MindMargin: An Article-Adjacent Commenting Platform

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Abstract
Commenting systems are a popular means for facilitating conversation among readers on many websites. Reading and writing comments can increase active user engagement in information exchange, personal reflection, and lively discussion, among others. We explore how user engagement can be increased by proposing a new commenting system and interface, MindMargin. In contrast to traditional commenting systems where comments are featured below the article, MindMargin presents comments adjacent to the article. Users can post and navigate comments and replies on a horizontal infinite scroll. Comments are anchored by users to specific sections or phrases of the article. This system exposes users to a diverse and relevant array of opinions as they read.

Author Keywords
Comments; anchored; commenting systems; opinions.

ACM Classification Keywords
H.5.2. [Information Interfaces and Presentation (e.g. HCI)]: User Interfaces

Introduction
News pages, media sites, online shops, blogs and social networks support the ability to give content-related

feedback in the form of comments. For readers and users, online commenting holds a compelling promise: to share their views, to contribute their relevant knowledge, and to engage in lively, thoughtful discussion with each other. As online political debate and discourse increasingly polarize and generalize individual political views, the prevailing opinion among researchers has been to present people with diverse perspectives in order to encourage more nuanced, independently reached points of view [4, 5, 7]. In light of this, the promise of deep and thoughtful online discussion becomes particularly valuable. However, because irrelevant and low-quality comments frequently crowd and dilute meaningful online conversations [3, 6], this promise remains unfulfilled.

We hypothesize that enhancing comment quality is only part of the challenge. Even high-quality comments have a limited influence on readers because of their equally limited visibility as other comments. Commenting systems most commonly rest beneath, and detached from, the main content of modern websites. Compelling existing research, however, suggests that separating secondary or additional content, such as comments, from the primary content has lead to a decreased understanding of the primary content, a more superficial and less critical engagement with the primary content, an amplified confusion of the secondary content, increased errors of comprehension and proper reference in secondary content, increased cognitive difficulty to the reader in matching references in the secondary content to the primary content, ultimately interfering with the transfer of information from the primary to the secondary content and with the facility of fluid discussion in the secondary content [1, 2, 8, 10, 9, 11, 12].

An alternative that has been markedly explored in educational settings [1, 2, 8, 10] is to present comments on the margin of the primary text, visibly linked to relevant sections of the text. Such anchored discussions improve conversation among readers of academic texts by making the context of the conversation clearer [1, 2, 8]. A study, which examined the placement of student- and teacher-generated annotations on students' comprehension of a text, found that students who saw and used annotations adjacent to the main text displayed a deeper understanding of the text than those who interacted with annotations placed at the end of the text [10].

We build on these insights to investigate whether placing user comments beside the primary text can encourage people to consider diverse perspectives when forming their individual opinions of an issue online. To enable an empirical investigation into this question, we have developed MindMargin, a system that exposes users to comments alongside the primary text as they read. The comments are anchored to relevant sections of the content in a minimally invasive design and are placed on an infinite horizontal scroll to reduce comment congestion.

We propose two hypotheses for MindMargin's effect on users, in contrast to the traditional vertical interface:

1. Users of MindMargin will develop more thoughtful and nuanced opinions of an article than users using a traditional vertical interface who are presented with identical comments. Specifically, we expect users who interact with MindMargin to report more moderate stances on controversial issues than users of a traditional vertical interface.
2. Users of MindMargin will report a more positive subjective impression of the existing comments because MindMargin displays anchored comments

that appear alongside relevant passages of the text. We expect that comment placement will make the relevance of the comments to the primary text more apparent to users interacting with MindMargin.

The results of our online study show that participants had significantly more positive impressions of the comments related to a controversial article when those comments were presented with MindMargin, as opposed to when those same comments were presented below the main article. Participants who used MindMargin also reported a more moderate stance on the controversial issue raised in the article than participants who interacted with the traditional vertical layout interface. Although this difference was not yet significant, it provides sufficient evidence for us to pursue a larger-scale study.

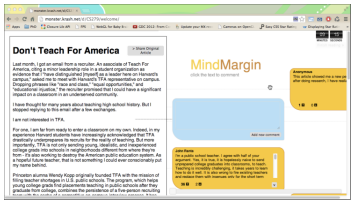

Figure 1: The MindMargin system with the reference medium on the left and an adjacent commenting system on the right.

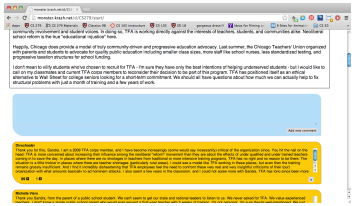

Figure 2: The traditional commenting system with a vertically ordered design.

MindMargin

We implemented two commenting systems. The first commenting system is MindMargin with anchored comments on a horizontal infinite scroll next to the reference medium (see Figure 1). The second commenting system is a traditional vertical interface (see Figure 2).

