Text Segment Length Can Impact Emotional Reactions to Narrative Storytelling

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ABSTRACT
Previous studies have suggested that simple physical changes in how a text is presented can have profound effects on how a text is learned and processed. Although research on text learning does suggest that physical changes in presentation can impact remembering, it may be possible that presentation differences (e.g., presenting text in multiple shorter segments) also produce a quantitatively different emotional reaction in a reader. The potential impact of presentation differences on the emotional reaction of the reader is the focus of the current set of studies. In two experiments that used different narrative texts, participants read in differently segmented narrative presentations. Participants were evaluated for both their memory of the text and their emotional reaction to the text. Results were identical across both experiments, such that despite equivalent memory, shorter text presentations produced higher estimates of emotional reaction and reading enjoyment. These results suggest that physical presentation characteristics can impact how a reader emotionally engages with a narrative text, and these characteristics might present an interesting opportunity to enhance (or detract) from the intrinsic emotional value of a given text.

Introduction
A myriad of different options currently exist for the distribution of text to potential readers. Not only are multiple traditional printed options commonly available for most texts (e.g., hardcover, paperback), but readers are also able to consume text on a variety of different electronic devices as well (e.g., desktop, e-reader, smartphone). Although the proliferation of these digital options likely facilitates access to textual material via reductions in cost or other physical constraints, a natural consequence of this convenience is that how a reader chooses to access a given text can significantly influence the physical presentation of said text, independent of the conceptual information contained within it. In other words, although the content of the text does not change in a conceptual sense, the presentation of this content can vary drastically across electronic platforms from moment to moment. This variance in physical presentation could potentially impact many factors by imposing artificial perceptual boundaries or breaks that are not necessarily connected to either the structure/content of the text itself or the intentions of the writer (i.e., page break in the middle of an intense emotional paragraph).

As such, the present-day reader is often very much at the mercy of the presentation medium when it comes to how much (and what) information is available to them at a given moment. Accurately diagnosing whether this variability in physical presentation of text produces observable differences in realizing overall text goals is an important, open question. The current set of studies...
seeks to investigate such effects of physical text presentation, specifically within narrative texts, to determine whether these changes in presentation may have unintended consequences on reactions to text.

**Narrative Texts and Relevant Factors**

Narratives represent a unique text genre, such that the primary goal of this type of text is to convey a retelling of events to the reader (Kintsch, 1980). This is different from expository or educational texts, whose primary goal is to disseminate information or knowledge in a more abstract, categorical form (Berman & Nir-Sagiv, 2007; Brewer, 1980). Although narrative texts can be used for many purposes, literature (or stories) exist as a subgenre of narratives that are designed specifically to entertain or otherwise produce an affective representation of events in the text (e.g., Brewer & Lichtenstein, 1982; Gernsbacker, Goldsmith, & Robertson, 1992). How effective a given story is at producing such reactions is often what divides a memorable story from a less-memorable one (Dudukovic, Marsh, & Tversky, 2004), as affective reaction appears strongly tied to ratings of entertainment for a given situation (David, Horton, & German, 2008; Tan, 2008).

Narrative text processing is sensitive to several factors that are directly related to the semantic content of the passage itself. For example, texts that are easier to read are often better understood (Fletcher & Bloom, 1988; Weaver & Bryant, 1995), and providing readers access to semantically organizing material also benefits understanding (Bransford & Johnson, 1972; Lorch & Lorch, 1996; Zhang & Hoosain, 2001). Similarly, texts that are more clearly organized or predictable also tend to be remembered better (Murray, Klin, & Myers, 1993; Thorndyke, 1977). Importantly, all these examples involve manipulation of characteristics that are inherently related to the semantic content/meaning of the text itself, and thus such manipulations have an explicit connection to the underlying conceptual and structural organization of the text. An interesting question, however, is whether other nonsemantically focused manipulations also affect noncomprehension or nonmeaning-based interactions with (or to) narrative text (e.g., enjoyment or emotional reactivity).

Some insight can be drawn from work on other text genres (i.e., expository) where it has been demonstrated that differences in how a text is physically presented to the reader can significantly impact reading and text comprehension. Although these examples all focus on learning, they still provide a strong suggestion that presentation differences can impact what readers take away from a text and thus lay a groundwork for an investigation into other aspects of the reading experience besides comprehension. For example, presenting instructional text in different font sizes can influence how well individuals learn from said text (Katzir, Hershko, & Halamish, 2013; LaBrozzi, 2016; Sanchez & Goolsbee, 2010). Similarly, reading a text on a computer screen instead of on paper copy can likewise affect comprehension (Mangen, Walgermo, & Brønnick, 2013). Finally (and directly relevant for the current study), presenting text in either shorter or longer text segments by implementing either page or paragraph breaks has also been shown to affect both learning and subsequent reading time of expository passages (Goldman, Saul, & Coté, 1995; Kaplan & Rothkopf, 1974; Rothkopf & Billington, 1983). In a broad sense, such results suggest that despite informational content being held constant, changes in simple physical characteristics of how a text is presented (e.g., font size or segment length) can change what readers learn or remember from an expository text. Importantly, such presentation characteristics have little to do with the semantic nature or meaning of the text itself but instead are artifacts of how the text is formatted for (and displayed to) the reader. Again, although the above results all focus on comprehension or learning, these patterns of effects seem to suggest that differences in physical presentation do influence the reading process, which may have other impacts on aspects of reading, including issues of emotional reactivity or enjoyment of the text.

However, to date, little to no research has explicitly examined how such simple differences in physical presentation may also influence the affective reaction of individuals to a narrative text, specifically literature or stories. Given that the primary role of stories is to produce an affective...
reaction and entertain the reader, identifying whether such presentation differences also influence reactions to narrative stories in ways that are consistent with those learning effects found in expository texts is an important question.

