An Examination of Typographic Standards and Their Relevance to Contemporary User-Centred Web and Application Design

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Abstract. The implementation of the various modes of typography on the Internet and device applications is now a relatively straightforward task, following a technological renaissance that began around 5 years ago that increased the importance of typography in web and application-based design.

Graphic designers had long desired to move beyond the early restrictions caused by the limited numbers of fonts that browsers could handle and display (and the even more restricted overlap between Windows and OSX operating systems). This desire fuelled an innovation boom that led to the wide array of font replacement and deployment technologies available today.

The new challenge for graphic designers is device fragmentation: keeping designs consistently readable across a variety of screen resolutions, screen types and devices. Yet, pure research on how users perceive, interact with and process the fundamental units of information transmission – words – remains limited. Extant studies are mostly confined to early (and outdated) papers in the 1980s and 1990s, investigations on the efficacy of e-ink, or other tenuously-related areas of human-computer interaction.

The presentation and comprehension of words and information is therefore restricted to niche areas of study for academic researchers and vehicles of aesthetic expression for graphic designers, with almost no communication between either group. This has led to a comprehensive lack of industry-standard best practices for typography, which is surprising considering the current focus of human factor-related disciplines in user-centered design.

This paper aims to collate and examine the history of typography, existing research, readability on electronic devices and current typographic trends, and lay down a roadmap for future research.

Keywords: Typography, HCI, Reading comprehension, Readability, Usability, Web design, Application design.

1 Introduction

With the establishment of the Internet as a ubiquitous communication and information delivery system utilised by users across private, public, academic, business, and government networks [1], rigid and well-considered standards have emerged across a

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broad range of technologies employed by Internet systems, processes, software and devices.

An example of such a technology is XML (Extensible Markup Language). XML was designed as a platform-agnostic solution to create a single portable, hierarchical data format comprehensible by both machines and humans. The properties of XML are defined in the XML 1.0 specification produced by the W3C which standardizes parameters like valid characters, encoding detection, escaping, comments, international use, well-formedness and error-handling [2].

Such detailed standards are entirely absent for the use of typography on the Internet, device interfaces and applications. The features of current tools used to create human-readable content on the internet (e.g. Adobe Illustrator, Adobe Photoshop, CSS3 and others) have only recently reached something approaching parity with each other. Furthermore, those systems themselves have only recently begun to offer the kind of basic functionality that dedicated typesetting tools have provided for many years [3].

With the mass-fragmentation of not only devices types, but also widely-varying device use scenarios well under way, practical research-derived typographical standards and best practices for fundamental use cases is long overdue.

2 Background

2.1 The History of Type

In the early days of personal computing, typography was a primitive, unconsidered and utilitarian aspect of information consumption. These limitations were partly due to hardware constraints (e.g. small, monochrome VDUs with low resolutions) and partly due to the fact that implementing type lay within the domain of software engineers that had little to no experience presenting information in readable ways.

The importance of type began to accelerate with increases in desktop computer power, screen sizes, resolution and graphics processing, all of which coincided with the mass-migration of graphic print designers who switched their careers over to website design in the early 2000s. Whilst this enhanced the presence of typography as an art form, there were still very few pure typography specialists or guidelines of use.

Today, industry still lacks specialist typesetters for all but very niche requirements. That there is no longer a seat for someone whose specialty is setting type—page makeup now typically being the province of the graphic designer and pasteup artist—only complicates the problem. [3] Ellen Lupton, curator of contemporary design at Cooper-Hewitt, National Design Museum in New York City notes: “Despite heroic efforts to create a critical discourse for design, our field remains ruled, largely, by convention and intuition.” [4]

This is evident throughout industry – graphic designers often rely on received wisdom, folk lore, design trends or purely aesthetics when utilising typography in their work. Oft-repeated mantras like ‘…serif font for headers, sans-serif font for body’ [8] originated at a time when low-resolution monitors predominated and serif fonts appeared blocky and difficult to read at these resolutions (Fig. 1).

The advent of high ppi (pixels per inch) displays on both mobile and desktop screens has long rendered this kind of rule redundant, yet these stylistic atavisms persist in the absence of any other up-to-date guidelines.

2.2 Technical Advances

Implementing the vast number of fonts and typefaces available in the mid-2000s for use on websites was a technical challenge. When graphic designers needed to use fonts that the browser could not display (e.g. for header text using the company's typeface), they would typically rely on the use of raster images, which created a number of collateral SEO and usability issues.

