Mitigating distractions during online reading: an explorative study

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Introduction & Background

Digital environments make vast amounts of information readily available. However, these environments are dynamic, competitively distracting the user with alerts, advertising, social media, and other distractions. It has been shown that auditory distractions, such as background noise, impair reading comprehension [1] and that visual distractions lead to disruptions in cognition [2]. In the case of educational material, irrelevant and attention grabbing images or animations alongside text material have negative effects on learning [3, 4]. However, distractions can be avoided by using attention guiding to ensure that important information is seen [5]. Our hypothesis is that attention guidance can be used to help reduce the disruption of visual distractions during reading.

We explore this hypothesis by also investigating the effects of text readability on the extent to which the visual distractions impact comprehension and distraction rate. We know that auditory distractions impair proofreading performance and prose recall, but the impairments only occur when the reading task is easy [6, 7]. In digital environments many visual distractions are possible, such as the reader having dual screens open with Facebook showing on one screen, advertising on webpages, or simply the pop-up alerts used by many applications such as email.

The objective of this study is to investigate whether attention guiding can be used to mitigate distractions for test with different readabilities. Furthermore, we investigate the effects of text readability and distractions on first language English (L1) and second language English (L2) readers. Distractions are induced using images that change at constant rates in a side bar. An eye tracker was used to record and monitor eye gaze of participants.

