

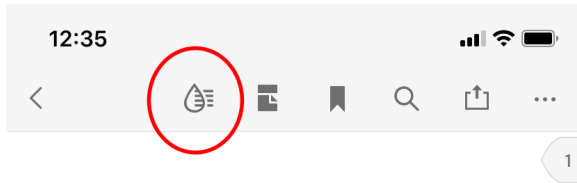
Adobe Liquid Mode

Adobe Acrobat is a free app for your smartphone or tablet. To make reading on a small screen easier, there is a new feature called Liquid Mode. It lets you change the way the text appears on your screen.

Liquid Mode works for PDF documents that have text. It does not work for pictures.

When you open your document, it will look like this. The text is very small and hard to read.

There is a button at the top of the screen that looks like a drop of water. Tap the button.



Accelerating Adult Readers with Typeface: A Study of Individual Preferences and Effectiveness

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Abstract
Information overload is the challenge of the modern era and text the medium. Every adult reader would benefit from faster reading, provided they could retain comprehension. The present work explores the reading speed gains possible solely by manipulating typeface. We consider that optimal typeface might be a matter of an individual's preferred font, or that some fonts might be better for all users. Indeed, eight in ten of our participants believed their favorite font would be their best. Instead, our findings showed that the preferred font was seldom best, and one font did not fit all. Adult readers in our study read better with varying font. An average 117 word per minute difference between worst and best typeface, or around 10 additional pages an hour, means font choice is of real-world significance. Our discussion focuses on the challenges of rapidly identifying an individual's optimal font, and the existing individualization technologies such as an advance allows.

Author Keywords
reading, typography, preference, personalization

CCS Concepts
Human-centered computing — Human computer interaction (HCI); User studies; Hypertext / hypermedia;

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0001-5721/2018/07-ARTICLE
DOI: 10.1145/3248828.3248830



Figure 1: Our study alternated between preference and effectiveness tests. Each preference test included a double-blind tournament of 4 fonts. In the effectiveness test, participants read passages in a fixed font which was either a random font or their most preferred font from the previous tournament.

Introduction and Related Work
The earliest word in the literature of choice for the information in our digital age. It work and pleasure alike, modern readers face pressure to comprehend ever-increasing amounts of information. In the face of information overload, new tools are needed. Prior work has identified one straightforward tool of optimization: typeface [1, 27]. In both a glance and long form reading, font choice has been shown to make a reading ability [5, 11, 15]. We posit that through optimal typeface, reading can be accelerated toward significant real-world improvement. If so, we expect a path toward systems which re-format information, optimizing the written word to enable fast, effective reading.

What, then, is an ideal font choice? While some fonts are indeed better at conveying information than others, subjectively to commonplaces, O'Connor identified the difficulty modern users face selecting their preferred font [21]. If users could pick their preferred font, would it also be an effective font choice for them? Our work accepts this challenge to identify a user's most preferred font and compare it with their most effective font in terms of reading speed and comprehension. In the past, Cooper et al. asked users to make pairwise comparisons using two physical monitors, each showing a different font family [8]. The idea of pairwise comparisons to derive a definitive ranking for user preference is present across HCI community [17, 22, 26]. Recent work into font preference and effectiveness has mostly ignored the comparison method to derive a definitive ranking, instead relying on a Likert scale or ranking font or fewer fonts [3, 6, 7, 25, 29].

Starting with the hypothesis that people's font preferences can point to more effective fonts, in this work we design and validate a method to quickly determine a participant's

preferred font using pairwise comparisons. Using our font preference toggle tool, we can derive a user's definitive ranking from among 16 fonts. This method can be deployed in the wild, outside of lab settings, using crowd workers. We compare 16 modern fonts, many of which have never been studied before to evaluate user preferences and font effectiveness [3, 5, 6, 7, 8, 25].

This work offers a first step towards large scale studies in users' naturalistic environments, to reveal the relationship between preference and readability. In this initial investigation, we introduce a preference toggle tool and font preference against effectiveness, with a definitive ranking and a higher number of fonts than previous studies. Our evaluation metrics focus on the individual's experience, pointing towards findings that are personal in nature.

