

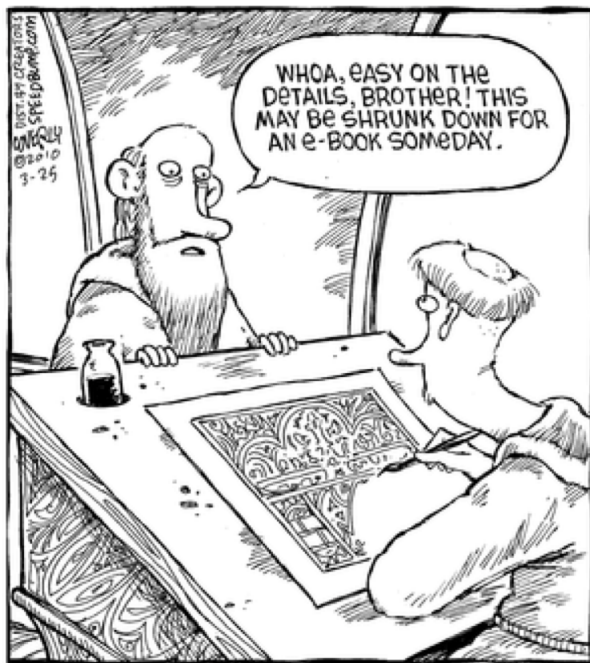
Type design: Catching up to the past

Steven Matteson

Editor’s note: This is a lightly edited transcript of the talk given at the TUG 2022 conference. Some of the illustrations are omitted here; for the full set, and the video of the talk, see tug.org/tug2022.

Abstract

The typographer’s goal is to provide the best possible reading experience for the reader. Thirty years of disruptive technologies have made this a greater challenge despite the overwhelming number of type designs available to us. Steve Matteson will give several historical and contemporary examples where fonts have been adapted or designed to meet constantly changing technological demands.



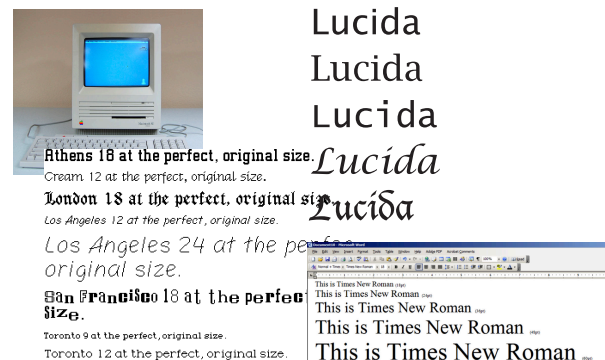
Thanks for the invitation back to speak this year. “Today’s type designer ought to design typefaces for specific needs.” This quote is from Chuck Bigelow, who I met in 1987 when he received the Goudy Award at RIT. It was an epiphany for me as a student. I’d already fallen hopelessly in love with letters — typefaces, typography, lettering. I’d been steeped in letterforms but where did I fit in?

TWO THOUSAND YEARS OF LETTER DESIGN
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 Two Thousand Years of Letter Design
 Two Thousand Years of Letter Design
 Two Thousand Years of Letter Design

After all, as a student, you study 2,000 years of letterforms and think ‘it’s all been done’. There’s no way I can do better or improve on the achievements of the masters.

Typeface designs have evolved on a parallel course with changes in the way in which technology reproduces them. With each change in technology we, as type designers, have to think about what were the best examples of design using previous technologies. With this understanding we can improve designs for the future.

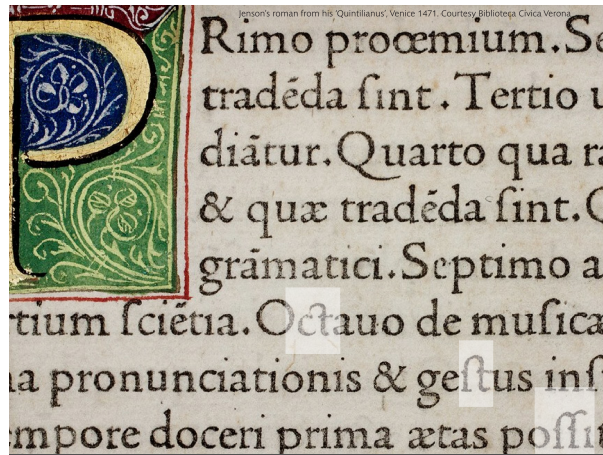
While some of these designs were certainly influenced by fashion, political movements and basic function rather than form, many also saw some underlying change in technology which had an impact on the success of the new approach to design.