**Text Segmentation and Affect in Narratives**

As mentioned above, presenting expository texts in longer segments can impact understanding, such that longer presentations produce a measureable reduction in learning or memory from these texts (Goldman et al., 1995; Kaplan & Rothkopf, 1974; Rothkopf & Billington, 1983). It has been speculated that this length effect was produced as a result of an increase in the sheer amount of textual information that the reader was forced to “sift through” to find relevant concepts, despite the same number of relevant concepts being available in longer or shorter presentations. In other words, it becomes more difficult to extract the critical information from the text due to the increase in the amount of information the reader must reconcile within their reading of the text, all while also lacking explicit physical markers that might provide a salient indication that such consolidation efforts should occur (Goldman et al., 1995). In addition to negatively affecting learning, this burdensome “sifting” process could also impact emotional reactivity to a narrative text, as readers may likewise struggle to find the information necessary to form their emotional appreciation of a given text.

For example, because readers often approach narrative stories with the goal of transforming or changing their current affect (Mar, Oatley, Djikic, & Mullin, 2011), longer presentations may make it more difficult for readers to experience this emotional change as they perhaps also struggle to find the necessary information needed to form an adequate emotional representation of the text. As readers can vary in the degree to which they “transport” into a narrative context based on factors such as prior knowledge or experience (Green, 2004), it is possible that different physical presentations might reduce the activation of such relevant information or otherwise make it more difficult to appropriately locate critical referents (e.g., O’Brien, Raney, Albrecht, & Rayner, 1997). If this is the case, it may be possible that longer textual presentations also potentially produce a flattening of affect in narrative texts, as critical affective information is likewise diluted (or obscured) by longer presentations. For example, because readers often assume the role of one of the protagonists in narrative reading (e.g., Gernsbacher, Hallada, & Robertson, 1998), longer presentations of continuous text might make this identification process (or its subsequent impact) more difficult or ineffective.

To evaluate how varying the length of text passages might impact the affective reaction to text, a set of experiments was conducted in which participants read a narrative passage that was presented in different segment lengths. Participants in both studies were evaluated for the degree of their emotional reaction and enjoyment of each text, in addition to their memory of the text and general cognitive ability. It was expected that longer presentations would significantly impact the emotional response of the readers, similar to comprehension results observed in other text genres. For example, because longer presentations have been shown to reduce comprehension, we speculated that longer presentations should likewise reduce emotional reactivity to narrative texts.

**Experiment 1**

**Methods**

**Participants**

Eighty-two undergraduate native English speakers (71% women) from a large public university in the United States participated in the experiment. All participants reported they had not read the text before and were compensated with course credit in an undergraduate Psychology course.
**Materials**

**Mood pretest.** This measure was designed to provide an approximation of the participants’ mood before they engaged with any experimental material and ensure that any subsequent differences in emotion ratings were not due to random group differences in initial mood. In this pretest, participants rated the following on a scale of 1 to 10: (1) How happy are you (1, Not at all happy; 10, Very happy), (2) How sad are you? (1, Not at all sad; 10, Very sad, and (3) Your overall mood (1, Very bad; 10, Very good). Lower scores were indicative of less happiness, less sadness, and a worse overall mood. The sadness rating was reverse coded, and then these ratings for all three questions were standardized independently on a $z$-distribution and averaged together to form a composite measure of participants’ initial mood. A composite measure for prior mood was calculated in the hopes of providing a more accurate measurement of initial mood that is less sensitive to variance from any single mood item. Higher composite scores are thus indicative of a more positive mood overall.

**Text and reading time.** All participants read an excerpt of a text drawn from the short story *Araby* (1914), written by James Joyce. This excerpt has been found to produce an emotional reaction in readers (Cupchik, Oatley, & Vorderer, 1998) and has been described as a suspenseful “coming to awareness” by literary critics (Tindall, 1979, p. 20). The excerpt was 766 words in length and has a Flesch-Kincaid grade level of 6.5. The full text and questions are available in Appendix A.

Participants read the text through a short, medium, or long text presentation. In the short condition participants received eight text segments that were approximately 95 words long per segment. In the medium length condition participants received four shorter text segments that were approximately 190 words long. Finally, in the long text condition participants instead received the entire text excerpt all at once. Importantly, in the short and medium conditions text segments were composed entirely of complete sentences and text divisions never occurred mid-sentence. This refusal to break text segments within a sentence was intentional and designed to best preserve the author’s original intent and structure, at least at a local level. Thus, although all participants read the same overall text, across presentation conditions participants had different amounts of textual information available to them at a given moment (Fig. 1).

Text for all conditions was presented digitally on a 20-inch computer screen using experimental software (Qualtrics, Provo, UT, USA), and reading time was recorded for every presented segment of text and aggregated to provide an estimate of overall reading time. Reading time was recorded to ensure that all participants engaged more or less equivalently with the text, at least evidenced by time spent reading. This was meant to control for the potential confound of time-on-task, which might also arise from different presentations and underlie any observed effect. To provide the most natural reading experience possible, participants were instructed that they were allowed to both read and reread as they desired and that they would be asked questions about the text later. Participants in the segmented conditions navigated through the text using presented “Next” and “Back” links, visible in Figure 1. All participants were able to read through the entire text within the prescribed time limit.

**Text memory.** Participants were first asked to respond whether they had read the presented text before the experiment, to which all participants responded they had not. To evaluate how well participants remembered the *Araby* text, a series of eight multiple-choice questions was developed. These questions were designed to draw evenly from the entire text and thus provide an estimate of how much information readers remembered from the text. The primary goal of this measure was to ensure that participants had actually read the text, and as is visible in Appendix A, these questions were not designed to measure aspects of “deeper” comprehension. Within this sample this memory test demonstrated an acceptable level of reliability (Cronbach’s $\alpha = .77$).

**Affect post-test.** After reading, participants were asked to complete two additional rating questions: (1) How much did you enjoy reading the story? (1, Extremely unenjoyable; 10, Extremely enjoyable), and (2) Level of emotional intensity experienced while reading the text? (1, Not at all intense; 10,
Very intense). These questions were rated on a scale from 1 to 10, with lower scores indicating less enjoyment or less emotional intensity.

