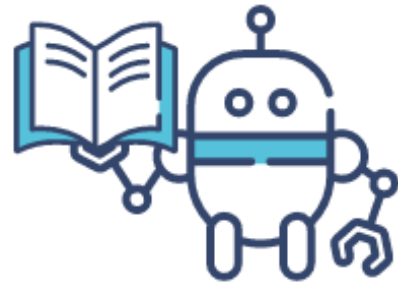
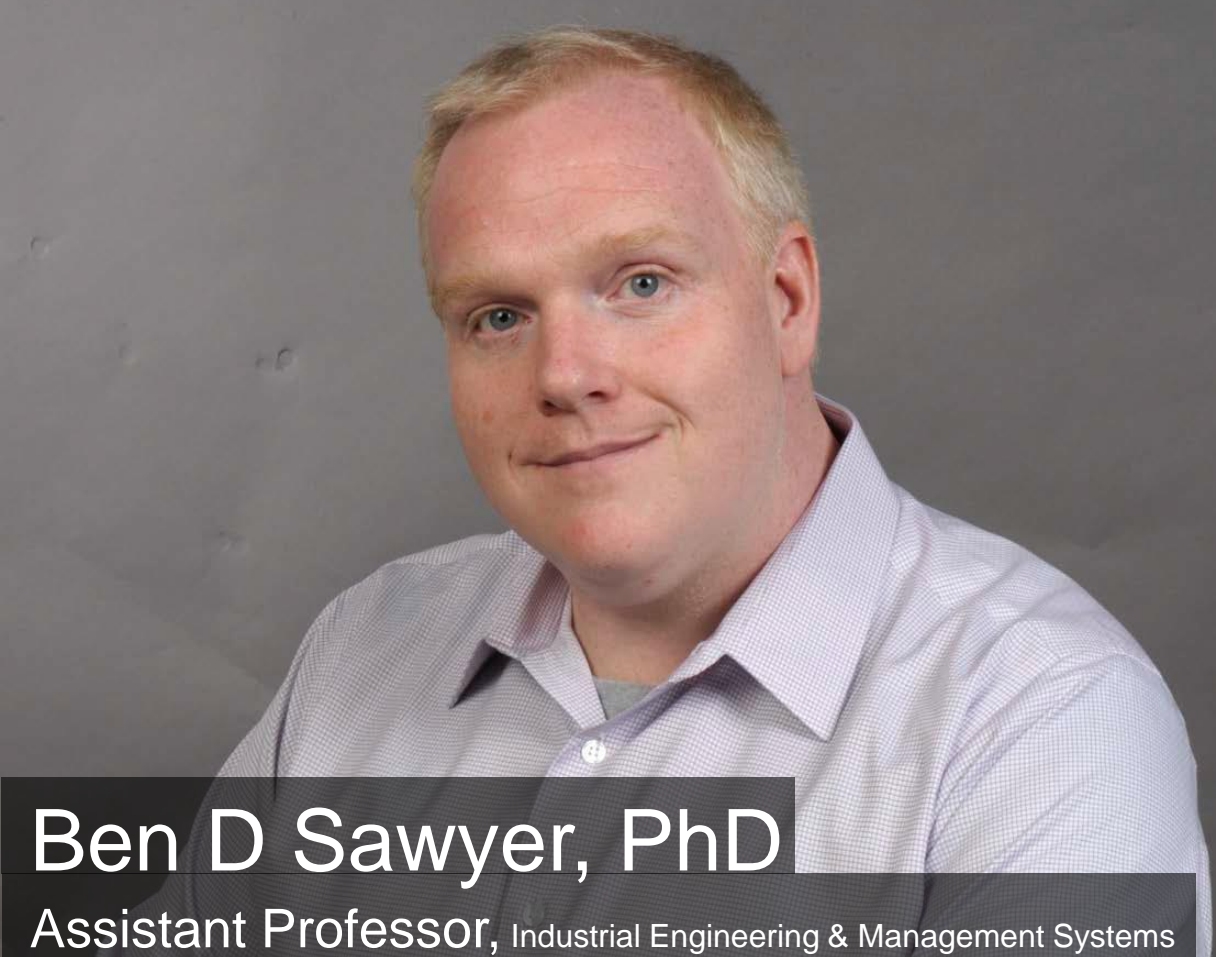


Building a



Virtual Readability Lab



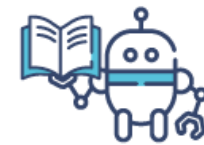


Ben D Sawyer, PhD
Assistant Professor, Industrial Engineering & Management Systems

Teaching: STA-3032, Statistics for Engineers
EIN-6298, Human-Computer Interaction

Funding: NIST, Adobe, Google, Monotype (ARL, KnowBe4)

Experience: MIT Center for Transportation & Logistics
USAF 711th Human Performance Wing, Applied Neuroscience



Virtual Readability Lab

readabilitylab.xyz

How can we leverage digital 'layers' to enhance human perception?