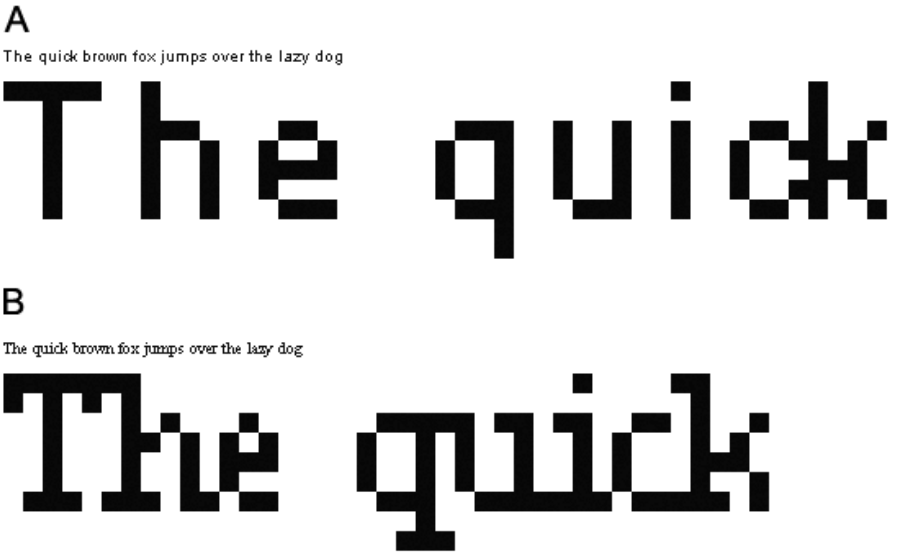

Fig. 1. An illustration of the differences in legibility between the sans-serif font *Arial* (A) and the browser default serif font *Times New Roman* (B) at 10pt resolution (with enlargement)

To circumvent these issues, designer/developers began to create font replacement and deployment technologies (such as sIFR), though many of the methods required extensive programmatic 'hacks' in order to display correctly in different browsers. The groundswell of frustration with these methods, and the lack of typography support in general, pushed the W3C to evolve the CSS web standard specifications to be on a par with desktop publishing programs.

2.3 Present Day

While still not fully implemented today, CSS3 now features much greater text support [5, 6]. Properties such as the @font-face rule allow direct embedding of almost any font [7], and fundamental text controls like overflows, word-wrapping and even

Photoshop-like effects such as drop shadow are now supported by most current browser versions [8].

Recently, the design and technology industries have redirected their efforts away from the graphically rich, difficult-to-scale and distracting interfaces that characterized digital design in the 2000s, and moved significantly in the direction of cleaner, unobstructed designs that place the user's access to clearly-presented content unambiguously at the center of importance.

3 Product Design

3.1 Complications

The expansion of browser capabilities and the proliferation of typefaces is clearly a major step forward for designers, allowing much greater freedom for creative expression in a much more usable way. However, a corollary also exists here: there are still no research-derived typography-specific standards in existence that will enable the consistent delivery of content which is easy for the user to read and process as efficiently as possible.

Creating such standards is further complicated by device fragmentation. The mosaic of different device types now available (contributed significantly to, but not exclusively by, the customizable open-source Android mobile operating system) has arguably exacerbated the problem by orders of magnitude (Fig. 2) [10, 11]. A custom typeface that is quite readable on a large desktop PC may be much more difficult to read on a small smartphone.