**Working memory capacity (WMC).** In an effort to control for general cognitive ability, which has been shown to be predictive of narrative text learning (Daneman & Carpenter, 1980), all participants completed the Symmetry Span task (Unsworth, Heitz, Schrock, & Engle, 2005). In this task, participants are asked to complete several trials in which they first make a spatial symmetry judgment (e.g., symmetric or not) across the vertical axis of a presented figure. After this judgment participants were given a spatial location within a $4 \times 4$ matrix to remember for later test. Trials were grouped into sets comprising two to five trials, and participants received each set length three times. At the end of each set participants were asked to recall all the presented spatial locations, in the correct order. This task has been shown previously to be a reliable estimate of WMC and general cognitive ability (Unsworth et al., 2005).

**Procedure**

After providing informed consent, participants first completed the Mood Pretest. After completing this pretest participants were then randomly assigned to text length condition and given up to 10 minutes to read the entire text. Participants were reminded to read the entire text and that they would be tested on the material in the text later. After participants indicated they were done reading, they first completed the Affect post-test and then completed the Text Memory task. Finally, they completed the Symmetry Span task and were then debriefed and dismissed. The entire experiment took no longer than 1 hour.
Results and Discussion

Descriptive statistics for all measures are available in Table 1. Unless otherwise noted, all effects were evaluated using between-groups ANOVAs with a critical value of \( p < .05 \). All variables except reading time and premood demonstrated equality of variances across conditions as evidenced by nonsignificant Levene’s test values (all \( p > .32 \)). Reading time and premood were then log10 transformed, which subsequently eliminated the observed violation of equality of variances. These adjusted values for the reading time and mood variables are used in all analyses below, although raw values are provided in Table 1.

Working Memory and Mood Pretest

Overall, there was no reliable difference in WMC across the three text segmentation conditions \((F(2,79) = 1.19, \, MSe = 33.88, \, p = .31, \, \eta^2 = .03)\). This suggests the groups were well matched on general cognitive ability. However, in terms of initial mood (i.e., before reading the experimental material), there did appear to be a significant difference between groups \((F(2,79) = 4.23, \, MSe = .001, \, p = .02, \, \eta^2 = .09)\). Planned comparisons using Fisher’s Least Significant Difference (LSD) procedure indicated that although there was no reliable difference between the short and medium presentations (95% confidence interval [CI], –.01 to .03; \( p = .47 \)), both the short (95% CI, .01–.05; \( p = .01 \)) and medium (95% CI, –.04 to .01; \( p = .03 \)) conditions were significantly different from the long condition, such that the long condition reported the highest positive mood overall. To better control for these unintended group differences, prior mood was included in subsequent analyses of emotional reaction as a covariate.

Text Memory and Reading Time

In terms of how well participants remembered details of the text, there was found to be no difference in remembering regardless of segment length \((F(2,79) = .34, \, MSe = 1.16, \, p = .72, \, \eta^2 = .01)\). However, text presentation did appear to have a significant impact on how quickly participants read the text \((F(2,79) = 10.19, \, MSe = .02, \, p = .00, \, \eta^2 = .21)\). Planned comparisons using Fisher’s LSD procedure indicated that although there was no difference in how quickly the short and medium presentation conditions were read (95% CI, –.13 to .02; \( p = .12 \)), the long condition was read significantly slower than both the short (95% CI, .03–.18; \( p = .01 \)) and medium presentation conditions (95% CI, .09–.24; \( p = .00 \)). These results suggest that although there was no difference in how well participants remembered the text, there may be differences in how the participants engaged with the text, as evidenced by reading time differences.

Table 1. Means (SDs) for all measures, by text presentation condition for Experiment 1

<table>
<thead>
<tr>
<th></th>
<th>Short (n = 25)</th>
<th>Medium (n = 32)</th>
<th>Long (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMC</td>
<td>28.60 (6.20)</td>
<td>30.75 (5.75)</td>
<td>30.76 (5.51)</td>
</tr>
<tr>
<td>Pre-existing mood (z-score)</td>
<td>–.26 (.88)</td>
<td>–.10 (.90)</td>
<td>.38 (.58)</td>
</tr>
<tr>
<td>Happy</td>
<td>6.84 (1.25)</td>
<td>7.09 (1.33)</td>
<td>7.68 (.80)</td>
</tr>
<tr>
<td>Sad (reverse code)</td>
<td>7.28 (1.59)</td>
<td>7.25 (1.41)</td>
<td>8.00 (.87)</td>
</tr>
<tr>
<td>Overall</td>
<td>6.96 (1.34)</td>
<td>7.38 (1.41)</td>
<td>7.92 (1.35)</td>
</tr>
<tr>
<td>Text memory</td>
<td>6.28 (1.06)</td>
<td>6.06 (1.05)</td>
<td>6.24 (1.13)</td>
</tr>
<tr>
<td>Reading time, s</td>
<td>245.91 (65.51)</td>
<td>214.11 (54.53)</td>
<td>325.67 (125.01)</td>
</tr>
<tr>
<td>Emotional intensity</td>
<td>6.08 (1.68)</td>
<td>5.94 (1.81)</td>
<td>4.56 (1.87)</td>
</tr>
<tr>
<td>Enjoy reading</td>
<td>6.04 (1.90)</td>
<td>6.13 (1.83)</td>
<td>5.24 (1.92)</td>
</tr>
</tbody>
</table>
To evaluate participants’ affective reaction to the text, a between-groups ANCOVA was conducted across the text presentation conditions for both questions of the affect post-test. Given the observed differences in both initial mood (Mood Pretest) and passage reading time, these variables were entered as covariates in these analyses.

As is visible in Figure 2, it does appear there was a significant impact of text presentation on ratings of emotional intensity ($F(2,77) = 5.30, MSe = 3.17, p = .01, \eta^2 = .12$). The covariates of prior mood ($F(1,77) = 2.77, MSe = 3.17, p = .10, \eta^2 = .04$) and reading time ($F(1,77) = .14, MSe = 3.17, p = .71, \eta^2 = .00$) were both not reliable predictors of this emotional intensity rating. Planned comparisons using Fisher’s LSD procedure indicated that although there was no difference between the short and medium conditions (95% CI, $-1.24$ to $.75; p = .63$), both the short (95% CI, $-2.83$ to $-1.62; p = .00$) and medium (95% CI, $-2.59$ to $-0.39; p = .01$) presentations produced significantly higher ratings of emotional intensity than the long presentation condition.

