fanfiction centralizes characters as a central focus, and this focus on character may be specifically revealed in fanfiction through themes of emotion and inner lives of characters (Barnes, 2015; Jenkins, 2013). Although narratives outside fanfiction may also aim to evoke emotion, previous researchers have suggested fanfiction often seems singularly focused on delivering the target emotions at intense, high concentrations (Barnes, 2015; Jenkins, 2013), and fanfiction genres tend to describe the emotional focus of the story (Van Steenhuyse, 2011). “Fluff” fanfiction, for example, portrays cheerful, lighthearted scenarios that are meant to give the reader warm, happy feelings, in both romantic and nonromantic settings. Fanfiction has also been described as centralizing relationships (Barnes, 2015; Jenkins, 2013; Zubernis & Larsen, 2012); in the context of fanfiction as a social simulator or imaginary play, the presence of intense emotions and a strong relationship focus may allow fanfiction writers and readers to explore emotional cognition and empathy (Oatley, 2016). Such a process is further indicated by the presence of parasocial relationships between fanfiction writers and the characters in their writing (Berkowitz, 2012; Scodari & Felder, 2000; Van Steenhuyse, 2011).

Although the themes identified by previous literature might appear to support the role of fanfiction as a social simulation, these insights are limited by methodological limitations of existing research; the ethnographic, narrative approach used by much of the extant research (Jenkins, 2013; Thomas, 2011; Van Steenhuyse, 2011) relies on small sample sizes, subjective analyses, and personal experience (Barnes, 2015). As fanfiction also is influenced by the themes and characteristics of the parent media (Stein & Busse, 2009), it is essential to systematically and reliably contrast fanfiction with comparable source text to validate if the importance of characters and relationships are defining traits of fanfiction specifically. Quantitative text analysis methods offer an opportunity to address these limitations; traditional quantitative methods are naturally suited to contrasting between groups and can thus discern the characteristics that differentiate fanfiction from the parent media. Furthermore, modern text analytic tools such as the Linguistic Inquiry and Word Count program (LIWC; Pennebaker et al., 2015) rapidly and reliably code large samples of text, thus expanding the limits of the amount of text that can be reasonably and reproducibly analyzed.

To our knowledge, only two studies have used quantitative methods to systematically explore the characteristics of fanfiction. Vinney and Dill-Shackleford (2018) assessed 52 *Mad Men*

fanfiction stories using a combination of human coding and the automated software Leximancer to show that fanfiction tended to be eudemonic rather than hedonic, demonstrating fanfiction writers’ motivations to seek insight into the deeper truths and meaning of life. This study also found that fanfiction contained negative or mixed emotional content, often took the perspective of female characters, and sometimes offered happy endings that did not exist in the source text. McCullough (2020) used an automated computer program to code integrative complexity, or the degree to which a work integrates multiple perspectives and possibilities and their related contingencies, in 45 popular and 45 unpopular fanfictions from nine fandoms. Across two studies, McCullough (2020) showed that popular fanfiction tended to show greater integrative complexity than unpopular fanfiction. Together, these studies do offer some support for imaginative engagement in the text and the prominence of the inner experiences of characters in fanfiction. However, neither of these works contrasted fanfiction with the text of the parent media; to our knowledge, no research has systematically compared fanfiction with commercial works, and it is, therefore, unclear how similar or different fanfiction is from other comparable commercial works.

The Current Study

The current study thus aims to fill this gap in the literature by using systematic, robust quantitative language analysis methods to identify the characteristics that differentiate fanfiction from commercial genre novels, and thereby offer insight into the processes involved with writing and reading fanfiction.

In line with previous literature, we hypothesize as follows:

Hypothesis 1: Fanfiction, compared with commercial genre novels, will include more content related to the inner lives of characters within the story.

Hypothesis 2: Fanfiction, compared with commercial genre novels, will include more content related to relationships within the story.

To test our hypotheses, we relied on two quantitative modern text analytic tools. These modern analytic tools facilitate the process of language analysis by minimizing the need to train multiple independent coders on often complicated coding schemes, a process that is time- and labor-intensive and not free of bias (Chung & Pennebaker, 2008). In this investigation, the LIWC software directly assessed the characteristics of fanfiction by testing our hypotheses in a top-down approach (e.g., the prominence of relationships and emotionality). The meaning extraction method (MEM; Chung & Pennebaker, 2008; Ramírez-Esparza et al., 2012) supplemented LIWC analyses as a bottom-up approach to offer more nuanced exploration of frequently occurring themes in each fanfiction and commercial novels.

The expansive *Star Trek* franchise provides a golden opportunity to achieve the research goals. *Star Trek* has a long-lasting legacy in fanfiction, and, despite its age, fan interest remains high; approximately 10,000 new works were posted under the *Star Trek* tag on Archive of Our Own (AO3) in 2019 alone. Furthermore, hundreds of original licensed *Star Trek* novels have been published in an official capacity, thus providing a sufficiently powered sample of comparable commercial genre works; by contrasting

fanfiction with these licensed tie-in novels, analyses can avoid confounds that would be introduced by assessing fanfiction aside scripts of the original TV series, such as the potential differences between text- and visual-based mediums (McCullough, 2020).

Linguistic Inquiry and Word Count Software

The LIWC software is ideal for automatically analyzing large samples of texts. The program analyzes each word in a given text and then reports the percentage of words that falls under each of the multiple categories counted by the program, with consideration of both verb tenses and plural forms of words; LIWC also reports select stylistic traits of the text such as emotional and analytic tone (Chung & Pennebaker, 2008). These categories were developed based on standard linguistic definitions (such as prepositions) or through ratings provided by multiple independent judges (e.g., affect- and family-related words); the development of these categories has been previously described in-depth by Pennebaker et al. (2015). LIWC has been shown to be valid in identifying differences in emotionality, social relationships, and thinking styles (Tausczik & Pennebaker, 2010) and has previously been effectively applied to identifying textual differences across genres of fiction (Nichols et al., 2014) and trends in bodies of literature (Morin & Acerbi, 2017).