When I started working with the latest desktop publishing tools at school and at work, I could see that not all fonts could hold up to the limitations of resolution and imaging technologies. New typefaces could be designed like bitmap fonts — which were used for individual size — or scalable fonts like Lucida, a family of different styles which worked well together even for bad laser printer output.

I quickly found that old typefaces were being adapted for new technologies like TrueType. When it came time for me to work on Microsoft’s first TrueType fonts, it was already the third time in my short career that I’d be making this font family for a different technology.

I’m going to look at a few specific aspects of type design that are relevant today and challenge us type designers to come up with old solutions to new problems. Ligatures: connected letterforms which either correct for shapes that would otherwise collide or simply make a more elegant combination. Kerning: the space between pairs of letters (different from tracking since kerning historically refers to the removing of material between letters to fit them closer together). Imaging: how the letters reproduce under various conditions, be it letterpress on dampened paper or shown through an RGB filter on a piece of glass and held in your hand.



All of these topics are shown here on a page of printing that launched a hundred typeface interpretations. This is Jenson’s typeface of about 1470. Modeled on an advanced form of the calligraphic ‘humanist bookhand’. This is my first reference to having to look to the past for guidance. For our ligature example you see the ligated or ‘connected’ ct, long-s t, and ss ligatures.

Kerning (or rather the lack thereof) can be spotted between Te. The process of hand setting text is already quite tedious; having to kern every gap in 12pt type would be beyond the pale.

While the Qu below the Te appears to be kerned, they were likely cast as a single piece of type to allow the tail to tuck under the u. Given how common this combination is in Latin, it was not an unusual practice.

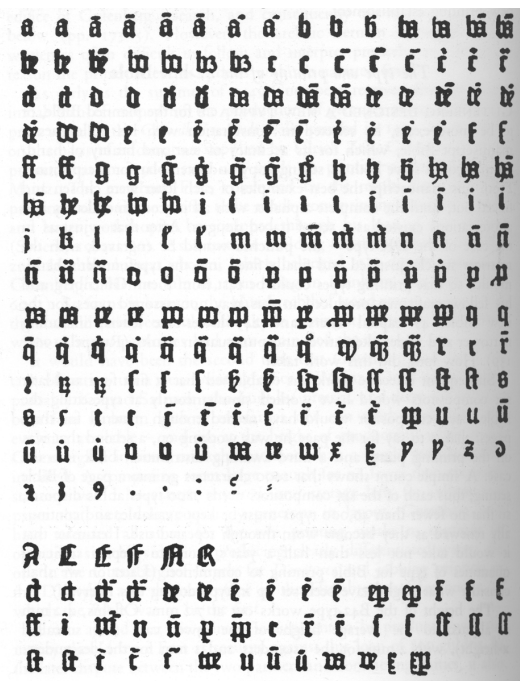
Finally, looking at the image quality achieved on this 550 year-old page, one can see the letterforms hold up remarkably well in consistency and color.

The variables of hand inking, uneven paper surface and the commonality of damaged pieces of type (the ae in quae on the line below Quarto; the e in Septimo on the next line; the g two lines further), viewing this at actual size demonstrates a remarkable achievement in letter design, typesetting, printing and rubricating.



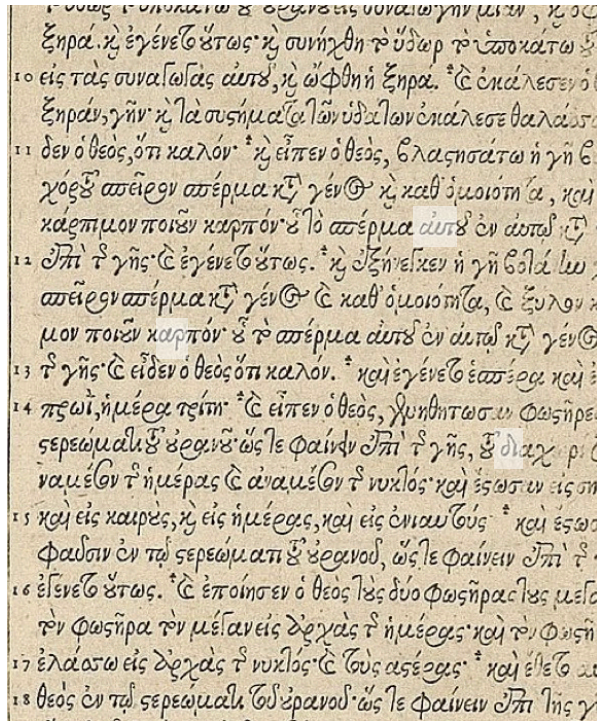
Ligatures. One of the first things that strikes a careful observer of the Gutenberg bible is the beautifully aligned justified columns of text.