Consistent with these ratings of emotional intensity, an identical pattern of effects was also observed for participants’ ratings of their enjoyment of reading the text ($F(2,77) = 4.15, MSe = 3.37, p = .02, \eta^2 = .10$). Prior mood was not a reliable covariate predictor ($F(2, 77) = 1.03, MSe = 3.37, p = .31, \eta^2 = .01$); however, overall reading time was ($F(1,77) = 5.20, MSe = 3.37, p = .03, \eta^2 = .06$). Just as with ratings of emotional intensity, planned comparisons using Fisher’s LSD procedure indicated that although there was no difference between the short and medium conditions (95% CI, $-1.24$ to $.75; p = .63$), both the short (95% CI, $-2.48$ to $.19; p = .02$) and medium (95% CI, $-2.71$ to $.44; p = .01$) conditions were rated as more enjoyable to read than the long presentation condition.

These results suggest that simple nonsemantically focused adjustments to a text presentation produced significant changes in not only how readers engaged with the text, but also caused readers to experience the text at a more intense emotional level and also enjoy reading it more. Further, the overall magnitude of these emotional effects is large (all $\eta^2 > .10$; Cohen, 1988), suggesting that the impact of these presentation characteristics is nontrivial.

Given the already suspenseful nature of the text (Tindall, 1979), it is possible that the originally nonsemantic characteristic of text segmentation may have unintentionally made the text even more suspenseful, inducing a “page-turner” like phenomenon where the reader becomes extremely engaged with the text and cannot wait to read the next segment. This suggestion is consistent with other research on narrative stories, which has suggested that suspense-based arousal can in fact increase reading speed and affect ratings (Cupchik, Leonard, Axelrad, & Kalin, 1998). As readers in the short and medium conditions did read faster and also provided numerically higher affect ratings, it is possible that this innocuous presentation characteristic

Figure 2. Emotional intensity and reading enjoyment ratings by condition in Experiment 1. Error bars represent the standard error of the mean.

Affect Post-Test
increased the intensity of the suspense experienced by the reader. Although suspense was not measured in this experiment, this potential interaction is interesting because it suggests that unintentional (and fundamentally nonsemantic) presentation characteristics could become semantically relevant under certain conditions.

**Experiment 2**

To further extend and explore the findings of Experiment 1, while simultaneously ensuring that the observed effect was not unique to the *Araby* text, a second study was conducted. This second study used a different narrative short story that was approximately twice as long as the *Araby* text, which hopefully allowed for an additional evaluation of whether or not this effect persists over longer and potentially more complex texts. Additionally, a measure of suspense was also added to this second experiment to explicitly test whether presentation differences do in fact increase this type of emotional arousal. Finally, a standardized measure of mood, the Brief Mood Introspection Survey (BMIS; Mayer & Gaschke, 1988), was also included in this second experiment to better ensure accurate measurement of this factor, without the need to aggregate across measures of happiness, sadness, and overall mood as was done in Experiment 1. In this second experiment mood was also measured before and after reading, which allowed for the detection of any change in overall mood brought on by the different presentations. Participants again read this narrative text under different presentation conditions; however, to provide the strongest comparison, participants read this new text in either the short or long text presentations only.

Based on the results of Experiment 1, it was hypothesized that a shorter presentation should have a measurable positive impact on reading enjoyment and the emotional reaction of the reader. Further, if suspense is the mechanism by which these affect ratings are influenced, it was also expected that a shorter presentation would produce a larger estimate of suspense than the long presentation.

**Methods**

**Participants**

Fifty-three undergraduate native English speakers (72% women; average age $[SD] = 21.63 [3.32]$ years) from a large public university in the United States participated in the experiment. All participants reported they had not read the text before and were compensated with course credit in an undergraduate Psychology course. Approximately half of the participants were randomly assigned to the short presentation condition ($n = 27$) and the remaining participants to the long reading condition ($n = 26$).

**Materials**

**Mood pretest/post-test.** To provide a more standardized measure of initial mood, participants completed the BMIS (Mayer & Gaschke, 1988) before and after reading. This scale consists of 16 adjectives, and participants are asked to indicate how well each adjective describes their current mood, on a four-point scale (1, Definitely do not feel; 2, Do not feel; 3, Slightly feel; 4, Definitely feel). Standard “pleasant–unpleasant” scoring procedures were used. Higher scores are indicative of a more positive initial mood. A change score was calculated between pre- and postmood measurements by subtracting pre-BMIS from postreading BMIS score.

**Text and reading time.** All participants read a short story, *All Summer in a Day* (1954), written by Ray Bradbury. This story as presented was 1,942 words in length and has a Flesch-Kincaid grade level of 4.0. Thus, this text was approximately 2.5 times longer than the text used in Experiment 1 and of approximately the same reading difficulty (i.e., primary school). The full text is available in Appendix B.
As in Experiment 1 participants read the text in either short or long text segments. Given the similarity observed between the short and medium presentation conditions in Experiment 1, the medium condition was omitted from this second study. In the short condition participants received 18 text segments that were ~110 words long. Again, all segments in the short condition were composed entirely of complete sentences, and text divisions never occurred mid-sentence. Finally, in the long text condition participants instead received the entire text excerpt all at once. Participants were informed that they had up to 15 minutes to read the overall text, and the text was presented digitally as in Experiment 1. Overall reading time was also recorded as before, and participants were allowed to reread as they desired and informed they would be tested on the text at a later point. All participants finished reading within the prescribed time limit.

Text memory. After participants responded whether they had read the presented text before the experiment, participants again completed a series of eight multiple-choice questions (adapted from Sieradski, 2017) to evaluate their memory for the text. These questions were designed to draw more or less evenly from the entire text and were included as a test that participants had in fact read the text and not designed to measure deeper levels of comprehension. These questions are available in Appendix B.