- 'Lab-in-the-wild' connecting individuals to their best format
- Over 5000 individuals have participated to date
- Fast Company Magazine recognized

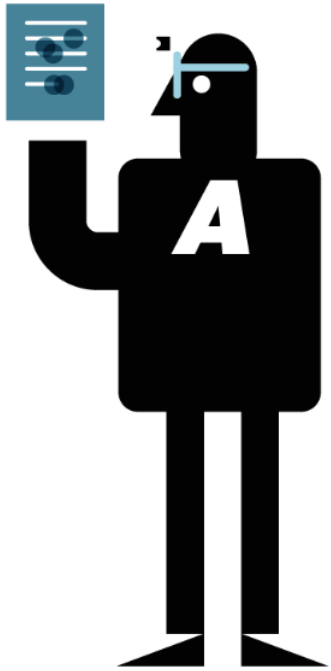


thereadabilityconsortium.org

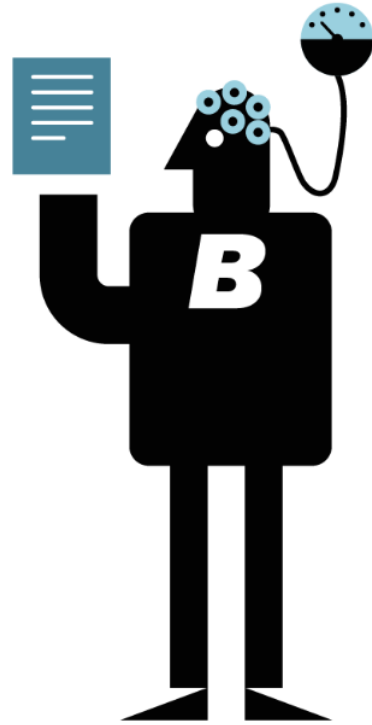
- Working to redefine digital reading interface through enhanced readability
- Members & UCF collaboratively identify & prioritize research objectives
- The first industry-nonprofit,-university dues-based consortium at UCF



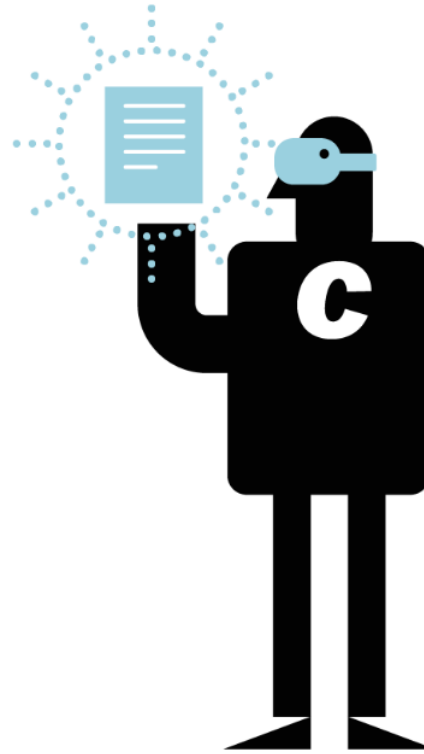
bendsawyer.com



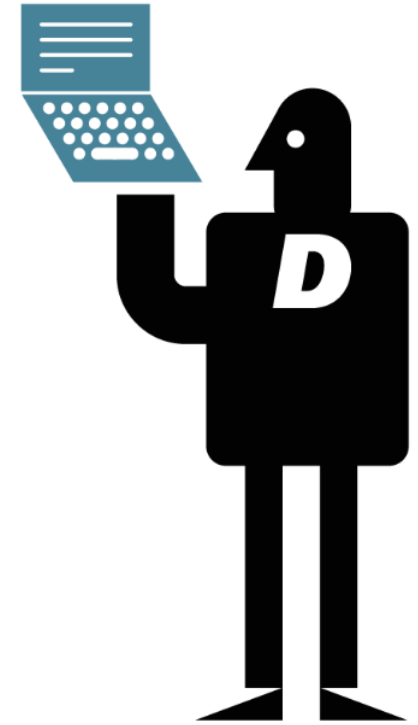
EYE TRACKING



NEUROIMAGING



AR/VR



DIGITAL DEVICES

ARTICLE

OPEN ACCESS [Check for updates](#)