Our first hypothesis states that fanfiction, compared with commercial novels, would include more content related to emotion and the inner lives of characters. To test this, we used LIWC to calculate the percentage of text related to “affect” (which focuses on words related to emotional states: e.g., *sad, angry*) and “cognitive processes” (which is defined as words that reflect cognitive thinking and metacognition, e.g., *cause, know*). Thus, we specifically hypothesized (Hypothesis 1) that fanfiction, compared with commercial novels, would have higher LIWC scores for “affect” and “cognitive processes.”

We also used exploratory analyses to explore the subcategories of the “affect” and “cognitive processes” category in fanfiction compared with commercial novels. LIWC breaks the category “affect” into words that denote “positive” (e.g., *love, nice, sweet*) and “negative” (e.g., *hurt, ugly, nasty*) emotions; the “cognitive processes” category is broken down into words that denote “insight” (e.g., *think, know*), “causation” (e.g., *because, effect*), “discrepancy” (e.g., *should, would*), “tentativeness” (e.g., *maybe, perhaps*), “certainty” (e.g., *always, never*), and “differentiation” (e.g., *hasn’t, but, else*).

Our second hypothesis states that fanfiction, compared with commercial novels, would include more content related to relationships. To test this, we used LIWC to calculate the percentage of text related to “social processes” (e.g., *mate, talk, they*) in fanfiction and commercial novels; that is, we hypothesize that (Hypothesis 2) fanfiction, compared with commercial novels, will have high LIWC scores for “social processes.” Exploratory analyses further compare the presence of words related to each of the social processes categories in fanfiction and commercial novels: “friendship” (e.g., *buddy, neighbor*), “family” (e.g., *dad, daughter*), as well as “sex” (e.g., *love, horny*).

Meaning Extraction Method

LIWC is limited in its ability to recognize multiple meanings to words in different contexts. As stories based in the *Star Trek* universe are likely to have a significant amount of esoteric, setting-

specific vocabulary (such as *vulcan, phaser, and warp*), LIWC may fail to identify certain thematic nuances (Chung & Pennebaker, 2007). Furthermore, works of fanfiction are often written by amateur writers, and fanfiction may have a higher tendency to “tell” (e.g., “Captain Kirk felt sad”), whereas licensed novels may be more likely to “show” (e.g., “Captain Kirk slumped against the wall”), which would not be as readily identified by LIWC analysis. The MEM allows for an inductive, bottom-up assessment of the factors that are particularly prevalent in each fanfiction and commercial novel and uses human inspection of resulting factors to identify themes. This analysis thus aims to supplement LIWC analyses by providing greater insight into the thematic nuances in each sample.

The MEM looks for the most frequent content words within the text by automatically filtering “stop words” (such as prepositions and other words that provide little information about underlying themes, e.g., *a, to, said, quickly*) and produces a matrix in which the rows indicate the sample text (e.g., *Spock’s World*) and the columns indicate the most frequent words found within the text. The analyses report the percentage of text related to a specific frequent word (e.g., the word *time* constitutes 0.24% of all text of *Spock’s World*, whereas *time* makes up 0.13% of the body of *The Joy Machine*). The matrix is then transferred to a statistical package, and principal components analyses are conducted to assess how words may co-occur to extract the most common themes used in the text (Blackburn et al., 2018; Chung & Pennebaker, 2008). This analytic method has been used effectively in previous studies to identify themes in narratives (Chung & Pennebaker, 2008) and fiction (Boyd & Pennebaker, 2015; Seehuus et al., 2019, 2020) and has specifically been used in conjunction with LIWC to bolster the conclusions of LIWC findings alone (Boyd & Pennebaker, 2015). In this study, we ran the MEM analyses independently for the fanfiction novels and commercial novels. Then, we observed how the themes are different or alike across samples.

Method

Sample

Fanfiction

Star Trek fanfiction was scraped from AO3 on March 24, 2020, using the python script AO3Scraper (Li & Stermann, 2017). Presently, AO3 is one of the most popular fanfiction websites, and unlike other fanfiction websites such as Fanfiction.Net, AO3 does not restrict stories by content. Stories were scraped from the tags for each of the five main *Star Trek* series that aired on cable TV from 1966 to 2005: *The Original Series*, *The Next Generation*, *Deep Space Nine*, *Voyager*, and *Enterprise*.

To ensure analysis within works comparable with licensed novels, works had to be in English, not “crossed-over” with any other series or franchise, and had to be at least 30,000 words in length. This minimum word count was selected because the shortest available licensed *Star Trek* novel in the sample had a word count of 33,898 (*Bantam Novels 10: World Without End*). Furthermore, only popular works of fanfiction were retained, in deference to previous calls for fanfiction research to consider community dynamics (McKee, 2004; Thomas, 2011); anyone can post a written work online, but a story with no readers cannot be considered to

exemplify the themes that popularly proliferate fanfiction communities. Specifically, popularity was determined as the number of “kudos” (or “likes”) a story received, and the 100 most popular fanfictions for each series was included for analysis, making for 500 works of fanfiction retained for analysis. This number was selected to create a balanced sample approximately equivalent to the sample of licensed novels and was validated with power analysis (described under Analyses).