Affect post-test. As in Experiment 1 participants were asked to complete the same rating questions (e.g., enjoy reading and emotional intensity) and were also asked to complete an additional third rating for the statement, (3) How suspenseful was the story? (1, Not at all suspenseful; 10, Very much suspenseful). This additional rating question was added because it was speculated after Experiment 1 that higher levels of experienced suspense might underlie any effects of text segmentation. These questions were all rated on a scale from 1 to 10, with lower scores indicating less enjoyment, less emotional intensity, or less suspense.

WMC. Participants once again completed the Symmetry Span test (shortened version; Oswald, McAbee, Redick, & Hambrick, 2015) to evaluate differences in general cognitive ability.

Procedure
The procedure was identical to that of Experiment 1, except that participants read a different narrative text and completed both pre- and postassessments of mood.

Results and Discussion
Descriptive statistics for all measures are available in Table 2. Unless otherwise noted, all effects were evaluated using between-groups ANOVAs with a critical value of \( p < .05 \). All variables demonstrated equality of variances across conditions as evidenced by non-significant Levene’s test values (all \( p > .20 \)).

| Table 2. Means (SDs) for all measures, by text presentation condition for Experiment 2. |
|-----------------------------------------------|---------------|---------------|
|                                              | Short \((n = 27)\) | Long \((n = 26)\) |
| WMC                                          | 14.33 (5.83)    | 15.77 (5.67)  |
| BMIS (pleasant–unpleasant)                   | 2.85 (7.64)     | 3.42 (5.54)   |
| BMIS post                                    | 1.67 (6.08)     | 2.04 (5.44)   |
| BMIS change                                  | 1.19 (5.34)     | 1.38 (3.84)   |
| Text memory                                  | 7.11 (.85)      | 6.85 (.97)    |
| Reading time, s                              | 526.92 (123.90) | 531.74 (123.73) |
| Emotional intensity                          | 6.78 (1.12)     | 5.81 (1.57)   |
| Enjoy reading                                | 7.18 (1.21)     | 6.54 (1.03)   |
| Suspense                                     | 4.85 (1.70)     | 5.04 (1.59)   |
Overall, there was no reliable difference in WMC across the 2 text segmentation conditions ($F(1, 51) = .83, MSe = 33.11, p = .37, \eta^2 = .02; 95\% CI, −4.61 to 1.74$). Further, there was also no observed difference in initial mood as evaluated by the BMIS ($F(1, 51) = .10, MSe = 44.82, p = .76, \eta^2 = .00; 95\% CI, −4.26 to 3.12$). This suggests that the presentation groups were well matched on both general cognitive ability and initial mood.

As in Experiment 1, there was no difference in remembering the details of the text, regardless of segment length ($F(1, 51) = 1.13, MSe = .83, p = .29, \eta^2 = .02; 95\% CI, −.24 to .77$). Unlike Experiment 1, there was no observed difference in overall reading time ($F(1, 51) = .02, MSe = 15332.02, p = .89, \eta^2 = .00; 95\% CI, −73.13 to 63.48$). These results suggest that text segmentation did not significantly impact memory for text or participants’ reading speed.

To evaluate participants’ affective reaction to the text, a between-groups ANOVA was conducted across the text presentation conditions for all three questions of the affect post-test. As in Experiment 1 there was a significant impact of text presentation on ratings of both emotional intensity ($F(1, 51) = 6.71, MSe = 1.86, p = .01, \eta^2 = .12; 95\% CI, .22–1.72$) and reading enjoyment ($F(1, 51) = 4.38, MSe = 1.27, p = .04, \eta^2 = .08; 95\% CI, .03–1.27$). For both ratings participants who read the text in shorter presentations rated the text as more enjoyable and experienced a greater emotional intensity while reading. Further, the magnitude of these effects ($\eta^2$) was nearly identical to that of Experiment 1. As it was hypothesized after Experiment 1 that such short presentations perhaps created an aura of suspense in the reader, it was of interest to see whether participants did indeed experience more suspense via a short presentation. This was not the case, because both presentation conditions experienced similar levels of suspense ($F(1, 51) = .17, MSe = 2.71, p = .68, \eta^2 = .00; 95\% CI, −1.10 to .72$). Thus, although the critical pattern of effects was replicated, it does not appear that these effects were a result of more suspense experienced by the readers, at least in this text (Fig. 3).

Finally, to explore changes in overall mood, a change score was calculated between pre and postadministrations of the BMIS by subtracting the prereading score from the postrating. Results...
indicated no reliable difference in this change across presentation conditions ($F(1, 51) = .02$, $MSe = 21.73$, $p = .88$, $\eta^2 = .00$; 95% CI, $-2.77$ to $2.37$). This finding suggests that although both conditions demonstrated a slight decrease in mood after reading, this change was not reliably different between groups.

**General discussion**

This set of studies examined the simple question of whether nonsemantically related presentation differences influence affective reactions to narrative stories. Specifically, it was of interest to diagnose whether differences in presented text segment length might somehow impact how readers emotionally react to a narrative story. It was anticipated that presentation differences might flatten affective responses to stories, similar to reductions in learning found in expository texts. Across two experiments and two different narrative stories, longer presentations did cause readers to produce both lower ratings of emotional reaction to the text and reading enjoyment. Thus, the current study not only demonstrates that physical differences in text presentation are also relevant in the processing of narratives but also finds that changes in physical presentation have impacts outside of learning, specifically for the reader’s affective reaction to the text. This finding is critical, as it could have profound implications for how narrative text is distributed and packaged, especially when manipulation of reader affect is the primary goal.

It was speculated that these differences in experienced enjoyment or emotional reaction might be attributed to differences in suspense brought on by the shorter presentations, such that it may have created a “page-turner”–like phenomenon, and this anticipation perhaps caused participants to enjoy the reading more. However, results from the second experiment suggest this is not the case, because shorter presentations did not produce heightened levels of suspense but differences in enjoyment and intensity persisted. Although it is perhaps not clear what is underlying the observed effect on affective reaction, it is possible that several factors are at play.