Gutenberg went to great lengths to make paper smooth enough to print on, ink black enough to look like the ink used by scribes, and typeset so carefully and in such a way that rubricators could hand color initial letters in red after the black ink was dry. On top of this he cast hundreds of additional special sorts — letter combinations connected in pairs or triples — varying in width and shape just enough to aid in justifying lines of text.



Johann Gutenberg: The Man and His Invention by Albert Kapr (Aldershot [England]: Scolar Press, 1996),

Gutenberg’s font of type had about 290 sorts, so if a line came out too long or short he had options to adjust the width of the line. Many remark that his columns line up as well as the scribes could do by hand.



Jump forward 100 years and we see another example of ligatures mimicking handwriting — in this case the Greek script. Christophe Plantin’s polyglot bible (ca. 1560) shows here, when viewed in detail, ligatures of common combinations of two and three letterforms, and alternative letter designs.

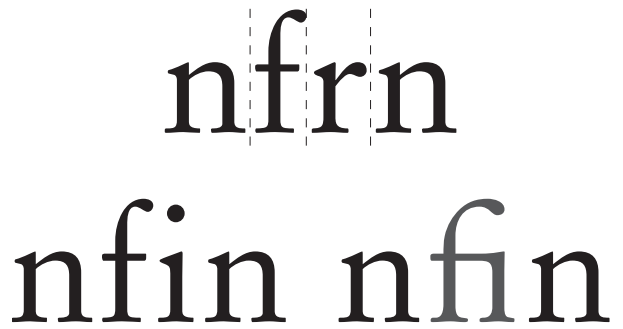


For the Latin alphabet — post Gutenberg — we have a more basic set of ligatures to help with the characters which are problematic — like the Qu combination in the Jenson example but more notably

in the f and long s (which I’ll leave out of this talk because it’s an odd duck we no longer use).

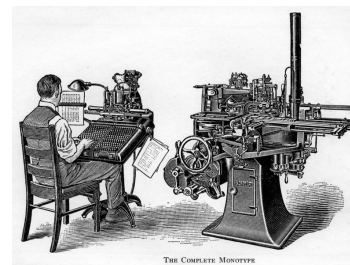
In this slide you can see how a type founder could cast the type so that it would overhang onto the shoulder of the following letter. This allowed for elegant f shapes, but would cause awkward situations like the dot of the ‘eye’ or the ascenders of h, l etc.

The solution was to create a new sort with a specially designed pair of letters.



Linotype machine, 1884

When the Linotype machine was invented the graceful overhang of f had to be tempered for the sake of mechanization. Ligatures could be added in manually, as shown in this slide, but were often just left out.



Monotype machine, 1897

The release of the Monotype keyboard and caster 13 years later reintroduced ligatures to the mechanized work flow. An operator could keyboard ligatures directly in the flow of text. For this and other reasons the Monotype machine was preferred for fine book publishing. Again looking to the past to restore lost aesthetics.

Gabriola

fi ffij ffk ffk | gg tt | σγ θη σφ α π̄ας

Zapfino

Th ff ft tt th gg pp ph

OpenType, 1996

Two contemporary examples bring us back to Plantin’s and Gutenberg’s attempts at mimicking handwriting through the use of ligatures (among many other design tricks). John Hudson’s tour de force, Gabriola has over 4500 characters to include Latin, Greek and Cyrillic. But it is unique in its extensive collection of ligatures. I think there are 100 f-ligatures alone. The beautifully comprehensive Greek is similar to Plantin’s with as many as three characters joined as though they were written by hand.

Hermann Zapf’s Zapfino has less than half the characters of Gabriola, and only supports Latin characters. Naturally a connected typeface such as this requires a huge number of special combinations to help fool the reader into thinking that a document was written specifically for him or her. Who better to concoct such a scheme than a master calligrapher such as the late professor.