Licensed Novels

Licensed *Star Trek* novels include all books that are affiliated with the owner of the franchise (CBSViacom, formerly Paramount) and can thus be distributed commercially without infringing on copyright law. Tie-in novels published until 2010 were included for analysis. Novels were excluded if they were a specialty run not based on one of the five main series, if they were novelizations of televised episodes or movies, or if they were authored by one of the *Star Trek* actors; these books were excluded because it was determined that the process by which these books were published likely differed significantly from the rest of the sample. In total, 363 licensed *Star Trek* novels were included for the present analysis (*The Original Series*: $n = 122$; *The Next Generation*: $n = 104$; *Deep Space Nine*: $n = 54$; *Voyager*: $n = 32$; *Enterprise*: $n = 13$). A complete list of the novels included for analysis, as well as all code used in this study, is available on the Open Science Framework page for this study: https://osf.io/j7fz8/?view_only=9ca2ce98105944b0a422d26dabd0704b

Analyses

Linguistic Inquiry Word Count

LIWC categorized content words from the texts, and then multivariate analyses of variance (MANOVA) were conducted in R with Pillai’s trace using the `aov` function from the `stats` package to assess differences in the categories of interest between fanfiction and novels (R Core Team, 2020). For each hypothesis, first aggregate LIWC categories were assessed (e.g., “affect”), and then the subcategories that underlay these aggregate categories were assessed in a separate analysis (e.g., “positive emotion” and “negative emotion”). Power analyses suggested that a total sample of at least $N = 382$ was required to achieve a power of .90 for a MANOVA with two groups and 14 outcome variables with an error probability of $\alpha = .05$; thus, the present sample was more than large enough to meet the desired power.

Meaning Extraction Method

A subset of stories assessed in LIWC analyses were used in MEM analyses, as assessing thematic nuances across all works from all five series on aggregate would risk washing out the specific characteristics of works for a particular series and therefore threaten the effectiveness of a bottom-up analysis. Specifically, as factor analysis requires a minimum sample size of at least 100 (Comrey & Lee, 1992; Kline, 1994), MEM analyses compared the themes that emerged in fanfiction and commercial novels in series with at least 100 commercial novels: *The Original Series* and *The Next Generation*. Analyses focused on both *The Original Series* and *The Next Generation*, rather than on a single series, to account for potential confounds introduced by the prominence of a

particular character or plot point in a single series. Thus, themes were extracted for four samples: fanfiction and commercial novels based on each *The Original Series* and *The Next Generation*.

The Meaning Extraction Helper (MEH; Boyd, 2019) was used to facilitate the process of MEM analyses by filtering out stop words and automating the tokenization of text, which extracts the bases of words with consideration for verb tenses and plural forms of words. In the present analysis, the standard stop lists from the MEH program and `tidytext` package in R (Silge & Robinson, 2016) were combined and further supplemented following the visual inspection of initial results to include the names of *Star Trek* characters and other noninformative words.

Usual convention in MEM analyses counts every word included in a corpus of text and uses binary matrices coding the presence or absence of each word for each separate text (Chung & Pennebaker, 2008). Due to the length of stories included in the present analysis, a binary approach would likely wash out variation; instead, the MEH program was used to extract “verbose” results, calculating the percent of text accounted for by each token. Furthermore, to reduce noise, only the tokens that appeared in at least 70% of the texts were included, which yielded at least 1000 tokens per sample analyzed.

Exploratory factor analyses were used to identify a model that yielded the fewest number of factors with appropriate model fit to explain the data (root mean square error of approximation $< .08$); this approach was adopted to maximize both accuracy and parsimony. Confirmatory analysis then used principal components analysis with varimax rotation to extract the appropriate number of factors as indicated by exploratory analyses, and tokens were considered for each factor if they had a loading $\geq |.30|$. All factors had an eigenvalue > 1 . Tokens that loaded on each factor were inspected by an author experienced with both *Star Trek* fanfiction and licensed novels to label the resulting themes. Stories based on *The Original Series* and *The Next Generation* were assessed separately to allow comparison between series.

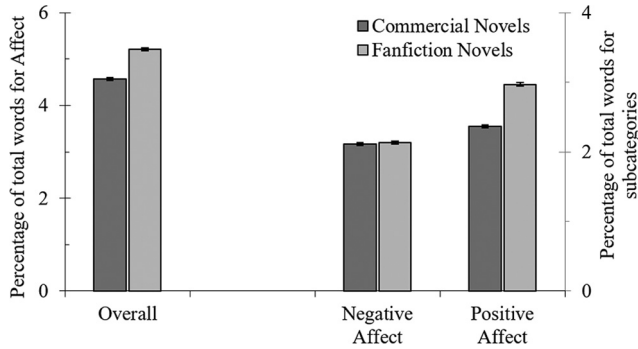
Results

Commercial *Star Trek* novels ($n = 363$) had a mean word count of 78,408.12 words ($SD = 23,470.60$), whereas fanfiction ($n = 500$) tended to be shorter ($M = 70,462.51$, $p < .01$) but much more variable in length ($SD = 57,162.58$). Most fanfiction stories (77.2%) were listed as complete, and only four works of fanfiction were tagged as being written in the first person. The average number of kudos for each fanfiction in the sample was $M = 167.2$, which was greater than 79.51% of all English-language *Star Trek* fanfiction over 30,000 words in length posted to AO3.

Linguistic Inquiry and Word Count

In line with the first hypothesis, *Star Trek* fanfiction had a significantly greater focus on internal character processes; Figure 1 shows that compared with commercial novels, fanfiction novels had a greater percentage of words related to the overall category “affect,” $F(1, 822) = 233.57$, $p < .001$, $d = 1.09$, 95% confidence interval [CI] [.94, 1.24], as well as for the subcategory “positive affect,” $F(1, 822) = 286.08$, $p < .001$, $d = 1.21$, 95% CI [1.05, 1.36]. No significant differences were found for the negative affect subcategory, $F(1, 822) = .38$, $p = .54$, $d = .04$, 95% CI [−.10, .18]. Similarly, Figure 2 shows that

Figure 1
Percentage of Total Words Related to Affect in Fanfiction and Commercial Novels



Note. Error bars represent standard errors of the mean. The left y axis corresponds to the overall Linguistic Inquiry and Word Count “affect” category; the right y axis corresponds to the subcategories.