For example, previous research has shown that explicit indicators to engage in “wrap-up” textual processing can cause participants to understand a text better (e.g., Rayner, Kambe, & Duffy, 2000). It is possible that this is likewise occurring here, but in an emotional sense. Physical breaks between segments may have doubled as salient text-signaling devices (Lorch, 1989) for readers to more frequently update and reflect on read information. Thus, rather than moving normally through the text, the disruption of the reader’s natural “flow” via segment breaks may have produced the unintended benefit of encouraging additional emotional processing. Because more reflective processing has been suggested to moderate emotional reaction (Leary, 2003), it is reasonable to expect that encouraging additional reflection within a reader could increase their estimations of enjoyment and their identification with the text. Longer presentations might also impede this integrative processing in additional ways, because they may make it more difficult for readers to locate the required information needed to form a coherent emotional representation of the text. Longer expository presentations do appear to make it more difficult to locate specific concepts when constructing meaning from text (Kaplan & Rothkopf, 1974; Rothkopf & Billington, 1983), and if a similar effect is occurring within narratives for emotional information, this inability to find relevant emotional information could potentially discourage superordinate emotional processing. This could be seen as analogous to a breakdown in situation model construction of text meaning (Graesser, Singer, & Trabasso, 1994), such that the inability to construct a global model of text affect is impeded by the inability to coherently identify emotional themes or threads within the text and instead encourages the production of a more locally focused (and disjointed) affective representation.

The lack of large differences in memory or reading time (<30 seconds in Experiment 1 and ns in Experiment 2) do tentatively speak against such “wrap-up” explanations, as one might expect that significant differences in processing should increase both memory and time-on-task and neither of these effects were observed consistently. However, it is possible that future investigations that include more complex measures of understanding (including emotional understanding), in addition to trace
methodologies like eye-tracking, may be better positioned to truly evaluate whether such integrative processing is occurring. For example, there was no measure of deep conceptual knowledge included in either study here. Including evaluation of understanding and inferencing at this more deep level, including measures that tap overall text goals relative to affect or motivation, would be especially useful for addressing such questions. Similarly, as even small temporal breaks (i.e., 500–1240 ms) can encourage elaboration (Calvo & Castillo, 1996), it is possible that only reading methodologies with a higher degree of resolution would be able to reliably detect such behavior. Such trace measurement could also be useful in clarifying other related questions, such as what produced the different patterns of reading time differences observed across experiments. Although possibly this difference is just reflective of intangible differences across the two texts (i.e., writing style or story complexity), knowing how a reader moves through different segmented presentations in very specific and accurate ways may more clearly illuminate the shared mechanism underlying the observed effect on affective reaction. More importantly, it might also prove useful for identifying whether other unanticipated text characteristics also interact with the effect of segmentation.

Related to this point, an interesting question is whether such presentation characteristics could likewise serve as viable interventions to intentionally manipulate reader perceptions. In other words, it may be worth investigating whether presentation characteristics like text segmentation can be used as a tool to deliberately influence reader experiences. This would be especially fascinating as a means toward maximizing entertainment value and also perhaps toward providing more effective messaging to readers relative to public interest stories, politics, and so on. Because persuasive messaging does appear to be sensitive to similar factors as narrative processing (e.g., prior knowledge, text structure, interest; Buehl, Alexander, Murphy, & Sperl, 2001), it is possible that physical presentation differences may also impact this type of text usage in similar ways.

In conclusion, these studies have demonstrated that often-overlooked artifacts of text presentation can impact a reader’s experience of a narrative story. Simply providing text in shorter text segment lengths appears to increase enjoyment and the experience of emotional intensity within a story. This suggests, consistent with research on learning in other text genres, that careful consideration of these presentation characteristics is necessary when attempting to understand how a reader processes a narrative story, and failure to do so may produce unanticipated consequences for how a reader emotionally reacts to a text.

References


Appendix A

Text and Questions from Experiment 1

When the short days of winter came, dusk fell before we had well eaten our dinners. When we met in the street the houses had grown sombre. The space of sky above us was the colour of ever-changing violet and towards it the lamps of the street lifted their feeble lanterns. The cold air stung us and we played till our bodies glowed. Our shouts echoed in the silent street. The career of our play brought us through the dark muddy lanes behind the houses, where we ran the gauntlet of the rough tribes from the cottages, to the back doors of the dark dripping gardens where odours arose from the ashpits, to the dark odorous stables where a coachman smoothed and combed the horse or shook music from the buckled harness. When we returned to the street, light from the kitchen windows had filled the areas. If my uncle was seen turning the corner, we hid in the shadow until we had seen him safely housed. Or if Mangan’s sister came out on the doorstep to call her brother in to his tea, we watched her from our shadow peer up and down the street. We waited to see whether she would remain or go in and, if she remained, we left our shadow and walked up to Mangan’s steps resignedly. She was waiting for us, her figure defined by the light from the half-opened door. Her brother always teased her before he obeyed, and I stood by the railings looking at her. Her dress swung as she moved her body, and the soft rope of her hair tossed from side to side.

Every morning I lay on the floor in the front parlour watching her door. The blind was pulled down to within an inch of the sash so that I could not be seen. When she came out on the doorstep my heart leaped. I ran to the hall, seized my books and followed her. I kept her brown figure always in my eye and, when we came near the point at which our ways diverged, I quickened my pace and passed her. This happened morning after morning. I had never spoken to her, except for a few casual words, and yet her name was like a summons to all my foolish blood.

Her image accompanied me even in places the most hostile to romance. On Saturday evenings when my aunt went marketing I had to go to carry some of the parcels. We walked through the flaring streets, jostled by drunken men and bargaining women, amid the curses of labourers, the shrill litanies of shop-boys who stood on guard by the barrels of pigs’ cheeks, the nasal chanting of street-singers, who sang a come-all-you about O’Donovan Rossa, or a ballad about the troubles in our native land. These noises converged in a single sensation of life for me: I imagined that I bore my chalice safely through a throng of foes. Her name sprang to my lips at moments in strange prayers and praises which I myself did not understand. My eyes were often full of tears (I could not tell why) and at times a flood from my heart seemed to pour itself out into my bosom. I thought little of the future. I did not know whether I would ever speak to her or not or, if I spoke to her, how I could tell her of my confused adoration. But my body was like a harp and her words and gestures were like fingers running upon the wires.