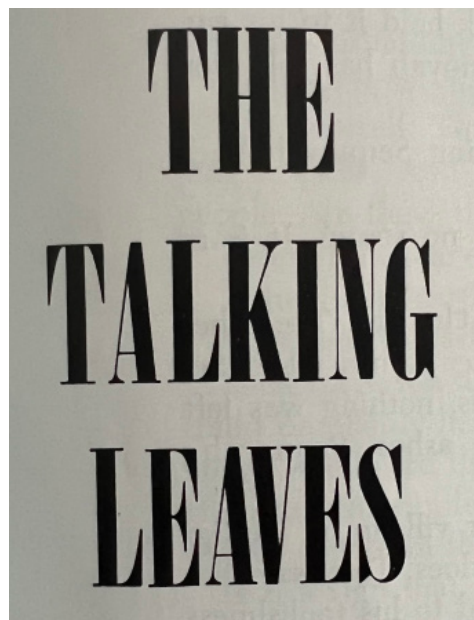
Left: 180pt kerned; right: 16pt unknerned

Kerning. As I alluded to with the Jenson example, Kerning was once a physical and time consuming process. To cut the wood or lead shoulder away from two letters so they fit together neatly required a steady hand and a good saw and file. I experienced this firsthand in our once-great letterpress lab at RIT when, just as our professor walked in, there was a loud ‘ping’ sound as a piece of type ricocheted out of a power saw. A lab assistant was then admonished for attempting to miter a small piece of metal type and had lost his grip but luckily not any fingers.



Courtesy of StarshapedPress.com

This lovely example from Starshaped press, used in an article ‘Let’s hear it for the kern’, shows the amount of material that would have to be removed to fit the AV in this font. It also shows that, while the second line is kerned, it’s not much better, given the resulting uneven spacing. The I and L would also need to be spaced apart with spacing material to reflect the openness of the AVA combination.



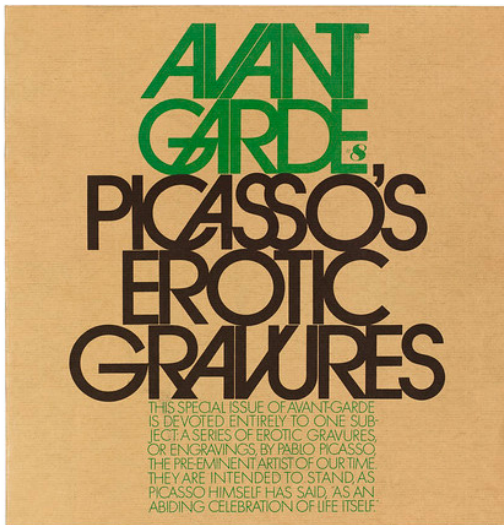
The Talking Le av es

Kerning, as often as not, could make things worse in display typography where not every piece of type is notched. Here the unkered word Talking looks better than the kerned result below: Leaves becomes three fake words: le av es.

In the late '70s and early '80s
 “Tight but not touching”
 was the art director’s mantra
 for headline typography.

(Some touching may have taken place anyway.)

Things quickly changed with phototypesetting, where it was comparatively very easy to kern. Just reverse or advance the filmstrip, expose a character and move on. No risk of losing a finger. “Tight not touching” was one descriptor of this style of typography. Others called it sexy spacing. Whatever you called it, this style dominated the scene for easily two decades. I call it kerning and not tracking because the people that were really good at this were not just entering a negative spacing value for whole lines of text - they carefully adjusted each letter combination in each word for the greatest effect.



design by Herb Lubalin

The master of this style was Herb Lubalin. As a lettering artist he knew exactly what he was doing when it came to interlocking and fitting letters. In the case of his Avant Garde typeface he nudged letters so close together he needed a huge set of ligatures of overlapping shapes to get the effect he wanted. Sexy spacing indeed.



By the time desktop publishing was taking off the sexy spacing schtick was overdone, even farcical. Got a long headline? Just keep hitting the minus button. Never mind using a condensed typeface or just a smaller size.

GOOGLE: 4,430,000 HITS

What is kerning?
 How to kern like a designer
 Kerning 2020 update
 Kerning text simply
 Art of kerning
 New rules for kerning
 Mathematical route to kerning
 10 simple steps to kerning
 13 tips to avoid bad kerning
 30 kerning fails
 Kerning: It's not always a good thing

Out of curiosity I googled kerning and found 4.4 million hits. Mostly it seems by people who never actually designed a typeface in their lives. All these rules and steps written by people with, perhaps, no practical experience at all. Thank you internet. My favorite—and probably the best piece of advice—kerning is not always a good thing. A title for a communication arts article that I haven't actually read but the title gives me some hope.