compared with commercial novels, fanfiction novels had a greater percentage of words related to “cognitive processes,” $F(1, 822) = 17.48, p < .001, d = .30, 95\% \text{ CI } [.16, .44]$, as well as for several subcategories: “insight” (e.g., *think, know*; $F(1, 822) = 42.50, p < .001, d = -.46, 95\% \text{ CI } [.32, .61]$); “discrepancy” (e.g., *should, would*; $F(1, 822) = 49.67, p < .001, d = .50, 95\% \text{ CI } [.36, .64]$); and “differentiation” (e.g., *hasn’t, but, else*; $F(1, 822) = 8.91, p = .003, d = .21, 95\% \text{ CI } [.07, .35]$). Yet, commercial novels had a greater percentage of text related to the subcategories “certainty” (e.g., *always, never*; $F(1, 822) = 9.60, p = .002, d = .22, 95\% \text{ CI } [.08, .36]$) and “tentativeness” (e.g., *maybe, perhaps*; $F(1, 822) = 6.22, p = .01, d = .18, 95\% \text{ CI } [.04, .32]$). No significant differences were found for “causation” (e.g., *because, effect*; $F(1, 822) = .61, p = .69, d = .03, 95\% \text{ CI } [-.11, .16]$).

As predicted by the second hypothesis, *Star Trek* fanfiction had a significantly greater focus on social relationships compared with

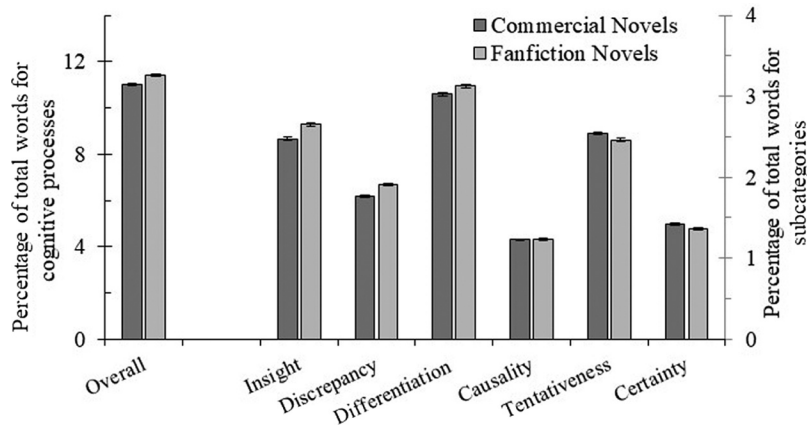
commercial novels. Figure 3 shows that compared with commercial novels, fanfiction novels had a significantly greater percentage of words related to the overall LIWC category “social processes,” $F(1, 822) = 185.5, p < .001, d = .97, 95\% \text{ CI } [.82, 1.12]$, as well as for each of the subcategories: “family,” $F(1, 822) = 48.61, p < .001, d = .50, 95\% \text{ CI } [.36, .64]$; “friendship,” $F(1, 822) = 47.34, p < .001, d = .49, 95\% \text{ CI } [.35, .63]$; and “sexual,” $F(1, 822) = 180.33, p < .001, d = .96, 95\% \text{ CI } [.81, 1.11]$. Table 1 provides the means and standard deviations of all LIWC variables assessed for each fanfiction and commercial novels.

Post Hoc Analyses

Because incomplete stories were included in the fanfiction sample but not the licensed novel sample, post hoc analyses assessed if completion status was associated with any of the outcome variables in the fanfiction sample; it was not. Next, because fanfiction was significantly shorter than licensed *Star Trek* novels in the main analysis, post hoc analyses further explored if word count was associated with any of the outcome variables. For fanfiction, word count was not significantly correlated with any of the main outcome variables but was marginally negatively correlated with words related to sexual content ($r = -.09, p = .06$). For licensed novels, wordcount was positively correlated with more words related to sexual content ($r = .12, p < .05$), family ($r = .14, p < .01$), and insight ($r = .12, p < .05$), but negatively correlated with words related to affect ($r = -.14, p < .01$), negative emotion ($r = -.16, p < .01$), and discrepancy ($r = -.15, p < .01$).

Thus, we retested the abovementioned MANOVA analyses using a subsample of works to account for potential confounding by work length and to guard against potentially overpowered analyses. Specifically, after examining histograms, $n = 200$ works of fanfiction and $n = 200$ licensed novels over 40,000 words in length were selected randomly from the complete sample. In this subsample, fanfiction tended to be longer by word count ($M = 86,755.33$) than licensed novels ($M = 76,912.82, p < .01$). Nevertheless, when the main analyses were rerun using this subsample, results did not

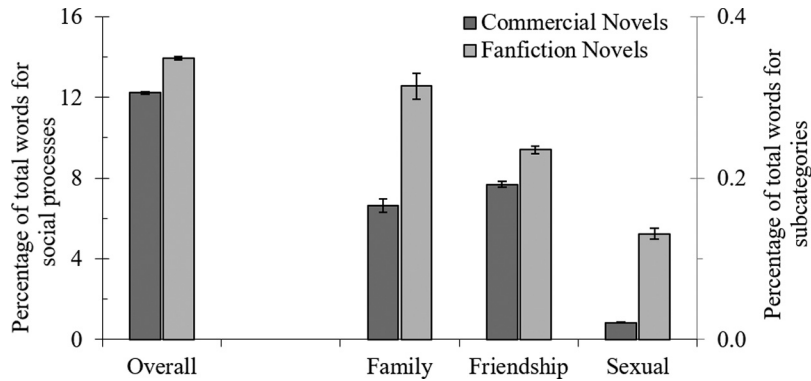
Figure 2
Percentage of Total Words Related to Cognitive Processes in Fanfiction and Commercial Novels



Note. Error bars represent standard errors of the mean. The left y axis corresponds to the overall Linguistic Inquiry and Word Count “cognitive processes” category; the right y axis corresponds to the subcategories.