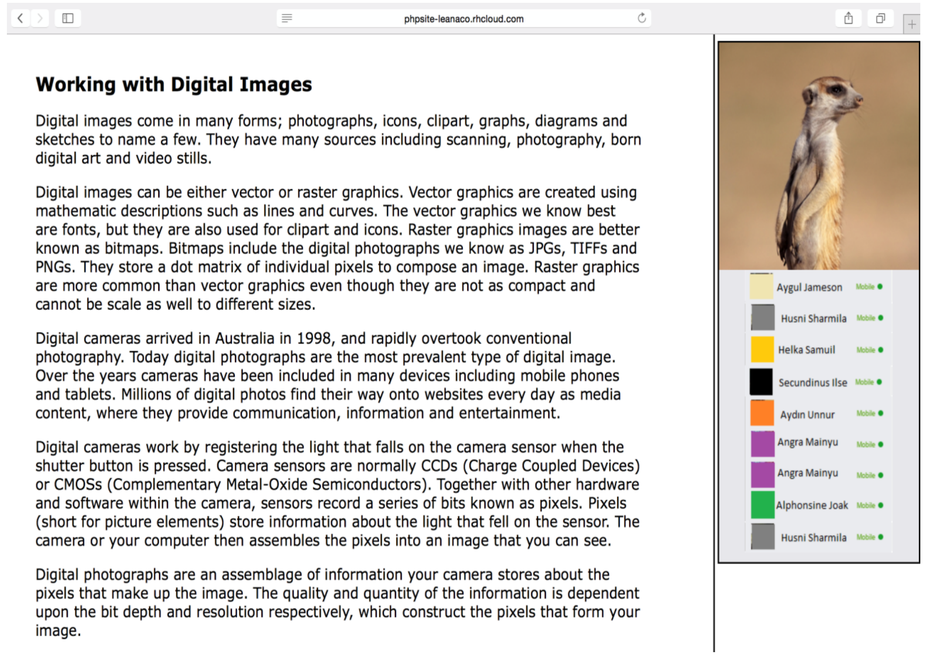


Figure 1. Example of artificial distracting environment

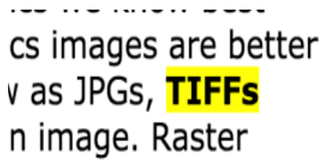


Figure 2. Example of Signal A

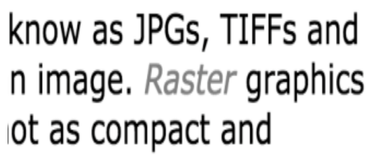


Figure 3. Example of Signal B

Method

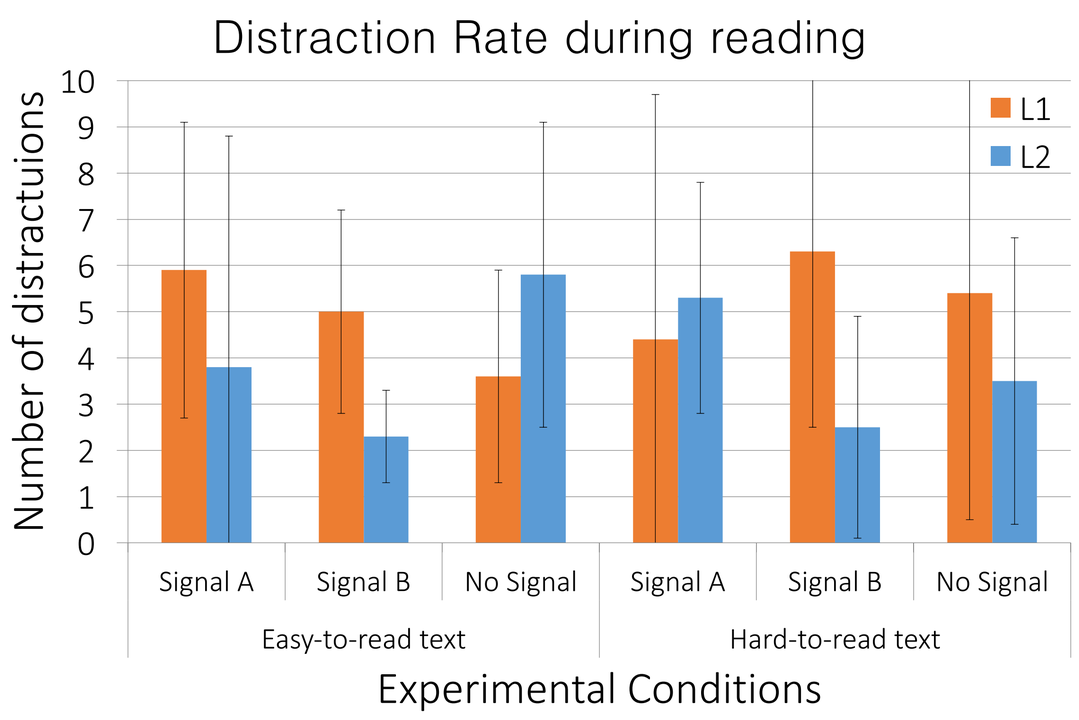
We conducted a user study in which 66 (28 female) participants' eye gaze was recorded as they read text in a visually distracting environment (see Figure 1). We explored two mitigation signals using real-time eye gaze data to investigate whether the mitigating effects help reduce distraction rate as well as help recovery after distractions. Participants were also given two questionnaires to complete; the first regarding their use of potentially distracting technology whilst studying, and the second, on mitigation signals.

The study used a between-subjects design with 3 independent factors: 1) the text difficulty; 2) the distraction mitigation signal; and 3) whether English was their first reading language. There were three mitigation signal conditions, with 22 participants in each group:

A. Signal A is highlighting and bolding the last word the reader fixated on (see Figure 2).
B. Signal B is the last word the reader fixated on colored grey and italicized (see Figure 3).
C. No cue applied to text

Results

- 98% of participants stated that they use social media and / or email and / or instant messaging whilst they are reading materials for university
- 85% of participants stated that these technologies distract them while studying.
- Almost half (46%) of the participants are using these technologies more than 10 times a day and 85% of them are using these technologies at least 2 times per day.
- On average, participants only fixated about 2% of the time in the distracting area, well below what we expected
- No difference in distraction rate between L1 and L2 readers, nor, between the easy- and hard-to-read texts.
- 55% participants in the signal A group said that signal A helped them to start re-reading compared to only 14% of participants in the signal B group



Conclusion & Further Work

- The questionnaire about use of potentially distracting technology reveals that students are getting distracted whilst studying, therefore, there is a need to mitigate these distractions.
- There were low distraction rates in the artificially visually distracting environment, better distractions should be employed to draw participants eyes away from the text.
- Highlighting and making the last word bold (signal A) helps students recover from distractions.

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References

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