AVA no kern

VAV over-kern

AVAILABLE just right

MATTESON → MATTESON

As far as my own thoughts and approaches for kerning: I go in with the understanding that it is not a cure-all. You can kern to improve the basic rhythm

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in a typeface but it is impossible to solve the balance of every imaginable scenario — even my own name. In fact I vividly remember my first kerning assignment in school where I was given a 72 pt drawer of type and told to typeset my name in all caps. The instructor said to me ‘ooh you’re going to have fun with this’, referring to the big white gap caused by the TT combination.

AVA ÅVÅ ÁVÁ ÄVÄ ÂVÂ
 Avin Åvin Ávin Ävin Âvin
 “A” “Å” “Á” “Ä” “Â”
 Ta Tå Tá Tâ Tâ Tã Tã Tã Tã Tã Tã Tã Tã . .

Today’s big advantage with kerning is the fact that we can consistently space every re-occurrence of a letter shape. Accented letters and punctuation can all be adjusted to fit together the same way a scribe would combine them by hand.

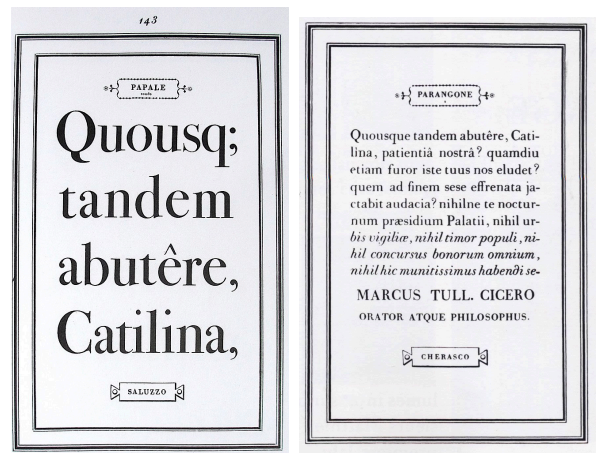


Aldus Manutius’ Virgil and Horace, printed in 1501

Finally I’ll discuss imaging of type and how it’s affected type design. We’ve already had a good look at Jenson and Gutenberg so let’s jump ahead a bit to 1501. When one speaks of beautiful books and beautiful typography, it’s pretty easy to get swept away with Aldus Manutius’ Virgil and Horace. These are the first use of italic types in print. They were cut by Francesco Griffo and based on pre-Carolingian calligraphic hands like the work of Giovanni Tagliente.

Italics were very popular during the Italian Renaissance both for their fashionable look and the fact that their narrow letter width allowed more lines to fit per page.

Printed on smooth vellum, the meticulous details of this gorgeous type hold up beautifully. Thin strokes are not too thin, the rhythm instilled by the italic slant is very regular and even in color.



In 1788 Giambattista Bodoni printed his specimen of typefaces — about 140 individually cut sizes of types. The *Manuale Tipografico*, as it’s called, clearly shows the contemporary fashion of upright stress and extremely fine hairlines. But it also illustrates an important reality that people in today’s digital type world forget. Each size is a slightly different design, cut by hand for maximum style, legibility and proportion.

Display

Text Size With infinite complacency men went to and fro over this globe about their little affairs, serene in their assurance of their empire over matter. It is possible that the infusoria under the microscope do the same. No one gave a thought to the older worlds of space as sources of human danger, or thought of them only to dismiss the idea of life upon them as impossible or improbable. It is curious to recall some of the mental habits of those departed days. At most terrestrial men fancied there might be other men upon mars, perhaps inferior to themselves and ready to welcome a missionary enterprise. Yet across the gulf of space, minds that are to our minds as ours are

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Scalable type expectations

To illustrate: what we expect today is for the same typeface to work at every size we select. 4 or 400 point — same letter, just a different size. If this were really meant to be, Bodoni’s largest and most contrasting size for display would be difficult to read in text. On the left you can see the condensed forms and somewhat wobbly rhythm compared to a true text cut on the right.