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Figure 3
Percentage of Total Words Related to Social Relationships in Fanfiction and Commercial Novels



Note. Error bars represent standard errors of the mean. The left y axis corresponds to the overall Linguistic Inquiry and Word Count “social processes” category; the right y axis corresponds to the subcategories.

meaningfully differ from those obtained from the original analysis with the complete sample and are not further discussed here.

Meaning Extraction Method

Figure 4 presents word clouds of the 100 most frequently occurring words in fanfiction and commercial novels based on *The Original Series* and *The Next Generation*. From these word clouds, it is evident that words related to the human body (e.g., *hand, face, body*), emotion (e.g., *love, hope, emotion*), and communication (*voice, talk*) are particularly prevalent in the terms frequently occurring in fanfiction, whereas words related to processes of the vessel (e.g., *captain, ship, system*) are more prevalent in the terms frequently occurring in commercial novels.

Altogether, 1,337 tokens, accounting for the 5% most frequently occurring tokens, were retained from fanfiction based on *The Original Series* for principal components analyses. Nine factors were extracted from fanfiction based on *The Original Series*; these factors

were titled Sensuality, Sex & Power, Outdoors, Diplomacy, Feeling, Ship Functions, Conflict, “Fluff,” and Medical (Table 2). Together, these factors explained 28% of the total variance. Eight factors, accounting for 31% of the total variance, were extracted from 4.9% of the most frequently occurring tokens in fanfiction based on *The Next Generation*: Narrative Stakes, Sex and Sensuality, Missions, Ship Functions, Diplomacy, Medical, “Hurt/Comfort,” and Action (Table 2). Thus, the fanfiction samples shared themes of sexuality, starship technologies, processes, mission dynamics such as exploration and diplomacy, as well as injury and medical treatment.

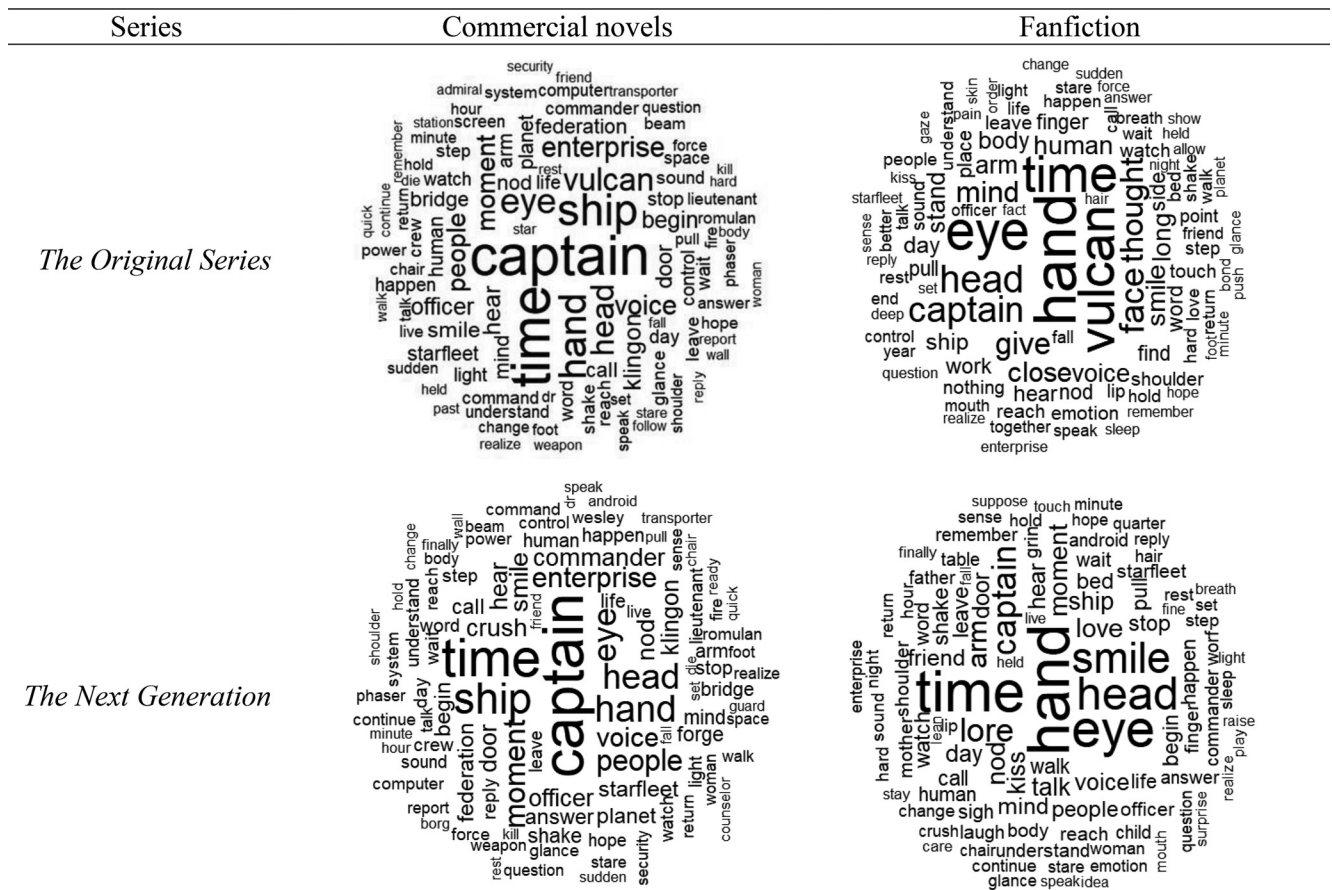
In total, 1,891 tokens were retained from commercial novels based on *The Original Series*, accounting for 4.6% of the most frequently occurring tokens in this sample. Eight factors were extracted from these stories, accounting for 25% of the total variance: Conflict, Missions, Sensors, Ship Functions, Debate, Values, Struggle, and Prose (Table 3). Nine factors, accounting for 28% of the total variance, were extracted from 5.7% of the most frequently occurring tokens in novels