One evening I went into the back drawing-room in which the priest had died. It was a dark rainy evening and there was no sound in the house. Through one of the broken panes I heard the rain impinge upon the earth, the fine incessant needles of water playing in the sodden beds. Some distant lamp or lighted window gleamed below me. I was thankful that I could see so little. All my senses seemed to desire to veil themselves and, feeling that I was about to slip from them, I pressed the palms of my hands together until they trembled, murmuring: ‘O love! O love!’ many times.
At last she spoke to me. When she addressed the first words to me I was so confused that I did not know what to answer. She asked me was I going to Araby. I forgot whether I answered yes or no. It would be a splendid bazaar; she said she would love to go.

**MC Questions: (correct answers marked with *)**

The narrator

A. Had never spoken to Mangan, except for a few casual words  
B. Spoke to Mangan every Sunday when dusk fell  
C. Had only spoken to Mangan through email  

The streets were  

A. Quiet with sullen woe  
B. Bustling with the sounds of flaring streets  
C. Empty, except for a few stray cats and dogs  

What is Araby?  

A. A traveling circus act  
B. A bazaar  
C. The name of the narrator’s apartment  

The narrator  

A. Was indifferent to Mangan’s advances  
B. Was well acquainted with Mangan  
C. Observed Mangan from afar  

Who did the narrator go to the market with?  

A. His father  
B. His aunt  
C. Mangan’s brother  

Who died in the back-drawing room?  

A. A priest  
B. A doctor  
C. A painter  

The narrator describes Mangan as having  

A. A brown figure  
B. A pale figure  
C. A slim figure  

What colour was the sky described as?  

A. A sparkling blue  
B. A blazing orange  
C. An ever-changing violet  

Appendix B

**Text and Questions from Experiment 2**

“Ready?”  
“Ready.”  
“Now?”  
“Soon.”  
“Do the scientists really know? Will it happen today, will it?”  
“Look, look; see for yourself!”

The children pressed to each other like so many roses, so many weeds, intermixed, peering out for a look at the hidden sun.
It rained.
It had been raining for seven years; thousands upon thousands of days compounded and filled from one end to the other with rain, with the drum and gush of water, with the sweet crystal fall of showers and the concussion of storms so heavy they were tidal waves come over the islands. A thousand forests had been crushed under the rain and grown up a thousand times to be crushed again. And this was the way life was forever on the planet Venus, and this was the schoolroom of the children of the rocket men and women who had come to a raining world to set up civilization and live out their lives.

“It’s stopping, it’s stopping!”
“Yes, yes!”

Margot stood apart from these children who could never remember a time when there wasn’t rain and rain and rain. They were all 9 years old, and if there had been a day, seven years ago, when the sun came out for an hour and showed its face to the stunned world, they could not recall. Sometimes, at night, she heard them stir, in remembrance, and she knew they were dreaming and remembering an old or a yellow crayon or a coin large enough to buy the world with. She knew they thought they remembered a warmness, like a blushing in the face, in the body, in the arms and legs and trembling hands. But then they always awoke to the tatting drum, the endless shaking down of clear bead necklaces upon the roof, the walk, the gardens, the forests, and their dreams were gone.

All day yesterday they had read in class about the sun. About how like a lemon it was, and how hot. And they had written small stories or essays or poems about it:

I think the sun is a flower,
That blooms for just one hour.

That was Margot’s poem, read in a quiet voice in the still classroom while the rain was falling outside.

“Aw, you didn’t write that!” protested one of the boys.
“I did,” said Margot. “I did.”
“William!” said the teacher.

But that was yesterday. Now the rain was slackening, and the children were crushed in the great thick windows.

“Where’s teacher?”
“She’ll be back.”
“She’d better hurry, we’ll miss it!”

They turned on themselves, like a feverish wheel, all tumbling spokes.

Margot stood alone. She was a very frail girl who looked as if she had been lost in the rain for years and the rain had washed out the blue from her eyes and the red from her mouth and the yellow from her hair. She was an old photograph dusted from an album, whitened away, and if she spoke at all her voice would be a ghost. Now she stood, separate, staring at the rain and the loud wet world beyond the huge glass.

“What’re you looking at?” said William.

Margot said nothing.

“Speak when you’re spoken to.” He gave her a shove. But she did not move; rather she let herself be moved only by him and nothing else.

They edged away from her, they would not look at her. She felt them go away. And this was because she would play no games with them in the echoing tunnels of the underground city. If they tagged her and ran, she stood blinking after them and did not follow. When the class sang songs about happiness and life and games her lips barely moved. Only when they sang about the sun and the summer did her lips move as she watched the drenched windows.

And then, of course, the biggest crime of all was that she had come here only five years ago from Earth, and she remembered the sun and the way the sun was and the sky was when she was four in Ohio. And they, they had been on Venus all their lives, and they had been only two years old when...
last the sun came out and had long since forgotten the color and heat of it and the way it really was. But Margot remembered.

“It’s like a penny,” she said once, eyes closed.

“No it’s not!” the children cried.

“It’s like a fire,” she said, “in the stove.”

“You’re lying, you don’t remember!” cried the children.

But she remembered and stood quietly apart from all of them and watched the patterning windows. And once, a month ago, she had refused to shower in the school shower rooms, had clutched her hands to her ears and over her head, screaming the water mustn’t touch her head.

So after that, dimly, dimly, she sensed it, she was different and they knew her difference and kept away.

There was talk that her father and mother were taking her back to earth next year; it seemed vital to her that they do so, though it would mean the loss of thousands of dollars to her family. And so, the children hated her for all these reasons of big and little consequence. They hated her pale snow face, her waiting silence, her thinness, and her possible future.

“Get away!” The boy gave her another push. “What’re you waiting for?”

Then, for the first time, she turned and looked at him. And what she was waiting for was in her eyes.

“Well, don’t wait around here!” cried the boy savagely. “You won’t see nothing!”

Her lips moved.