MindMargin is split into two sides: the primary content on the left and and an adjacent commenting system on the right. Comments are dispalyed in a horizontal infinite scroll. Thus, an unrestricted amount of comments can be linked to the reference medium. Navigation within the infinite scroll component can be performed via mousewheel interaction (either left/right or top/down scrolling with the same effect) or by adjustment of a slider on the bottom of the right split screen. While navigating through the infinite scroll, the reference medium remains fixed on the left. Similar to [11, 12], comments are anchored to the horizontal reference point of the primary content. We minimize disturbance by avoiding interactions with the primary text, as defined by [11], and using thin dotted lines for anchoring to the article's right edge. This design decision was motivated by MindMargin's inherently more visible and thus distracting interface than the traditional vertical system's.

If a comment has replies, a dropdown button appears on the comment's footer. Lighter in color, replies to comments appear vertically under their comment when the button is clicked. This arrangement optimizes horizontal real estate by reserving horizontal space for parent comments. Readers can upvote and downvote comments. Most recent comments and most popular comments are displayed directly next to the reference medium for increased visibility.

Our implementation of the traditional vertical commenting system follows a vertically ordered design: The primary content appears first and on top of the commenting system that follows below. Navigation within the article as well as within the comments can be performed via top/down scrolling. The replies, upvoting, and downvoting function and are organized in the same manner as MindMargin.

Experiment

We performed a between-subjects online experiments with young adults.

Participants. 106 online participants landed on our page for our user study and evaluation, of which 46 proceeded to begin and complete the study (30 female). 19 participants were randomly assigned to the Mind Margin condition and 27 to the vertical interface condition. Participants were recruited online through social media and college listservs. Participants were college students,

aged 18 to 25, and 68% hailed from the local university. The self-reported reading frequency of online news among participants ranged from daily to almost never.

Experimental Conditions. The two conditions in our study were MindMargin and the traditional vertical interface, both seeded with existing comments from a relevant news article. The article was selected on the basis of its opinionated nature and its relevance both in recent news and to our anticipated participant pool. We chose an opinion piece from our university's undergraduate publication, titled "Don't Teach for America." Teach For America (TFA) is a non-profit organization that recruits recent college graduates to teach for two years in public schools.

The article already had over fifty comments by affiliates and non-affiliates of the university alike, from which we selected the top 39 comments as ranked by Disqus, the existing commenting system on the publication's website, to be used in our study. The same comments were used in both conditions. In the traditional vertical interface, the comments appeared in the identical order as ranked in the original article. In MindMargin, we anchored them to the article based on textual references, specific phrases, quotes, and relevant content in each comment.

Tasks. To ensure that our results would be informative for the design of real-world commenting systems, we designed the experimental tasks to focus participants' attention on the content of the article. The study design did not emphasize that the evaluation of the commenting system was the object of the study, but this information was clearly communicated and disclosed in the consent form.

Participants were presented with an article and they were instructed to read the article and to anticipate a questionnaire that followed, but were not asked or required to interact with the commenting system. Once they completed reading the article, we asked them the general stance of the article–For TFA or Against TFA–and, in a free-text response, we requested two pieces of supporting evidence used in the article to verify their reading and comprehension of the article. All 46 participants gave correct and thorough answers to these verification questions. Participants were then asked to complete a post-experiment questionnaire, which asked for their personal stance on the issue, whether they liked the article, and whether they agreed with the article. They were also asked to self-report whether they read the comments in the article and to provide two adjectives that described either their reaction to, or a description of, the comments.

To further incentivize participants to focus on the content of the article and reflect on the issue discussed therein, we used the following tagline to advertise the study: "Do you (really) think like a Harvard student?" and at the completion of the study, we provided them with feedback comparing their answers to the responses made by other Harvard students.

Procedure. Participants were given an initial questionnaire asking basic demographics and news reading frequency. Before being shown the article, they were also asked either to provide a username or pseudonym, or to remain anonymous. Participants were allotted 10 minutes to read the article. After 2 minutes, they were permitted to proceed to the questionnaire. The 2-minute delay was to ensure the reading of the article, and did not seem to prevent fast readers from moving too slowly, as the average reading time was 3 minutes 47 seconds.