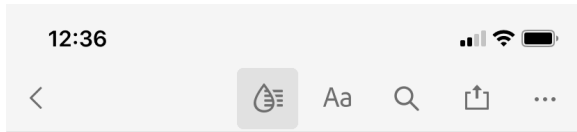
Procedure
Study design: To compare preference and effectiveness per font, we designed a study to alternate between (i) preference tests, where participants performed a toggle task comparing a set of four fonts and (ii) effectiveness tests to determine reading speed and comprehension, where participants read two sets of consecutive passages and answered comprehension questions in a single font (Fig. 1, bottom). Participants also completed a pre-study phase mimicking one main study block, and pre- and post-surveys. Study phases (i) and (ii) alternated per main study block and the wrap-up block (Fig. 1, top). In the wrap-up block, participants chose their most preferred font by comparing the four writing fonts from the main study blocks and then performed an effectiveness test with the same font. Participants saw all sixteen fonts across the preference tests. Due to study time limitations, participants only tested five total fonts for effectiveness. During the effectiveness tests, half of the time, participants read passages

PDF
Times
Arial
Calibri
Garamond
Newspaper
Poynter Gothic Text
Helvetica
Franklin Gothic
Utopia
Readability

in a preferred font from their preference tests), and the other times in another randomly assigned font.
Fonts: To account for fonts people encounter regularly, we selected 4 fonts from each of 4 sources (Fig. 2): (i) the most common fonts used for digital documents¹, (ii) popular fonts for print media [4], (iii) fonts recommended by readability experts [13, 26], and (iv) the most common fonts used on websites². Our default font size of 16pt is based on prior work [4, 12, 16] and is the default setting in modern browsers (e.g., Firefox, Chrome).
Reading passages: For the font preference tests, we used 10 passages (74–76 words) from a history textbook [18]. For the effectiveness tests, we used 10 passages (113–175 words) from a history textbook [18].

this study. The pairing of fonts is randomized before each hour of pairwise comparisons. In our study, participants also make repeat comparisons to address the issue of previous selections (Fig. 1, validation block). The task fundamentally differs from recent work (Likert scale to measure preference [3, 24, 29]).
Participants: We recruited 63 participants: 12 from a university mailing list, 15 from the UserTesting.com platform, and 36 from Amazon's Mechanical Turk. Participants completed the study on the web using a device of their choice in their natural environments. We removed 3 university participants from the study because of unusually low comprehension scores or lack of comfort with English. For the effectiveness tests, participants ranged in age from 18 to 65 (113–175 words). Mean reading speed was 185 words per minute (average = 31). Overall, 51% of participants identified