Table 1
Means and Standard Deviations of LIWC Variables by Work Type

Variable	Fanfiction		Commercial novels		p
	M	SD	M	SD	
Affect	5.21	0.63	4.57	0.52	<.001***
Negative emotion	2.13	0.45	2.11	0.32	.54
Positive emotion	2.97	0.57	2.37	0.35	<.001***
Cognitive processes	11.41	1.48	11.02	0.97	<.001***
Insight	2.65	0.41	2.48	0.32	<.001***
Discrepancy	1.91	0.33	1.76	0.25	<.001***
Differentiation	3.12	0.52	3.03	0.36	.003**
Certainty	1.36	0.27	1.42	0.19	.002**
Tentativeness	2.46	0.48	2.54	0.35	.01*
Causality	1.24	0.20	1.23	0.15	.69
Social processes	13.94	2.03	12.22	1.25	<.001***
Friendship	0.23	0.10	0.19	0.06	<.001***
Family	0.31	0.36	0.17	0.14	<.001***
Sexual	0.13	0.15	0.02	0.01	<.001***

Note. LIWC = Linguistic Inquiry and Word Count.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

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Figure 4*Word Clouds of Commercial Novels and Fanfiction Based on The Original Series and The Next Generation*

based on *The Next Generation*: Missions, Action, Sensors, Feeling and Body, Ship Functions, Reaction, Setting, Conflict, and Universe (Table 3). Overall, commercial novels appeared to share themes of starship technologies, missions and goals, and physical conflict. Although only sample words for each factor are presented in the tables, complete lists of factor loadings for all words are available in the [online supplemental materials](#).

By comparing the common themes that emerge from the fanfiction and commercial novel analyses, it is apparent that both *Star Trek* fanfiction and commercial novels are characterized by their setting within the science fiction framework of space exploration, as evidenced by the consistently emerging words with missions-related themes (e.g., *recover*, *provide*, *protocol*) and words with ship-related functions (e.g., *status*, *console*, *navigation*). *Star Trek* fanfiction, however, also is characterized by sexuality (e.g., *pleasure*, *moan*, *thigh*) as well as injury and medical treatment (e.g., *patient*, *medical*, *wound*), neither of which appears in either commercial novel sample. Conversely, physical conflict (e.g., *kick*, *strike*, *jerk*) emerges as a factor for both commercial novel samples but only for one fanfiction sample.

Discussion

The findings of the present study replicate the conclusions of previous small-scale, often narrative research regarding the themes

that proliferate in the “imaginary play” of fanfiction and offer support for fanfiction as a social simulation. In line with both our hypotheses, LIWC results showed that compared with commercial novels, popular *Star Trek* fanfiction had greater percentages of content related to the overall categories of affect and cognitive processes (Figures 1 and 2), as well as social processes (Figure 3). Thus, fanfiction appears to focus more closely on the inner lives of characters and on social relationships than do commercial genre novels, as previously suggested by scholars such as Jenkins (2013) and Barnes (2015).

Supplemental MEM analyses bolstered the presence of emotion and relationships in fanfiction; in partial support of the first hypothesis, themes related to feeling or comfort after injury emerged in both fanfiction samples, but MEM analyses were not equipped to compare the extent to which these factors may or may not have been greater in fanfiction compared with similar factors that emerged in commercial novels. In strong support of the second hypothesis, factors related to sexual relationships and sensuality emerged in both fanfiction samples assessed but in neither commercial novel sample (Tables 2 and 3). In addition, themes related to the science fiction setting of space exploration also emerged in principal components analysis of fanfiction, demonstrating that a greater focus on character or relationships did not involve removing the science fiction setting (Figure 4).

Table 2
Factors Extracted From Fanfiction

Factor	Eigenvalue	Sample words (loadings \geq .30)
<i>The Original Series</i>		
1. Sensuality	78.85	Draw, heat, fingertip, shudder, low, light, tremble, pulse
2. Sex & Power	59.40	Serve, pleasure, free, thrust, win, obey, claim, knelt, flesh
3. Outdoors	47.53	Ground, sky, animal, pack, bag, cut, rock, safe, water, cold, sun
4. Diplomacy	41.54	Extend, contact, provide, visit, building, people, species
5. Feeling	38.00	Pain, physical, mental, mind, intense, body, presence, sensation
6. Ship Functions	33.92	Switch, adjust, ship, status, area, desk, warp, monitor, assign
7. Conflict	32.74	Fist, rage, shove, jerk, phaser, drag, slam, threat, slap, slump
8. "Fluff"	29.70	Lip, flutter, hand, eye, mouth, smile, cheek, trail, lean, pull
9. Medical	26.74	Medical, sickbay, patient, treatment, scan, injury, condition
<i>The Next Generation</i>		
1. Narrative Stakes	101.57	Knowledge, power, destroy, force, exist, threat, advance, death
2. Sex & Sensuality	85.67	Heat, moan, pleasure, warm, touch, soft, thigh, arch, body
3. Missions	48.38	Approach, recover, mission, aboard, intend, anticipate, focus
4. Ship Functions	46.03	Android, code, system, data, function, access, console, panel
5. Diplomacy	37.57	Admiral, announce, party, formal, pour, starship, gift, drink
6. Medical	32.29	Blood, tricorder, wound, nurse, medical, heal, patient, wrist
7. Hurt/Comfort	31.12	Grimace, assure, choke, hover, sob, squeeze, sigh, grateful
8. Action	28.03	Happen, scare, confuse, hit, jump, <i>bedroom, husband, family</i>

Note. Words in *italics* have a strong negative factor loadings.