“Nothing!” he cried. “It was all a joke, wasn’t it?” He turned to the other children. “Nothing’s happening today. Is it?”

They all blinked at him and then, understanding, laughed and shook their heads. “Nothing, nothing!”

“Oh, but,” Margot whispered, her eyes helpless. “But this is the day, the scientists predict, they say, they know, the sun. . . .”

“All a joke!” said the boy, and seized her roughly. “Hey, everyone, let’s put her in a closet before teacher comes!”

“No,” said Margot, falling back.

They surged about her, caught her up and bore her, protesting, and then pleading, and then crying, back into a tunnel, a room, a closet, where they slammed and locked the door. They stood looking at the door and saw it tremble from her beating and throwing herself against it. They heard her muffled cries. Then, smiling, they turned and went out and back down the tunnel, just as the teacher arrived.

“Ready, children?” she glanced at her watch.

“Yes!” said everyone.

“Are we all here?”

“Yes!”

The rain slackened still more.

They crowded to the huge door.

The rain stopped.

It was as if, in the midst of a film, concerning an avalanche, a tornado, a hurricane, a volcanic eruption, something had, first, gone wrong with the sound apparatus, thus muffling and finally cutting off all noise, all of the blasts and repercussions and thunders, and then, second, ripped the film from the projector and inserted in its place a peaceful tropical slide which did not move or tremor. The world ground to a standstill. The silence was so immense and unbelievable that you felt your ears had been stuffed or you had lost your hearing altogether. The children put their hands to their ears. They stood apart. The door slid back and the smell of the silent, waiting world came in to them.

The sun came out.

It was the color of flaming bronze and it was very large. And the sky around it was a blazing blue tile color. And the jungle burned with sunlight as the children, released from their spell, rushed out, yelling, into the springtime.
“Now don’t go too far,” called the teacher after them. “You’ve only two hours, you know. You wouldn’t want to get caught out!”

But they were running and turning their faces up to the sky and feeling the sun on their cheeks like a warm iron; they were taking off their jackets and letting the sun burn their arms.

“Oh, it’s better than the sun lamps, isn’t it?”

“Much, much better!”

They stopped running and stood in the great jungle that covered Venus, that grew and never stopped growing, tumultuously, even as you watched it. It was a nest of octopi, clustering up great arms of flesh-like weed, wavering, flowering this brief spring. It was the color of rubber and ash, this jungle, from the many years without sun. It was the color of stones and white cheeses and ink, and it was the color of the moon.

The children lay out, laughing, on the jungle mattress, and heard it sigh and squeak under them, resilient and alive. They ran among the trees, they slipped and fell, they pushed each other, they played hide-and-seek and tag, but most of all they squinted at the sun until the tears ran down their faces, they put their hands up to that yellowness and that amazing blueness and they breathed of the fresh, fresh air and listened and listened to the silence which suspended them in a blessed sea of no sound and no motion. They looked at everything and savored everything. Then, wildly, like animals escaped from their caves, they ran and ran in shouting circles. They ran for an hour and did not stop running.

And then—

In the midst of their running one of the girls wailed.

Everyone stopped.

The girl, standing in the open, held out her hand.

“Oh, look, look,” she said, trembling.

They came slowly to look at her opened palm.

In the center of it, cupped and huge, was a single raindrop.

She began to cry, looking at it.

They glanced quietly at the sky.

“Oh. Oh.”

A few cold drops fell on their noses and their cheeks and their mouths. The sun faded behind a stir of mist. A wind blew cool around them. They turned and started to walk back toward the underground house, their hands at their sides, their smiles vanishing away.

A boom of thunder startled them and like leaves before a new hurricane, they tumbled upon each other and ran. Lightening struck ten miles away, five miles away, a mile, a half mile. The sky darkened into midnight in a flash.

They stood in the doorway of the underground for a moment until it was raining hard. Then they closed the door and heard the gigantic sound of the rain falling in tons and avalanches, everywhere and forever.

“Will it be seven more years?”

“Yes. Seven.”

Then one of them gave a little cry.

“Margot!”

“What?”

“She’s still in the closet where we locked her.”

“Margot.”

They stood as if someone had driven them, like so many stakes, into the floor. They looked at each other and then looked away. They glanced out at the world that was raining now and raining and raining steadily. They could not meet each other’s glances. Their faces were solemn and pale. They looked at their hands and feet, their faces down.

“Margot.”

One of the girls said, “Well . . .?”

No one moved.
“Go on,” whispered the girl.
They walked slowly down the hall in the sound of the cold rain. They turned through the doorway to the room in the sound of the storm and thunder, lightening on their faces, blue and terrible. They walked over to the closest door slowly and stood by it.
Behind the closed door was only silence.
They unlocked the door, even more slowly, and let Margot out.

**MC Questions (correct answer marked with *; adapted from Sieradski, 2017)**

The real reason the children are prejudiced against Margot was:
A. They thought she cheated on her poem
B. She has a foreign accent
C. Her refusal to play
*D. Her history and opportunities

Margot’s biggest crime was what?
*A. She had come to Venus only five years before and remembered the sun
B. Her parents were taking her to Earth the following year
C. She thought she was better than the other children
D. She would not play with the other children

All of the following are TRUE about the children of Venus EXCEPT:
A. They live in an underground city
B. They use sun lamps
C. They play in tunnels
*D. They play in the forests every day

What happens every seven years on Venus?
A. A ship arrives with more settlers
*B. The sun shines for 1 hour
C. The forest changes color
D. An earthquake shakes the underground homes

When the rain stops, what do the children experience first?
A. A quick rise in temperature
B. A huge dust storm
*C. A tremendous silence
D. A strange smell

How do the children react when they first go outside that day?
A. They are fearful
*B. They run and shout with pleasure
C. They all begin to cry
D. They hug their teacher

How does the author describe the forests of Venus?
*A. a nest of octopuses with fleshy arms
B. a blessed sea of motion
C. an avalanche of color
D. a dusty old photograph

When the children remember Margot, how do they react?
A. They become fearful for her safety
B. They become jealous
*C. They feel shame and embarrassment
D. They feel a new affection towards her