Knowledge of all fonts

In the vehicle safety world, high-tech appears to rule supreme. A recent MIT study, though, has proved how optimising typeface characteristics could be a simple and effective method of providing a significant reduction in interface demand and associated distractions.

We have a strange relationship with typography. Every day we see thousands of words composed of millions of letters. These letterforms surround us, inform us, and entice us. Yet in our increasingly literate and information-saturated society, we take them for granted, and rarely spare a thought as to how they got there, or why they look the way they do. Few people ever bother to appreciate the myriad of differences in shape, thickness and style that define the difference between typefaces such as the austere Helvetica, fastidious Times New Roman or clownish Comic Sans. More to the point, few people realise that the design of typefaces – and the way in which their strokes and terminations play off each other from letter to letter and word to word – can have a significant impact on our ability to read and absorb what they are trying to communicate.

Typographic design

The design of a typeface is a subtle art, within which all of the letters must dance to the same tune, unified by a consistent stylistic rhythm that allows them to link together when scanned by the reader. At the same time, the letterforms must not become too constrained or monotonous, lest the reader’s eye confuse a ‘g’ for a ‘9’. This tension between legibility, consistency and variation is at the heart of all typographic design. Consider Frutiger – a typeface crafted in the ‘humanist’ tradition, and Eurostile, a ‘square grotesque’ typeface (p42). Both of these are sans serif, meaning they lack the added spikes, flourishes and ‘feet’ found in the typeface you are reading now. As a result, at first glance they might appear to be quite similar, but a closer examination reveals substantial differences between the two typefaces. Where Frutiger is open, leaving ample space between letters and the lines of individual letterforms, Eurostile is tighter and more closed. Eurostile also enforces a highly consistent squarish-off style, while Frutiger allows for more variety in letter proportions (note Eurostile’s nearly identical zero and ‘O’).

Typographers have long addressed these issues as they pertain to long-form, static texts such as books, magazines and newspapers. But times are changing, and we increasingly read not in long stretches from printed
Typography

As information-rich and connected technologies have invaded the driving space, the public has become increasingly concerned about how these potential sources of distraction affect safety. Surprisingly, we now have laws prohibiting the use of cell phones while driving – a measure that is perceived as comparable to mandatory seatbelt laws (correct or not).

Although much attention has been given to banning what is perceived to be bad for driving, not enough attention is being paid to maximizing the ease of use of what is already there. A ‘top down’ approach to employ laws and policies to mandate safe driving behaviour. On the other hand, a ‘bottom up’ approach considers how a host of vehicle technology details – everything from whether an infotainment centre has physical buttons or a touch interface, to the colour and size of those buttons – can reduce demand on the driver and improve the user experience.

“We keep talking about the traffic issues in the design of distraction – should this be allowed, should that be allowed?” said Bryan Reimer, one of the study’s lead researchers in a recent interview. “What we tend to overlook in this discussion are the simple building blocks that form good HMI development in the vehicle.”

“If we can reduce a 15% or greater improvement based on a single screen feature, 30% by adjusting white space, 1% from contrast enhancement and glare reduction, and a few percent more from something else, these ‘little’ refinements can add up to significant enhancements in safety,” added co-investigator Bruce Mehler.

One of the biggest advances in clearview is its large, legible typeface that was designed to be readable under driving conditions. Oncoming cars cause the letterforms to glow and blur, as well as the humanist Frutiger typeface on the right. This design has maintained legibility when light from oncoming lights spike and diminishes the visual effects of ever-shifting screens that present the driver’s in-car reading material, comprised the beginning and end of glance times measured. Two studies were conducted that differed only in the relative brightness of the display, and they produced highly consistent results. Across the studies, it was found that visual demand – as measured by the total glance time to the screen – was 10.6% lower among men when Frutiger was used as compared to Eurostile, or a difference of about 470ms. Men also showed a reduction of total glance time and number of glances when reading Frutiger, and both men and women showed a 3% reduction in task errors. In short, Frutiger resulted in more accurate use of the information system, and particularly for men, faster task completion time, lower visual demand and more time spent looking at the road.

In-vehicle recognition

Several automobile manufacturers have come to favor more humanistic typefaces such as Eurostile for onscreen displays, presumably for their modern, somewhat ‘retro’ appearance. As sans serif typefaces, both Eurostile and the humanist design, Frutiger, lack the tiny spikes and flourishes that would be difficult to render on a relatively coarse vehicle display (as opposed to the much finer resolution of traditional print). Either typeface would thereby seem to be an adequate choice for the interface, and Eurostile – with its Bambolino-like aesthetics – has a certain psychological appeal. Results from MIT’s Agelab, however, show that the deeper design characteristics of each typeface correspond with effects on glance legibility, and that the humanist-style Frutiger typeface is a better, more legible choice for a quick glance environment. A 70ms reduction in glance time could easily mean the difference between avoiding a traffic accident and having one.

The gender differences observed were surprising. Women showed a 4% to no effect of typeface on task completion measures, and generally performed slightly better than men overall. Whether this is due to intrinsic perceptual differences between men and women (colourblindness, for example, is common in men but quite rare in women) or a greater incidence of cultural effects (women may be more cautious drivers and thus are less likely to take their eyes off the roadway for extended periods of time) remains to be seen, and presents an interesting avenue for future research.

Human factors

As more advanced technologies become integrated into most vehicles – bringing with them even more information-dense and dynamically changing display content – these nuanced human interaction and design issues will become a more important part of our safety considerations. As research in these areas is just starting to receive attention, there are therefore tremendous opportunities to increase the safety of the driving experience, even in something as easily overlooked as a typeface.


Further reading

The research discussed in this article is detailed in a white paper released by the MIT Agelab. An Evaluation of Typeface Design in a Test-Rich Automotive User Interface (http://agelab.mit.edu/files/AgeLab_typeface_white_paper_2012.pdf). Monotype Imaging has also released a video detailing much of the research, and includes interviews with the researchers behind the project (https://www.youtube.com/watch?v=AM7PCQ_NZqyg3IN). This is also available with Japanese subtitles (https://www.youtube.com/watch?v=AM7PCQ_NZqyg3IN)