The prominence of emotions, cognitive processes, and relationships in fanfiction compared with commercial novels suggests that the "imaginary play" of fanfiction might engage social processes more than commercial genre fiction. These findings lend support for Barnes' (2018) argument that emotional investment and imaginary engagement with fiction moderates the association between fiction and social cognition; for readers who demonstrate high imaginative engagement with the text, popular genre fiction may have associations with social cognition similar to those of literary fiction. Future research is needed to explore the extent to which the links between fanfiction engagement and social cognition is comparable with the links between literary fiction and social cognition, but the present findings do demonstrate the prominence of

themes related to social-cognitive processes in fanfiction based on a popular science fiction franchise.

The present study additionally moved beyond confirming the presence of inner character focus and relationships in fanfiction, and several previously overlooked patterns were further explored. For instance, previous scholars have not differentiated between the positive and negative sides of the emotional spectrum (Barnes, 2015; Jenkins, 2013). To our knowledge, only Vinney and Dill-Shackelford's (2018) study has explored the presence of different emotions in fanfiction and found fanfiction tended to be characterized by negative or mixed emotional content; the authors argued these traits were evidence of fanfiction writers' eudemonic motivation. The present study demonstrated that popular *Star Trek* fanfiction shows

Table 3
Factors Extracted From Commercial Star Trek Novels

Factor	Eigenvalue	Sample words (loadings \geq .30)
<i>The Original Series</i>		
1. Conflict	113.19	Duck, shoulder, swung, knee, tug, kick, jerk, wall, drag, doorway
2. Missions	72.66	Scene, examine, require, determine, role, construct, provide
3. Sensors	61.39	Sensor, abruptly, vanish, image, reading, range, detect, emerge
4. Ship Functions	46.80	Ship, bridge, photon, warp, shield, navigation, crew, system
5. Debate	46.19	Anger, relax, question, explain, convince, worry, interrupt
6. Values	43.37	Wise, intelligence, honor, discipline, vulcan, personal, purpose
7. Struggle	40.38	Strength, survive, brace, struggle, sense, sacrifice, fought
8. Prose	36.54	Properly, solid, reduce, star, <i>grunt, respond, echo, assure, shrug</i>
<i>The Next Generation</i>		
1. Missions	92.80	Offer, provide, introduce, protocol, arrival, operation, assistance
2. Action	76.53	Brave, rush, streak, answer, dash, <i>spoke, word, speak, meaning</i>
3. Sensors	63.11	Abruptly, transmit, range, kilometer, remote, detect, reading
4. Feeling & Body	61.36	Eye, cheek, emotion, skin, heat, held, rage, knee, forehead
5. Ship Functions	50.42	Tactical, command, deck, space, console, control, station
6. Reaction	48.57	Confusion, amuse, genuine, shout, firmly, annoyance, curiosity
7. Setting	44.45	Edge, building, street, corner, city, wall, rain, dirt, smell, sound
8. Conflict	40.80	Curse, grunt, enemy, strike, victory, <i>normal, usual, perfect</i>
9. Universe	37.14	Sun, star, civilization, horizon, mass, lifetime, species, ancient

Note. Words in *italics* have a strong negative factor loadings.

a significantly greater percentage of text dedicated to positive emotion words compared with commercial novels, but the presence of negative emotion words did not vary between the two work categories. In light of Vinney and Dill-Shackleford's (2018) findings, these results suggest that although negative emotion may be present in fanfiction, such negative emotion is comparable with that found in commercial works. Thus, eudaimonia might not differ between fanfiction and commercial works, but further analyses assessing the presence of mixed emotional content between work type is needed to confirm such a conclusion.

Furthermore, Vinney and Dill-Shackleford (2018) also found that fanfiction often offered happy endings that did not exist in the source text, and the present study confirmed that the prominence of positive emotions differentiates fanfiction from the parent text. If fanfiction represents a form of social simulation or imaginary play, this focus on positive emotion might suggest that many individuals engage with fanfiction as a form of escapism, and these individuals may possess more hedonic motivations than commercial writers.

In addition, the finding that popular *Star Trek* fanfiction has more words related to cognitive processes compared with commercial novels – and in particular, more words related to insight, discrepancy, and differentiation, and fewer words related to certainty (Figure 2) – is notable because previous research has shown that popular fanfiction tends to be higher in integrative complexity than unpopular fanfiction (McCullough, 2020). Integrative complexity has been argued to be related to several of the cognitive processes coded by LIWC analyses, such as discrepancy (Slatcher et al., 2007); thus, the present findings might lend support to the argument that popular fanfiction is characterized by stories that make finer distinctions and differentiations and that integrate multiple, discrete perspectives (McCullough, 2020). Yet, although previous work has only examined integrative complexity in popular fanfiction compared with unpopular fanfiction, the present findings suggest that popular fanfiction may make distinctions and differentiations even more so than commercial novels from the same franchise. The presence of integrative complexity in fanfiction has been argued to reflect fanfiction writers' frustration with the source text (Jenkins, 2013; McCullough, 2020). Alternately, if fanfiction is more character-focused than commercial novels, and fanfiction acts as a social simulation for writers and readers, the presence of these cognitive categories may be reflective of the integration of multiple, in-depth character voices.

Finally, although much academic research on fanfiction has focused primarily on stories that describe romantic and sexual relationships (Bacon-Smith, 1992; Jenkins, 2013; Jones, 2002), the present study showed that words related to family and friendship were also more frequent in fanfiction compared with commercial novels, suggesting that the presence of both platonic and romantic relationships characterizes the fanfiction genre in comparison with commercial fiction. Thus, if the "imaginary play" of fanfiction offers social benefits through social simulation, these benefits likely extend to both romantic and platonic relationships. Such an implication may be particularly important, given that individuals who tend to daydream about fictional characters tend to report higher loneliness and lower social support (Mar et al., 2012). That said, MEM analyses also showed that compared with other factors, sexuality explained some of the greatest amount of unique variance in fanfiction samples. Thus, the previous focus

previous literature has given to sexuality and romance in fanfiction is not unwarranted (Jenkins, 2013).