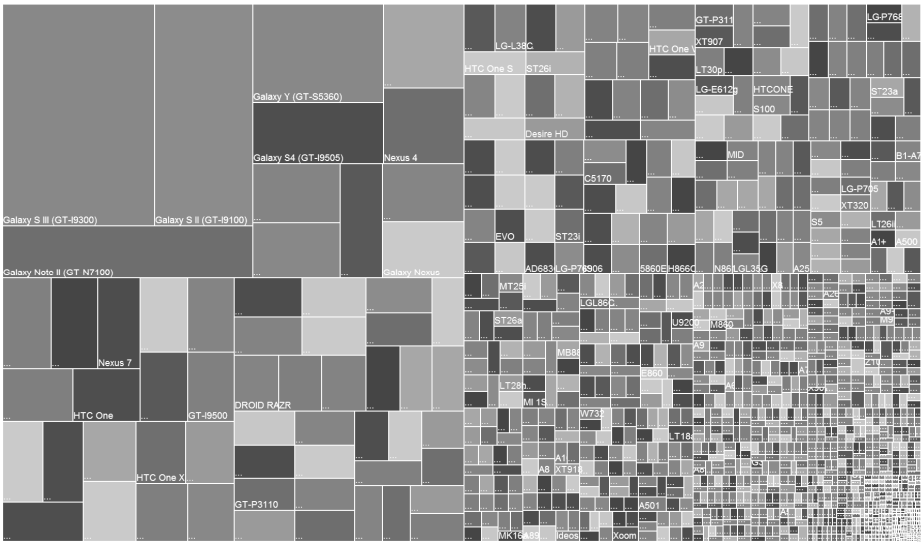

Fig. 2. Visualisation showing the number of Android devices that downloaded Open Signal's Wi-Fi/cellular network app

The new paradigm of responsive design is making some headway towards alleviating these kinds of issues of scale and readability. As discussed earlier with font replacement technologies, responsive design is a solution still in its infancy, and has yet to overcome many of the challenges of nascent technology (i.e. inconsistent application; low penetration; high technical overheads, etc.)

3.2 Processes

During the product design processes (Fig. 3) (A), the design phase normally starts from high considerations at the beginning of the project (the devices used), through the screen types on those devices, to the design of the app or website itself, down to the content and finally the typography, and perhaps (not in all cases) a consideration of the environment.

From the user's perspective (B), the considerations are almost reversed. Information is usually consumed on a device that is already owned by the user, or one that they are very familiar with (such as a workstation), so this is a very low concern. Most of their time is actually spent navigating the product or consuming the information within it, so the presentation of that content is of a very high concern.

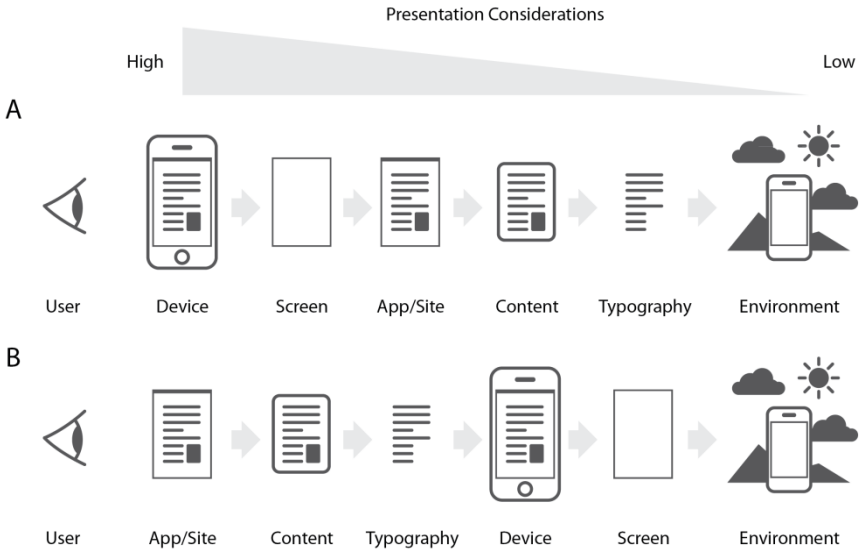

Fig. 3. Generalized illustration of the relative consideration given to information design. A: From the product design perspective; B: From the user perspective.

Product designers are considering the user in a much greater way than ever before, as evidenced by the growing fields of user research, information architects and interaction designers, though much more emphasis is needed on the mechanisms of information consumption in the product design pipeline.

4 Current Trends

With very little in the way of comprehensive research to use as a benchmark, a qualitative look at the current typographical trends can be employed to try and gain some understanding of how typography is being used, and what research (if any) has led in that direction.

Large companies have dedicated research and development teams, so in order to try and make some inference on their design methods, the products of four big technology companies (Microsoft, Apple, Google and Sony) were examined.

Microsoft, Apple, Sony and – to a lesser extent – Google (Android) share strong similarities in their treatment of typography. A cursory glance at their products reveals a general congruence of typographical form (fig.3).

Microsoft spent a huge amount of time and resources dedicated to their new design language (formerly known as 'Metro', now known as 'Windows 8 user interface' [12]) which has formed the design basis of most of their new products.