The great typography bake-off: comparing legibility at-a-glance

Ben D. Sawyer^{a,b,c}, Jonathan Dobres^c, Nadine Chahine^d and Bryan Reimer^c

^aDepartment of Industrial Engineering & Management Systems, University of Central Florida, Orlando, FL; ^bInstitute for Simulation and Training, University of Central Florida, Orlando, FL; ^cMassachusetts Institute of Technology, Agelab, Cambridge, MA; ^dMonotype Imaging, Woburn, MA

ABSTRACT

Typography plays an increasingly important role in today's dynamic digital interfaces. Graphic designers and interface engineers have more typographic options than ever before. Sorting through this maze of design choices can be a daunting task. Here we present the results of an experiment comparing differences in glance-based legibility between eight popular sans-serif typefaces. The results show typography to be more than a matter of taste, especially in safety critical contexts such as in-vehicle interfaces. Our work provides both a method and rationale for using glanceable typefaces, as well as actionable information to guide design decisions for optimised usability in the fast-paced mobile world in which information is increasingly consumed in a few short glances.

Practitioner summary: There is presently no accepted scientific method for comparing font legibility under time-pressure, in 'glanceable' interfaces such as automotive displays and smart-phone notifications. A 'bake-off' method is demonstrated with eight popular sans-serif typefaces. The results produce actionable information to guide design decisions when information must be consumed at-a-glance.

Abbreviations: DOT: department of transportation; FAA: Federal Aviation Administration; GHz: gigahertz; Hz: hertz; IEC: International Electrotechnical Commission; ISO: International Organization for Standardization; LCD: liquid crystal display; MIT: Massachusetts Institute of Technology; ms: milliseconds; OS: operating system

ARTICLE HISTORY

Received 26 February 2018
Accepted 17 October 2019

KEYWORDS

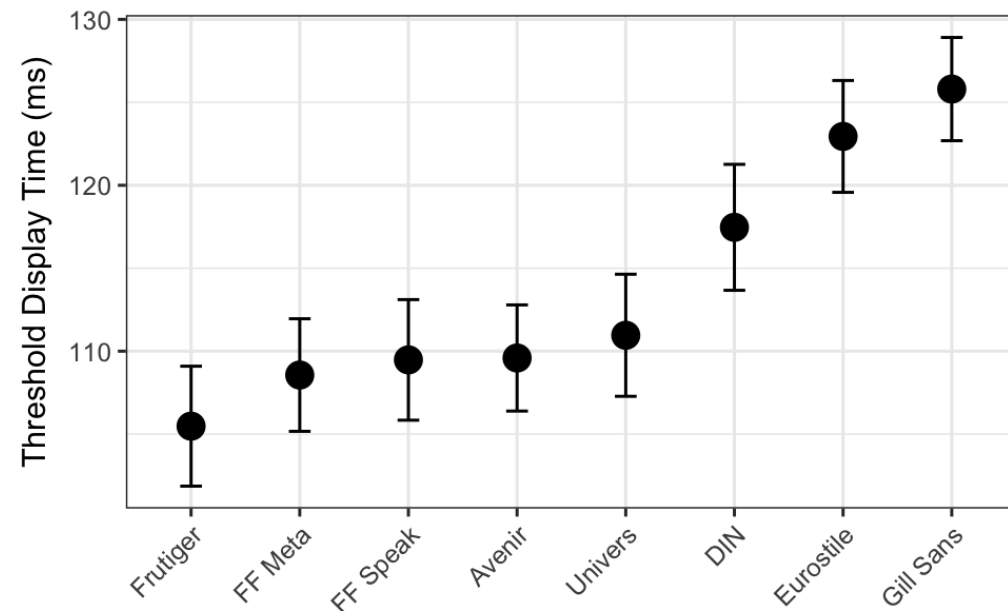
Reading; attention;
usability; font; glanceability