6pt **Bodoni**

12pt **Bodoni**

72pt **Bodoni**

1994 ITC Bodoni

Conversely, if we set the text size as big as the display, we see how heavy the hairlines are in order for them to hold up at small sizes. ITC Bodoni claims to be entirely accurate to the type punches that Bodoni cut for 6, 12 and 72pt. I remain a bit dubious about this though I haven't had the pleasure of going to Parma Italy to see for myself.

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Display

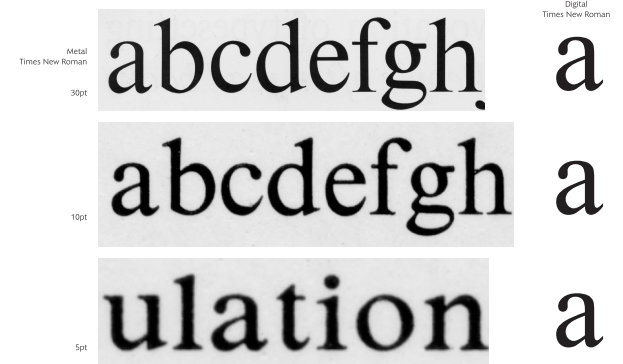
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2019 Walbaum

Another quick example of using a display face for text. Walbaum's extreme hairlines are beautiful and elegant in the intended size, but blow out in text. This may remind some of things like the Vogue magazine logo, whose hairlines are so thin they'd never print well for anything smaller than a logo.



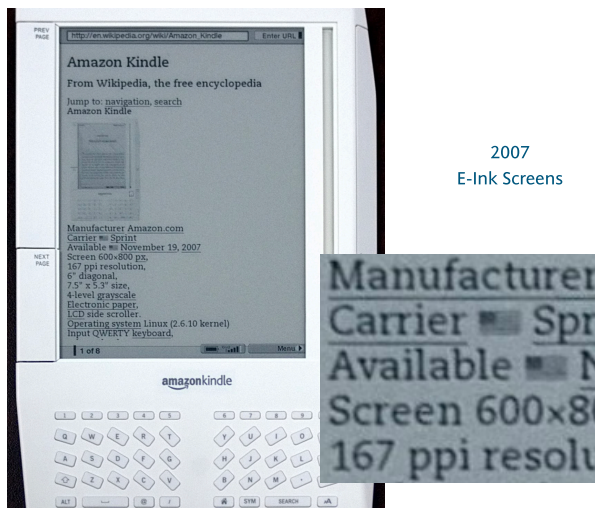
Times New Roman, made by Monotype for casting metal newspaper type, had over 30 different master sizes created. Each unique in slightly different ways. When you look at the catalog you might be struck by how legible Times is at 5pt and how elegant it is at 72. This cannot be matched in digital unless different designs are created for this wide range of uses. The digital version of Times was based on the 14pt metal size drawings.



The idea being that 14 was text-like enough for extended reading but delicate enough for large sizes. You could call it Times New 'Average'. It works reliably in text but struggles for the extreme small use. It looks ok in display but loses a great deal of its finesse.



The Monotype archive has every drawing of every size of typeface. I found this lovely unique illustration of size overlays. This g from a typeface called Spectrum by Jan van Krimpen shows the nuanced changes from 6, 8, 12pt sizes. You can see slight adjustments to weight and the amount of prescribed spacing on each side.



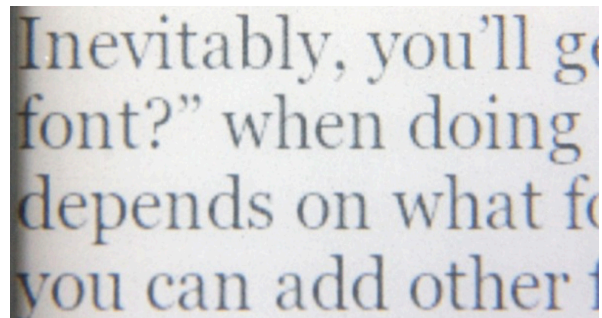
This notion of making designs for specific sizes, or size ranges, is what drew me into the fray of the e-reader boom. Seeing how really well designed fonts that were made specifically for print were falling apart in digital products encouraged me to look at size masters for solutions.

The problem of e-Readers was not just of low resolution; the poor contrast of e-ink screens added to the deformation of letterforms. The magnetic disks that were supposed to flip to their black or white sides in the e-Reader hardware didn't always do so, adding to the grey-cast of the screens. I think

one engineer told me 'white' was actually about 70% grey in the best scenarios.