Design and Analysis. We used a between-subject full

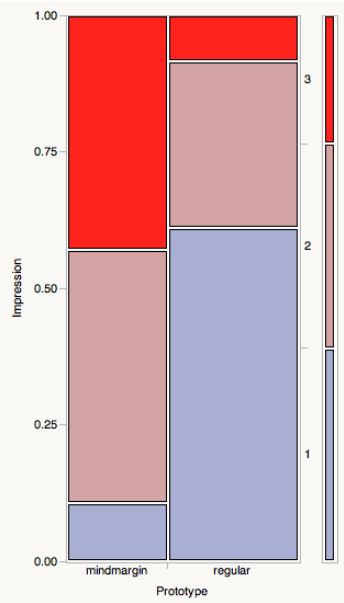

Figure 3: When using MindMargin, the majority of participants described the comments as positive.

factorial design with two factors and the interaction between them. The two factors were: *Prototype* {MindMargin or vertical}, and *Prior exposure to the article* {"read" if they have read or skimmed the article before, "seen" if they have seen the article but did not read or skim it, and "none" if they have neither read nor seen the article previously}. To compare conditions, we excluded participants who reported not to have read the comments [[***State how many or what fraction of participants that was; ideally report it by condition so that people can see that there wasn't a huge imbalance in how many people skipped the comments***]].

We analyzed two dependent variables. First, we computed *Stance Polarization*, which captured how far a participant's personal stance on the issue (on a scale from 0-Strongly For TFA to 100-Strongly Against TFA) was removed from the neutral stance (50). We excluded participants who opted out of answering this question [[*** how many?***]].

Second, we measured *Attitude Toward Comments*. As mentioned earlier, each participant who reported having read the comments was asked to provide two adjectives describing their reaction to the comments accompanying the article. We asked four independent raters, blind to the experiment, to classify these adjectives using a four-bin classifier ("Positive," "Negative," "Neutral," and "Invalid"). We removed adjectives given two or more "Invalid" classifications.For the remaining adjectives, we used the majority vote. Disagreements among raters were between "Positive" and "Neutral" or "Neutral" and "Negative," but never between "Positive" and "Negative". We were thus confident in using the resulting median encodings for the final classification of the specified adjectives.

We treated Stance Polarization as a continuous variable and we analyzed it using analysis of variance. We treated Attitude Toward Comments as an ordinal variable and we analyzed it using ordinal logistic regression.

Results

People who used MindMargin reported a less extreme stance (mean of SP was 17). People who used a traditional vertical interface reported a more extreme stance (mean of SP was 27). However, this difference was not statistically significant (results of statistical test XXX). We also tested for interaction between commenting system design and prior exposure to the article, and found that people who had prior exposure to the article had a more moderate stance using MindMargin than the traditional vertical interface. This effect is illustrated in Figure 4.

People who used MindMargin had a more positive than negative impression of comments (positive: 18.8%, negative: 4.7%, neutral/descriptive: 20.3%). People who used a traditional vertical interface had a more negative than positive impression of comments (positive: 4.7%, negative: 34.8%, neutral/descriptive: 17.2%). We observed a significant main effect of commenting system design on the impressions. This effect is illustrated in Figure 3. We also tested for interaction between commenting system design and prior exposure to the article XXX.

Discussion

The lower SP values among MindMargin users reveal that participants with MindMargin who had prior exposure to the article reported less polarized views to reading the article for a second read or glance.

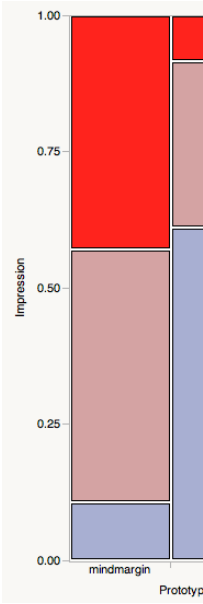

Figure 4: When us
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However, there are limitations to our observations, as the results suggest that our trends are not yet statistically significant. This could likely result from using a between-subjects methodology. To address this in subsequent research, we plan to significantly increase the participant pool and to employ a within-subjects methodology, in which we query participants for their individual stance prior to their reading of the article and observe the deltas in SP values afterward.

MindMargin users had a significantly more positive impression of the comments. Since all participants were exposed to identical comments, we conclude that MindMargin readers consider the comments more substantial and ultimately place greater trust and consideration into others' opinions.

In addition to our quantitative results, we would also like to acknowledge qualitative feedback from a MindMargin user that suggests actions he/she took beyond the scope of reading and commenting article: "This article showed me a new perspective on TFA, which after doing research, I have realized I agree with." No written feedback suggesting actions outside the scope of the article was received from participants with the traditional commenting system. While there is insufficient evidence to conclude that MindMargin motivated the participant's pursuit of further research into the issue, it nevertheless indicates that this particular participant, exposed to the MindMargin interface, thought critically and independently about the issue discussed in the article.

Future Work

In the future, we plan to expand the participant pool to include participants of all ages and backgrounds. We would like to explore if MindMargin causes increased difficulty for readers to leave inflamed comments because MindMargin forces them to choose an appropriate anchoring place for their comments. Finally, we plan to pursue research on a commenting system like MindMargin, but for videos and music, that anchors comments to certain times or time-intervals within a given recording. Research into annotations on visual pieces, other than text, is also being considered.

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