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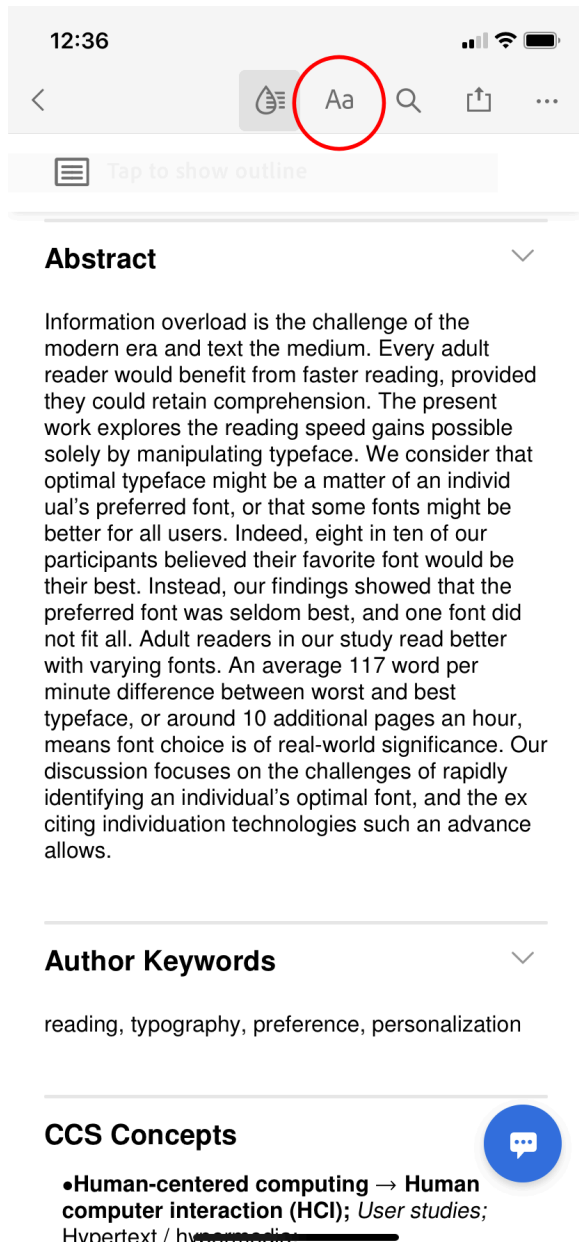
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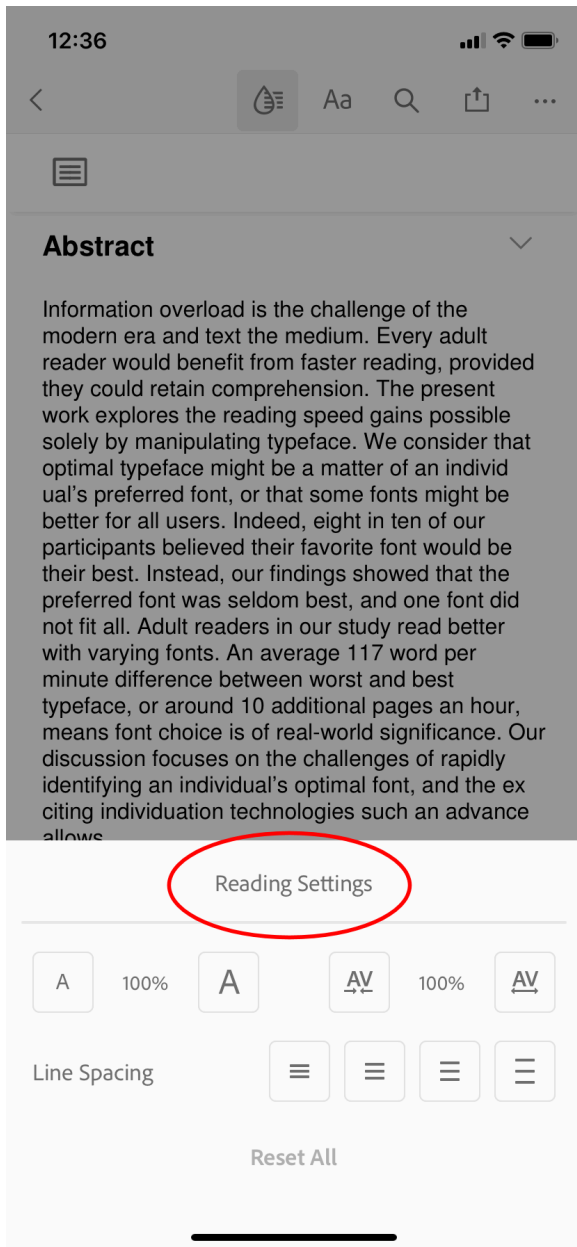


Now the text is much larger and easier to read.



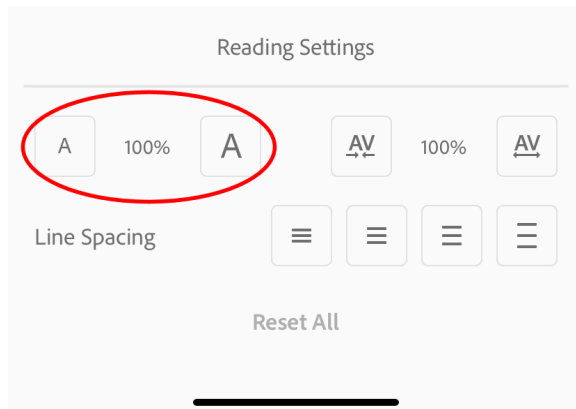
If you keep reading, you see that the title is easier to read, but the text is still small and crowded.