Introduction

It was 12 years ago that Steve Jobs introduced the modern smart phone to the world, and in that brief time mobile computing has become the centre of our attention. Low-resolution screens, once restricted to our desks, now offer high definition imagery and messages in our pockets, on our wrists, in our cars, and even perched on our faces (Sawyer et al. 2014; Beckers et al. 2017). Such ubiquitous screen real estate has changed both user expectations and interaction. Elegant, intuitive interfaces that communicate clearly and quickly have become the gold standard in attracting customer attention and build

tasks involve consequences ranging from the inconvenient to the fatal (see Reimer et al. 2014; Sawyer et al. 2014; Beckers et al. 2017). The human tendency to multi-task makes it imperative that digital information be delivered efficiently; every moment spent focussed away from important situational information makes failure at a task more likely. Typographic choices can have a payout, or a cost, and so digital text plays a crucial role in the war for our limited attention.

Font, colour, contrast, size, layout; these fundamental choices define an extremely complex 'design space', even in a simple interface. Designers face functionally limitless



Monotype®

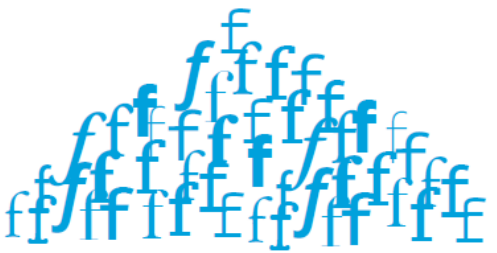
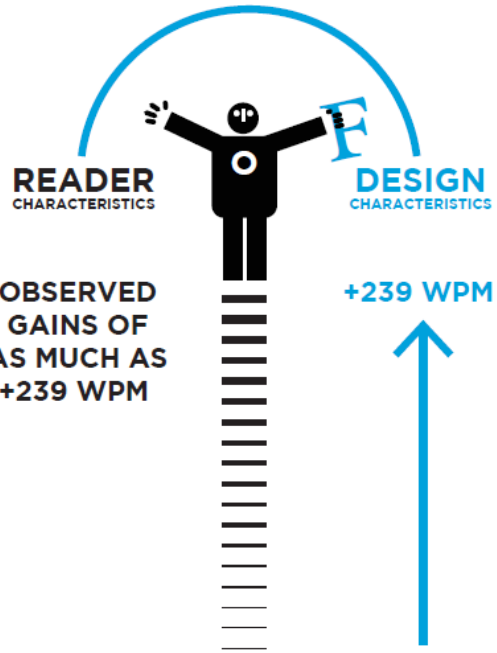


MIT Center for
Transportation & Logistics

just finding the right format

BIG JUMP

speed + comprehension

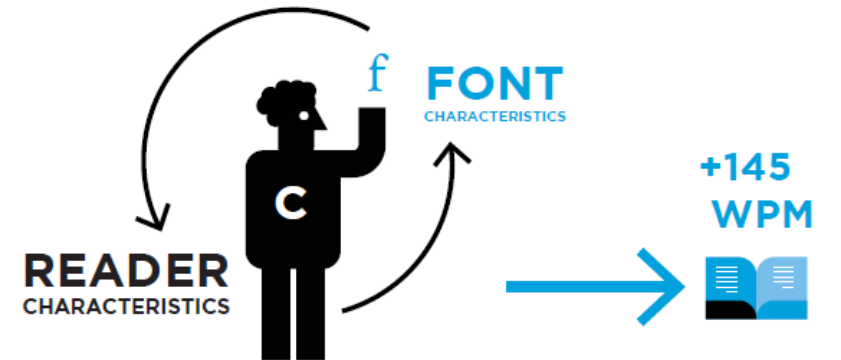
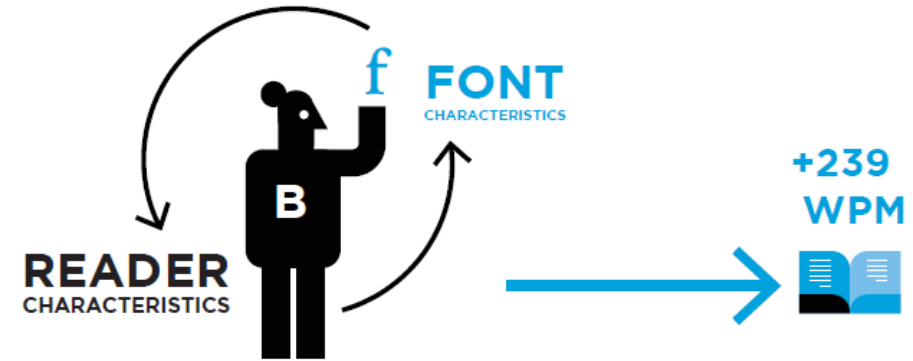
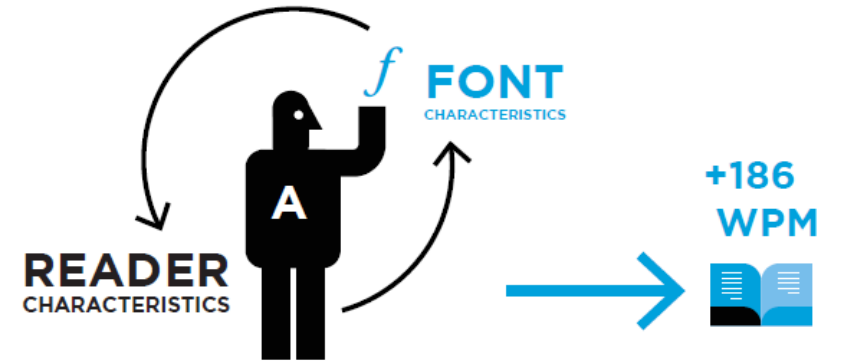