Amazon had chosen a pretty solid design for the Kindle: Thesis Serif by Lucas de Groot. It had humanist book proportions, was mono-linear with sturdy serifs. Most designs of this ilk are not book proportioned — they're typically very geometric such as Rockwell or Stymie and not great for reading extended text.

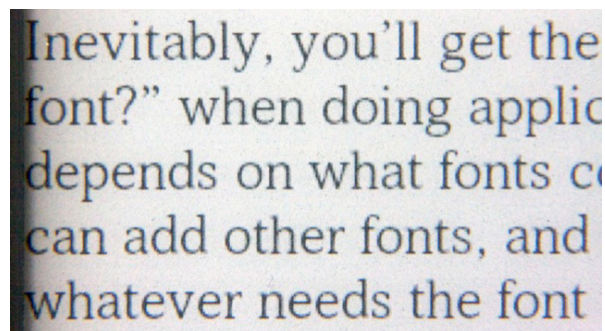
Inevitably, you'll g



Georgia, by Matthew Carter, renders poorly on an early e-ink screen

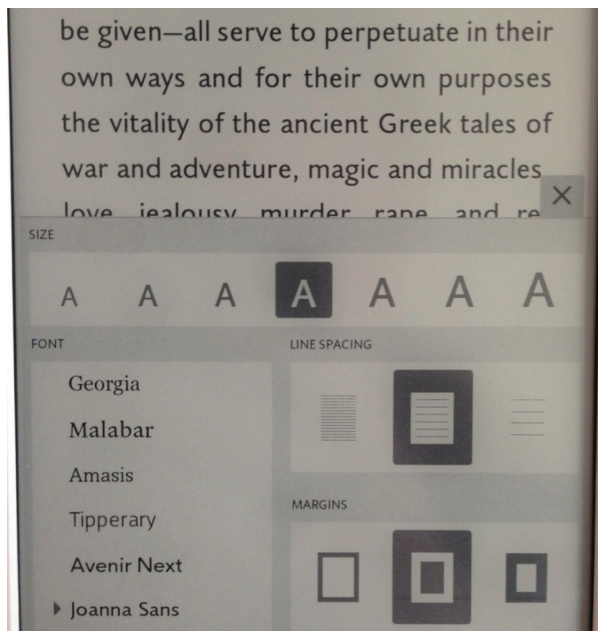
When Barnes and Noble started developing their competing product, the Nook, I immediately suggested what I thought were outstanding low resolution text fonts — Lucida and Georgia. The results of both were quite bad; one could never have predicted how bad without actually seeing the product firsthand. Here you can see Georgia falling apart with the 4 bits of greyscale and low contrast causing many letter details to consistently drop completely out of sight. Unfortunately I don't have a picture of it but Lucida almost looked like a stencil design as hairlines simply looked detached from the stems.

Inevitably, you'll get the

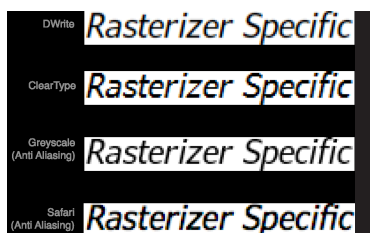
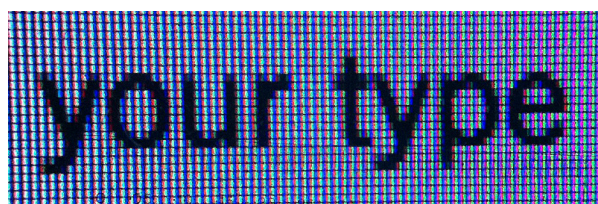


Monotype's Amasis typeface works better but still needs improvements

I decided to try Monotype’s Amasis family as a starting point — shown here with improved contrast but still not quite right. I made several edits to the design creating an “e-paper specific” version which bumped up the visual contrast by strengthening hairlines a bit further and increasing the x-height slightly — just as one would do in making a small-size font master.



Now, with e-paper’s latest generation the resolution is 300dpi and the contrast closer to 90% white. The font menu is far more extensive as a result. The fonts still need more robust qualities than many existing digital book faces but the options are far greater in number than when they started.