The focus for this new design language is 'content before chrome' [13]. That is to say, the information the user is interested in takes precedence, superseding the former over-reliance on rich graphical elements that tended to distract the user's attention away from the content [14]. Windows 8 UI was announced as follows:

"Metro is our design language. We call it metro because it's modern and clean. It's fast and in motion. It's about content and typography. And it's entirely authentic." [15]

Windows 8 UI leans heavily on the use of typography as wayfinders and navigation elements. The flagship font (designed in-house) is called 'Segoe UI' and comes in 5 weights:

- Segoe UI Light (200)
- Segoe UI Semilight (300)
- Segoe UI Regular (400)
- Segoe UI Semibold (600)
- Segoe UI Bold (700)

The 'Semilight' and 'Light' weights are used for most text [16], and this gives a very distinctive, slender yet modern feel to Microsoft's products and is highly readable.

Apple's iOS7 human interface guidelines follow a similar path to Microsoft; not only in their design philosophy, but also by focusing much more on typography and the clarity of text at all scales [17]. Apple's employment of the slender 'Helvetica Neue Thin' font across many areas of iOS 7, bears some strong similarities to Microsoft's Windows 8 UI typography strategy.

Sony also uses a slender font for many of its UI features on the Playstation 4, whilst Google's Android uses a slightly heavier bespoke font called Roboto and only calls into use the thin weight in rare cases.

Without knowing the details of these companies' internal research results, it is impossible to assert whether this apparent congruence of form is due to the research teams converging on the same design solutions, or whether the design teams are simply 'aping' each other's work under a design zeitgeist.

If the former is true, it provides a tantalizing hint that research can reveal fundamental typographic design rules that will allow the creation of consistently readable content structures.

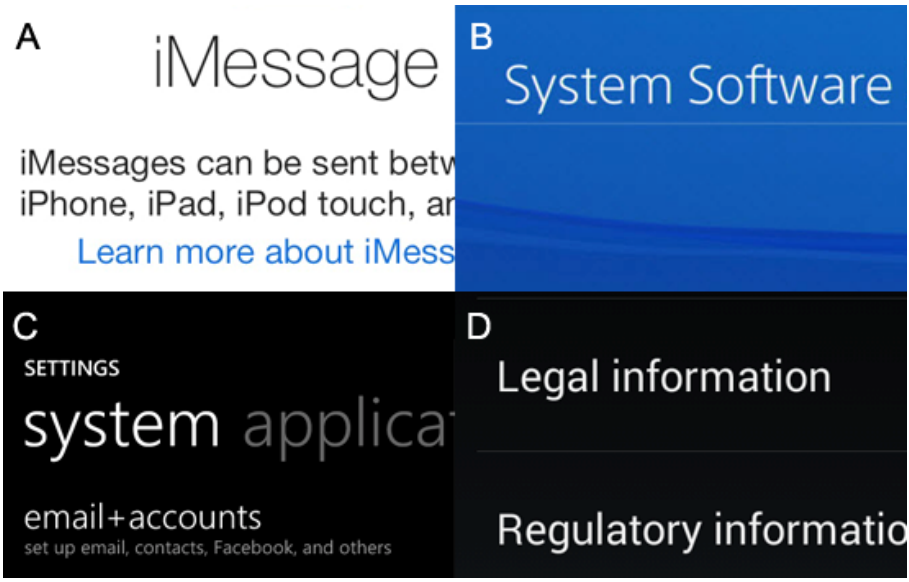

Fig. 4. Screenshots illustrating typography used in the operating systems of four different companies. A: Apple iOS7 (iMessage screen); B: Sony Playstation 4 (software update screen); C: Microsoft Windows Phone 8 (settings screen); D: Google Android (settings screen).

5 Suggested Approach

In order to create a research project based around the relative legibility of fonts, the interplay of user, device, content (typography) and environment needs to be considered.

An in-depth analysis of user perception and information processing lay outside the scope of this paper. However, a list of the basic elements affecting a user's ability to consume comprehend information are presented (fig. 4).

These elements can be further broken down into some of the more important variables that can affect the speed at which information is perceived and processed (fig. 5).