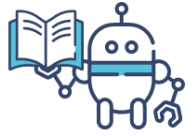
ZERO TRAINING
BUT PERSONALIZATION
REQUIRED

SLOWEST FONT 35 HOURS
FASTEST FONT 18 HOURS

WAR AND PEACE

(Based on an average reader in our top 25%)





Virtual Readability Lab

readabilitylab.xyz

Find what works best for you!



Take our 5 minute tests



Favorite Font

Do you prefer this font or this one? We pit pairs of fonts against each other until we can proclaim one font victorious.

Start Test



Fastest Font

Which font do you read fastest in? We give you a set of short reading passages in different fonts to test the best font for you.

Start Test

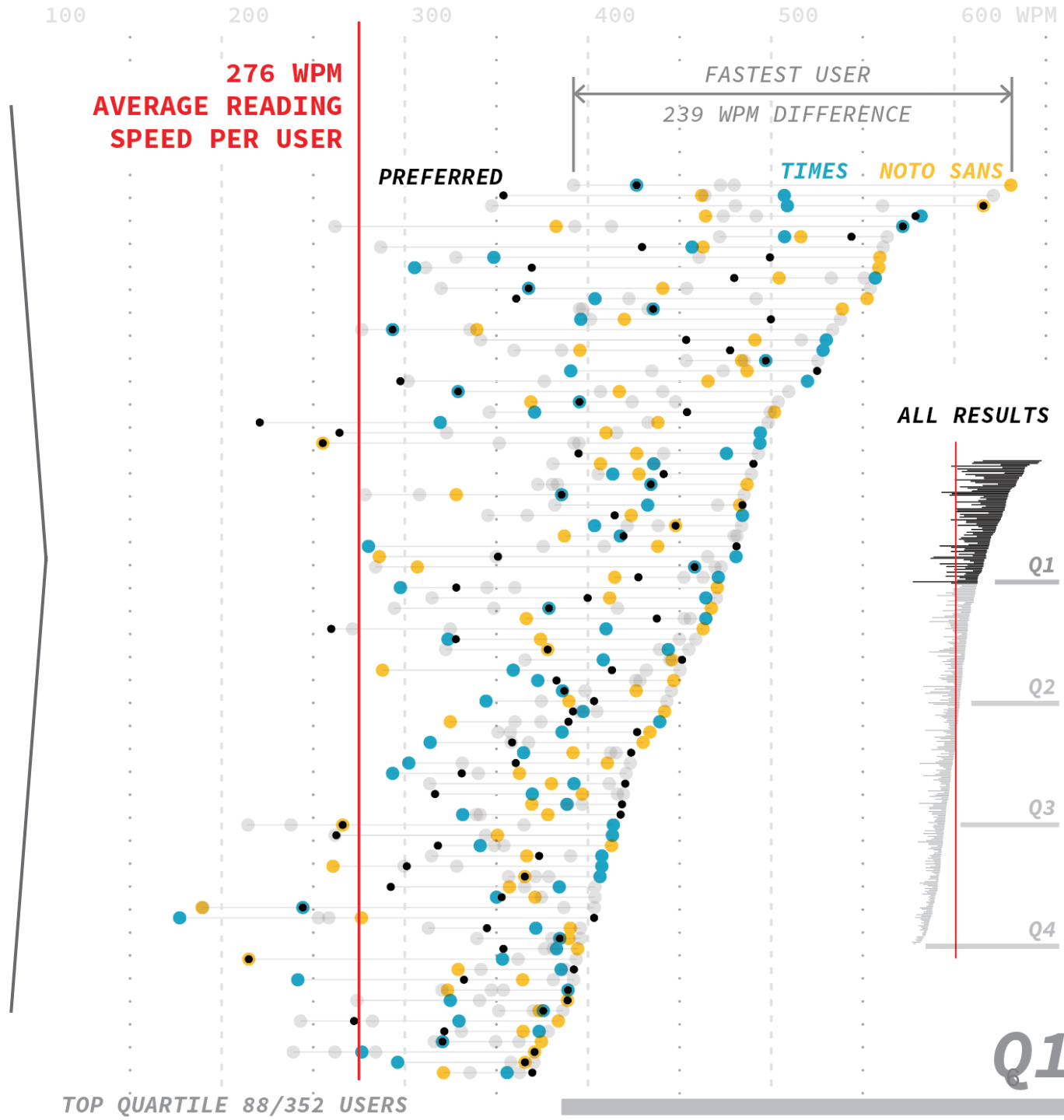


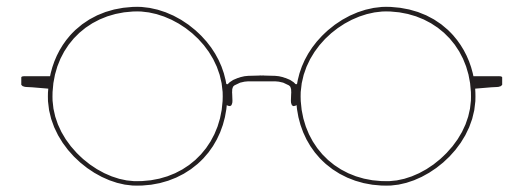
Best Spacing

Does increasing or decreasing the spacing between letters help you read better? Try this study to find out!

Start Test

bendsawyer.com





Diverse format changes



Font family



Font size



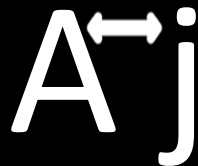
Character spacing



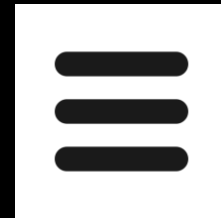
Line spacing



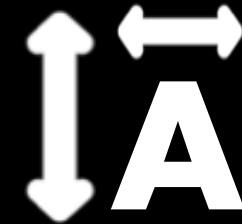
Stroke width



Kerning



Polarity



Variable fonts

Optimizing Electronic Health Records Through Readability

Rachel V. Ball, Dave B. Miller, Shaun Wallace, more...

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First Published July 22, 2021 | Research Article | Check for updates

<https://doi.org/10.1177/2327857921101028>

Article information

Abstract

Medical professionals engage in an enormous and ever-increasing Records (EHRs), which may have adverse impacts on patient care. may help to accelerate reading these records, without training, and comprehension in this critical task. Using History of Present Illness investigated how personalized fonts impacted medical text reading workers without medical training read a set of eighth-grade level pa their fastest and slowest fonts, which were then used to display