Interestingly, although not originally hypothesized, MEM analyses showed that both *Star Trek* fanfiction samples—but neither *Star Trek* novel samples—were characterized by factors related to injury and medical care. This theme may offer a way for fanfiction authors to highlight relational and emotional themes while providing narrative tension, for instance, through the popular "hurt/comfort" genre. "Hurt/comfort" is defined as "stories, which, as the name implies, revolve around a character being injured and another character comforting him" (Busse & Helleckson, 2006), and the present analyses might suggest that this genre might warrant more focused attention in future research.

Strengths and Limitations

The present study's primary strength is its expansive sample of works, both fanfiction and comparable commercial novels. To our knowledge, this study constitutes the largest academic assessment of fanfiction ever conducted, and the use of multiple systematic and reproducible methods of language analysis bolsters the conclusions drawn from the results. Yet, the present study only offers preliminary evidence for the influence of imaginative engagement on social-cognitive influences of fiction; because the present study did not directly assess imaginative engagement or emotional investment, we cannot make strong conclusions that either imaginative engagement or emotional investment on the part of fans accounted for the themes identified in fanfiction. Furthermore, the presence of themes related to social cognition does not necessarily imply social-cognitive benefits of engaging in fanfiction comparable with those identified as associated with exposure to literary fiction (Kidd & Castano, 2017). Future research might experimentally explore whether writing or reading fanfiction is associated with social-cognitive benefits such as emotional recognition and if such effects might yield long-term benefits in emotional skills or relationship quality.

This study also is limited by its exclusive focus on long, popularly read works of *Star Trek* fanfiction. Although the inclusion criteria were defined to create a sample comparable with commercial novels and to incorporate some level of community processes, the present findings cannot necessarily be generalized to all fanfiction. It is plausible that works shorter than 30,000 words would have even higher emotional content than longer fanfiction due to the need to maintain narrative tension in their condensed size; they also may be higher in sexual content, as suggested by our post hoc analyses. Future analyses should investigate such possibilities in samples of shorter fanfiction. Similarly, the present results are specific to *Star Trek* fanfiction in comparisons of licensed *Star Trek* novels; fanfiction for other franchises might not show equivalent patterns of contrast with their parent media. *Star Trek* fanfiction may be exceptionally more emotional and character-driven than the source text because fanfiction writers aim to fill in the "gaps" of action-driven stories; that is, characteristics of fanfiction identified by the present research may be indicative of the nature of the stories assessed, and fanfiction of franchises that are less action-driven may not differ from their parent media on these dimensions (e.g., *Grey's Anatomy*).

Furthermore, both fanfiction and commercial *Star Trek* novels are likely influenced by external demands; commercial *Star Trek* authors contend with the wishes of publishers, and fanfiction writers

may cater to desires, needs or goals they perceive in their readers. As such, the discrepancies between fanfiction and commercial *Star Trek* novels might be reflective of pressures on the two writing communities and not solely indicative of individual cognitive processes within writers of either camp. Regardless, previous research into fanfiction suggests that an interest in social, relational, and character-focused themes is consistent across numerous fandoms (Barnes, 2015; Jenkins, 2013), implying that this demand for stories with social themes is common among heavily invested fans.

In addition, as previously mentioned, *Star Trek* fanfiction is often written by amateur writers, and differences between *Star Trek* fanfiction and licensed novels may be partially explained by differences in amateur and professional writing. Although the use of MEM analyses aimed to minimize confounds regarding amateur and professional writers' varying tendencies to "show" or "tell," other differences may remain. For instance, amateur writers may struggle to effectively develop narrative tension compared with professional writers, which may minimize any apparent differences in negative emotions in fanfiction compared with licensed novels. Nevertheless, the findings in the present study are expected given previous research, suggesting this limitation may be minimal.

Future Directions

Multiple avenues for future research remain. For instance, it is unclear if it is emotional investment with a parent media that leads individuals to focus on social-cognitive themes in fanfiction, or if individuals with greater interest in emotions and relationships tend to be drawn to fanfiction. If the individuals who are motivated to write fanfiction are particularly interested in emotional, character-driven stories overall, even original stories written by these authors would be expected to show similar traits as the fanfiction assessed in the present study. Future research might compare bodies of original works between writers who have never written fanfiction and writers who also write fanfiction within different genres.

Future investigations might also explore potential psychological impacts of engagement in fanfiction in addition to the social-cognitive benefits associated with literary fiction. Some initial research has suggested familiarity and fondness for works of fiction may yield additional benefits beyond exposure to fiction alone. For instance, Gardner and Knowles (2008) showed that exposure to a favorite fictional character (rather than nonfavorite character) yielded improved performance on a familiar task, akin to the presence of a friend in similar social facilitation paradigms. Derrick (2013) showed across two studies that exposure to a familiar fictional world and writing about a favorite fictional character replenished self-control resources. Future analyses might attempt to replicate these findings in the context of fanfiction to assess if reading or writing fanfiction about familiar favorite characters or worlds offers similar benefits in task performance or self-control resources, or potentially other processes related to stress management.

Conclusion

The present study of popular *Star Trek* fanfiction provides what is to our knowledge the first systematic comparison of fanfiction to commercial literature. This study corroborates previous smaller scale work and, based on analyses of 863 works, demonstrates that relative to commercial novels, popular fanfiction is characterized by

a greater focus on social relationships and internal character processes. These findings suggest that higher emotional investment and imaginative engagement with fiction may be associated with greater engagement with social-cognitive processes; these also provide important directions for further study of the factors that are associated with participatory engagement with popular culture.

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