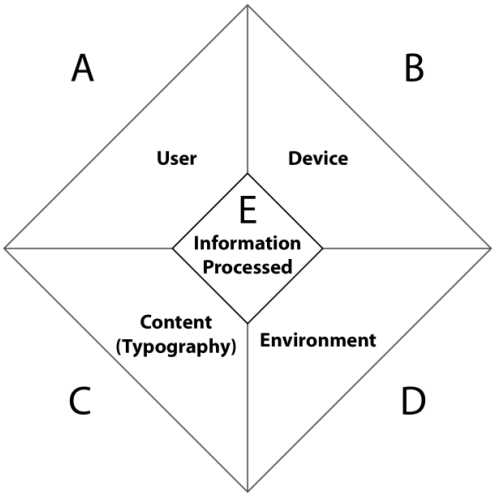

Fig. 5. Factors affecting user experience with regards to consumption of information. A: The user. B: The device. C: Content (typography). D: Environment. All factors culminate with E: the information processed.

Table 1. A breakdown of some of the primary factors affecting user consumption of information. The key variables asserted are highlighted.

	A: User	B: Device	C: Content (typography)	D: Environment
Variables	**Literacy**	**Screen size**	**Size**	**Ambient light**
	Distance to screen	**Screen brightness**	**Color**	**Ambient sound**
	Fatigue level	Screen type	**Typeface**	**Location**
	Visual acuity	Screen resolution	**Weight**	Temperature
	Task	Form factor	**Words per line**	
			Casing	
			Leading	
			Tracking	
			Kerning	
			Margin	
			Padding	
			Context	

As can be seen, there are handful of variables used when presenting typographical content. The parameters of these variables are mostly discrete, i.e. they are set using integers (except perhaps for color), which is useful when performing analysis.

Selecting which of the hundreds of thousands of available typefaces to use for testing (incorporating all of the different varieties, such as slab serif, sans serif, italicised, etc.) poses a huge challenge. Samples of typefaces should be carefully selected from each variety; all comprising a representative spread fonts that users may commonly encounter on the Internet and through device use.

6 Conclusion

From this cursory investigation into typography past and present, it should be clear that the way users interact with, and process words on, different devices in different use scenarios does not currently receive the attention given to other areas of research.

Significant amounts of research time is devoted to eye tracking/gaze interaction studies, and conclusions drawn from them are primarily based on information architecture, navigation structures, advertising efficacy, reading, searching, item location, design, etc.

The limited number of existing typography studies show that is a complicated, multi-faceted field of design with a large number of variables that are sensitive to other conditions.

Recent enhancements in technologies like CSS3 represent a significant maturation of the design and development industries, and have opened up fertile ground for a rigorous analysis-based development of typography and content consumption.

Future studies should strongly focus on real-world device use scenarios, and aim to provide a basic typographical toolkit with which to arm the graphic designer when creating content for human consumption.

References

1. Wikipedia article on the Internet, http://en.wikipedia.org/wiki/Internet
2. Wikipedia article on XML, https://en.wikipedia.org/wiki/XML
3. Felici, J.: The Complete Manual of Typography, 2nd edn., Peachpit, California, pp. 17–18 (2012)
4. Lupton, E.: http://elupton.com/2009/10/science-of-typography/#more-113
5. W3C CSS3 introduction, http://www.w3schools.com/css/css3_text_effects.asp
6. W3C CSS3 Text working draft, http://www.w3.org/TR/css3-text/
7. W3C CSS3 @font-face, http://www.w3schools.com/css/css3_fonts.asp
8. Mills, C.: Practical CSS3: Develop and Design, Peachpit, California, p. 87 (2013) ISBN-10: 0-321-82372-9, ISBN-13: 978-0-321-82372-4
9. Peck, W.: Great Web Typography, ch. 1, p. 7. Wiley Publishing Inc. (2003)
10. Open Signal Android Fragmentation Report (2013), http://opensignal.com/reports/fragmentation-2013/
11. Android OS, http://www.android.com/meet-android/
12. Windows Dev Center, http://msdn.microsoft.com/en-us/windows/apps/hh779072

13. Microsoft UK Developers,
http://www.microsoft.com/en-gb/developers/articles/content-before-chrome-and-on-demand-ui
14. Modern Design at Microsoft,
http://www.microsoft.com/en-us/news/stories/design/
15. Microsoft Research – Microsoft's new design language,
http://research.microsoft.com/apps/video/default.aspx?id=170075
16. Windows Dev Center,
http://msdn.microsoft.com/en-us/library/windows/apps/hh700394.aspx
17. Apple's iOS7 Human Interface Guidelines,
https://developer.apple.com/library/ios/documentation/userexperience/conceptual/mobilehig/