a se comprehension questions. Results showed that PRFs accelerated r while maintaining comprehension. This finding suggests that individ specifically font optimization, may be a straightforward way to optim future in which PRFs may help physicians in reading medical inform investigating PRF impacts on medical professionals' EHR reading.

ERGONOMICS

<https://doi.org/10.1080/00140139.2020.1758348>

Check for updates

Glanceable, legible typography over complex backgrounds

Ben D. Sawyer^{a,b}, Benjamin Wolfe^{c,b}, Jonathan Dobres^b, Nadine Chahine^d, Bruce Mehler^b and Bryan Reimer^b

^aIndustrial Engineering and Management Systems, University of Central Florida, Orlando, FL, USA; ^bAgeLab, Massachusetts Institute of Technology, Cambridge, MA, USA; ^cComputer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA, USA; ^dArabicType, London, UK

ABSTRACT

Modern digital interfaces display typeface in ways new to the 500-year old art of typography, driving a shift in reading from primarily long-form to increasingly short-form. In safety-critical settings, such as at-a-glance reading competes with the need to understand the environment. To keep both type and the environment legible, a variety of 'middle layer' approaches are employed. But what is the best approach to presenting type over complex backgrounds so as to preserve legibility? This work tests and ranks middle layers in three studies. In the first study, Gaussian blur and semi-transparent 'scrim' middle layer techniques best maximise legibility. In the second, an optimal combination of the two is identified. In the third, letter-localised middle layers are tested, with results favouring drop-shadows. These results, discussed in mixed reality (MR) including overlays, virtual reality (VR), and augmented reality (AR), considers a future in which glanceable reading amidst complex backgrounds is common.