There is a button at the top of the screen that says “Aa.” Tap the button.

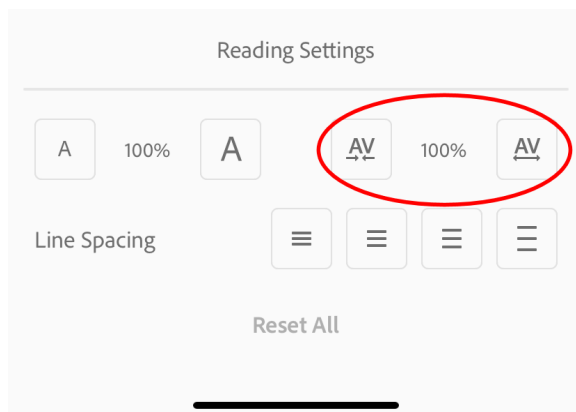


The top part of the screen will get dark, and a new section that says “Reading Settings” appears.

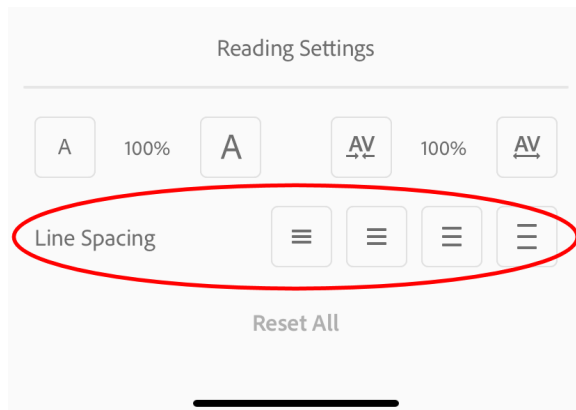
Change the size of the text by tapping the “A” buttons. The small button makes the text smaller. The large button makes the text larger.