Practitioner summary: Typography over complex backgrounds, meant to be read and understood at a glance, was once niche but today is a growing design challenge for graphical user interface HCI. We provide a technique, evidence-based strategies, and illuminating results for maximising legibility of glanceable typography over complex backgrounds.

Abbreviations: AR: augmented reality; VR: virtual reality; HUD: head-up display; OLED: organic light-emitting diode; UX: user experience; MS: millisecond; CM: centimeter

ARTICLE HISTORY

Received 6 June 2019
Accepted 22 February 2020

KEYWORDS

Perception; vision and lighting; environmental ergonomics; information displays; human-machine systems; mixed reality virtual environments human-computer interaction

ABSTRACT

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

Twitter LinkedIn Facebook Email

Authors: Shaun Wallace, Rick Treisman, Jeff Huang, Ben D. Sawyer, Zoya Bylinski

Authors Info & Affiliations

CHI EA '20: Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems • April 2020
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Published: 25 April 2020

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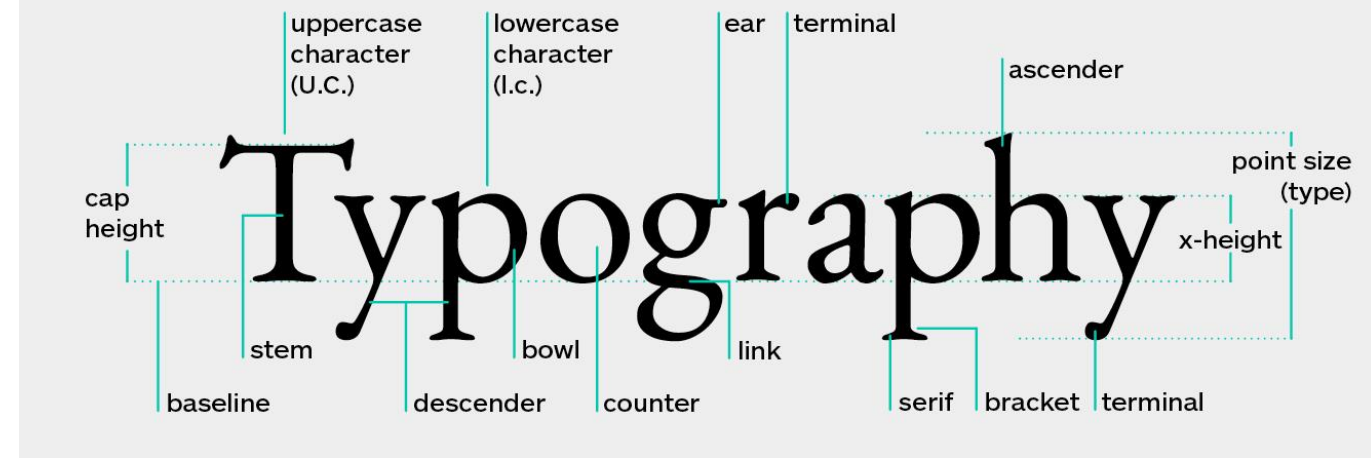
ABSTRACT

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 fonts. 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 exciting individuation technologies such an advance allows.

CHI EA'20



Machine Learning Approaches to Rapid Information Individuation on Digital Devices



Information Individuation in Extreme Environments



Information Design in Environment Visualization for Multi-Domain Operations





Academic Excellence Proposal: Bringing Digital Readability to All at UCF

We propose integration of our UCF-developed, award winning, industry-backed readability technology into UCF's digital learning infrastructure.