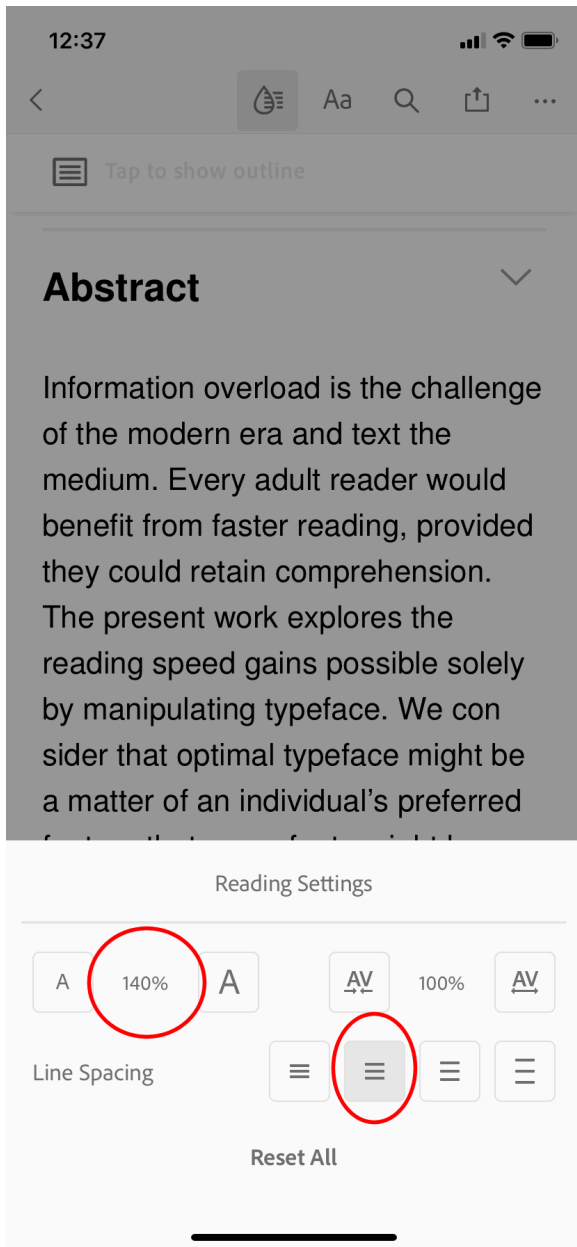


Change the spacing between the letters by tapping the “AV” buttons. The button with the arrows pointing in makes the spaces smaller. The button with the arrows out makes the spaces wider.



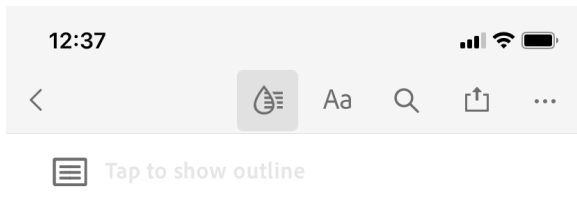
Change the spacing between the lines with these buttons. The first button makes the spacing smaller. The next three buttons make the spacing higher.





These settings make the text larger and there is more space between the lines.

When you like the way the text looks, tap the screen above the reading settings section. The screen will be light again so you can read it.



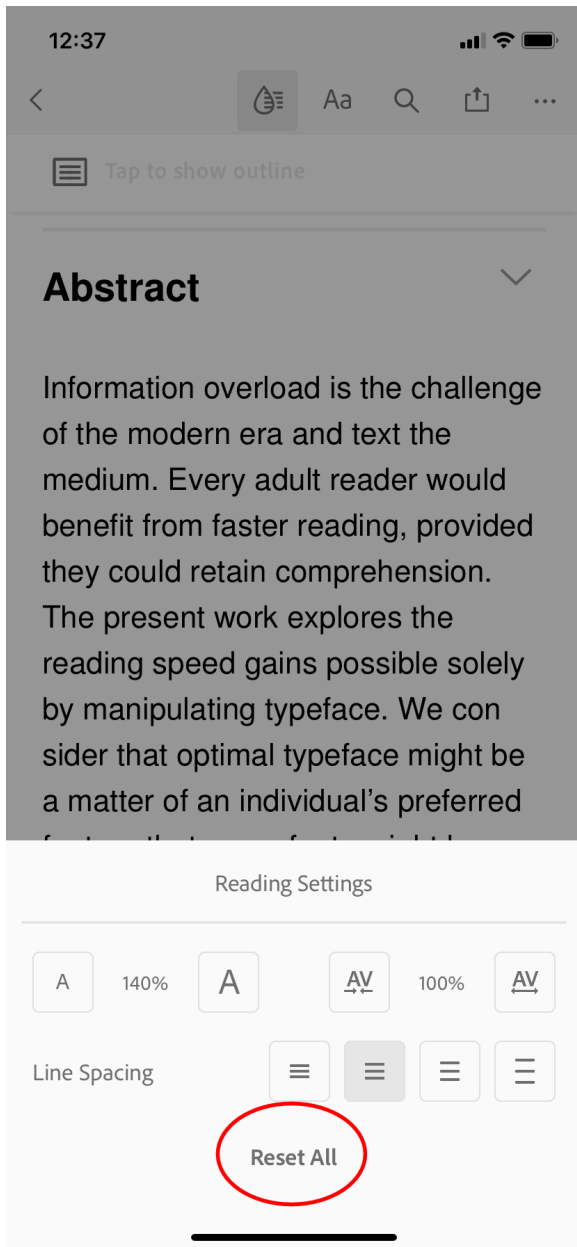
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Instead, our findings showed that the preferred font was seldom best, and one font did not fit all. Adult readers in our study read better with varying fonts. An average 117 word per

Not everyone thinks the same text is easy to read. For some people, this is easier. For other people, it is not. Use the settings to see what works best for you.



There is a button that says “Reset All” at the bottom of the page. Use this button to undo the changes. The text will look like it did at the start.