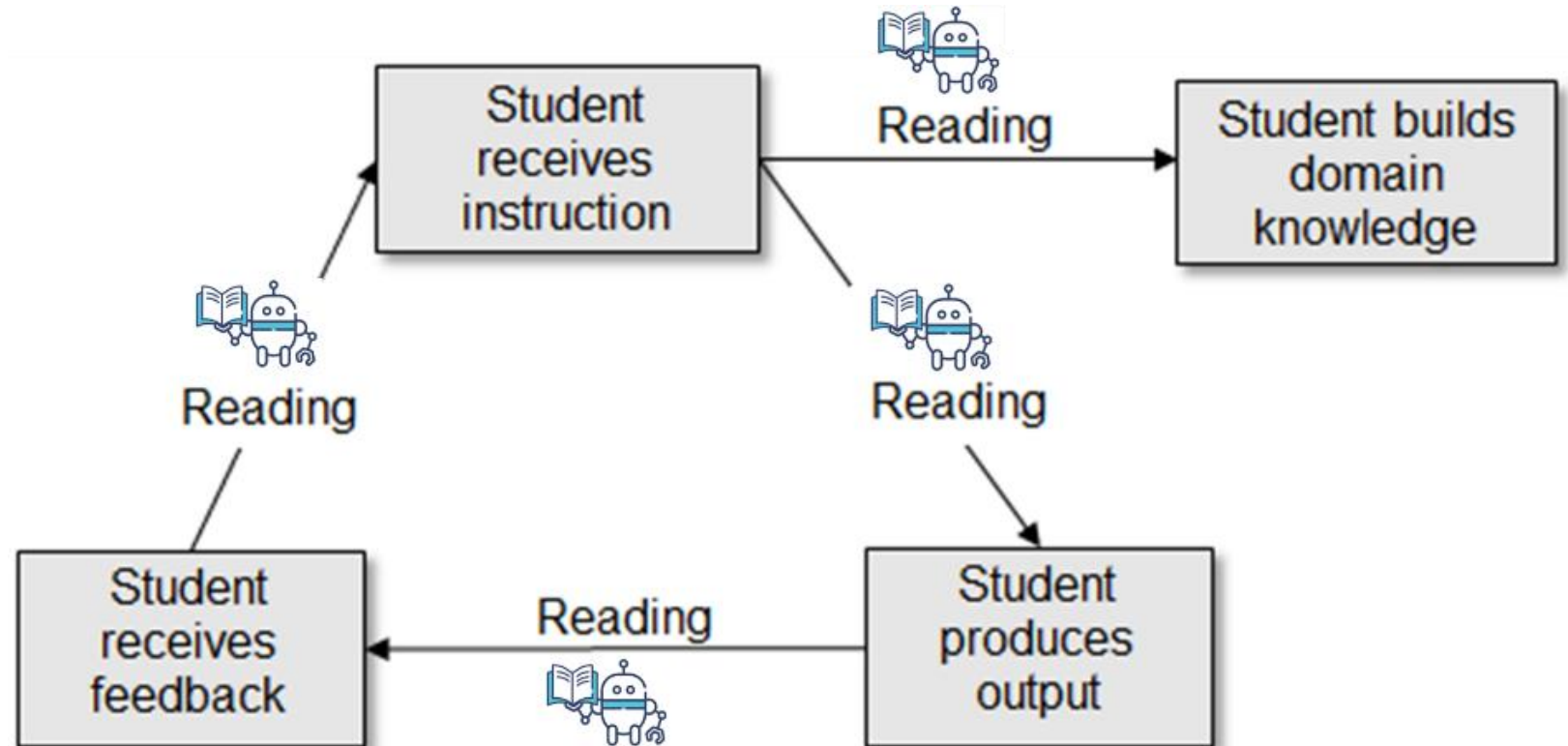


Internal Proposal: Improving Student-teacher Interacton in Composition at UArizona

All undergraduate composition classes will include readability technology, enhancing University of Arizona digital infrastructure and improving student-instructor feedback cycles.

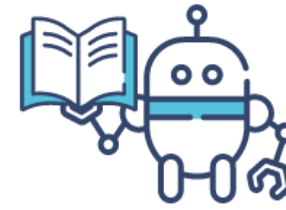
Virtual Readability Lab technology

- is open-source
- will be trialed at multiple institutions
- instantly enhances individual reading speed and comprehension
- has implications for students and instructors
- may enhance student retention, progression, graduation, and career success
- provides opportunities for big data toward 'metrics for success'





**THE
READABILITY
CONSORTIUM**



Virtual Readability Lab

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Who would be a good candidate to join The Readability Consortium?

try it at readabilitylab.xyz

Partner with the Laboratory



Join us!

■ Seeking collaborators in:

- instructional design
- machine learning (computer vision, time series, GAN, beyond)
- augmented reality & associated display technologies
- human-machine systems with digital displays
- domain expertise in likely domains
 - Medical, Battlefield, Security, beyond?

Contact: *Dr. Ben D. Sawyer*
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