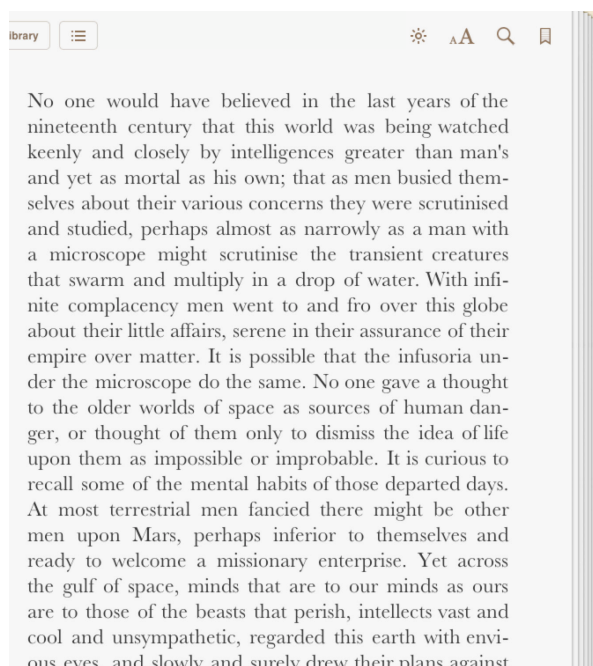


At the same time all of this was happening with e-paper, LCDs were gaining in pixel density. LCD monitors, however, varied a great deal from one to another and to complicate things further every

platform, browser and some apps all rendered type differently.

Interesting side note: E-reader or tablet companies would order screens, reject them based on some hardware flaws and they’d get sold to automotive companies for their navigation systems further degrading that sector for reading.

This image of different rasterizations of the same typeface, Verdana, illustrates well the moving targets we faced in designing fonts for screen use. The Segoe typeface I designed for Microsoft’s OS in 2004 was carefully analyzed with the ClearType rasterizer turned on. Now the technology has changed and resolution has improved I’m not sure what’s being used but it still looks ok.



2010 iPad, 132dpi LCD screen

When the iPad came out Apple heralded their book app. They provided a menu of fonts chosen at random rather than by quality for reading on screen. Only Palatino was pleasant to read. They offered Monotype Baskerville but it looked delicate and wan on the iPad screen.



Baskerville MT

Baskerville E-Text

Type design: Catching up to the past

ere but poor entertainment, and the f one of the worst of men, among h our Host made one, who, had he uddenter, would have outdone his his I think is the most perplexed l. From hence, Saturday, Dec. 23, a ly day, after an Intolerable night's forward only observing in our way rated on a Navigable river wth in-nd people more refined than in / towns wee had passed, tho' vicious and Tavern being next neighbours. difficult River wee come to Fairfield id were much refreshed as well with th Latter I employed in enquiring n and manners of the people, &c. c town, and filled as they

could get nothing there but poor en Impertinant Bable of one of the w many others of which our Host ma bin one degree Imudenter, woul Grandfather. And this I think is night I have yet had. From hence, very cold and windy day, after a Lodging, wee hasted forward only the Town to be situated on a Na diferent Buildings and people m some of the Country towns wee had enough, the Church and Tavern be Having Ridd thro a difficult River v where wee Baited and were much r the Good things wth Latter I em; concerning the Town and manne: This is a considerable town, and fil

So I once again turned to size masters for the solution. The eText version of Baskerville is based on the 6pt drawings for metal. The serifs and hairlines are quite sturdy and the stems are darker for greater contrast. The height was larger to look 'bigger on the body', becoming more legible in comparative text.

Alas, as things go with Apple, the advice to switch fonts fell on deaf ears. Fonts aren't as sexy as apps. Luckily both Amazon and B&N picked up the design. Jeff Bezos, in an unprecedented nod to fonts, remarked with fascination that the font he was showing an audience was from the 18th century!

The day Thorvald's mother gave changed. Creidhe was weaving, h flying, a fine web of blue and cr perfect pattern, testimony to the s her. So industrious was she, and s been forgotten. The bestowal of s was surely best suited to a mom Margaret spoke to her son quietly hearth. Creidhe could see them i weaving chamber. They did not ar in this most orderly of household door slam open, and she saw Thor

switchboard. Within fifteen seconds every light was on.

"Our cameramen have taken film that has either been confiscated or deliberately exposed. Our reporters' stories have disappeared. Yet we do have film, ladies and gentlemen, and we have correspondents right here in the studio—not professional reporters, but eyewitnesses to what may be the greatest disaster this country has ever faced ... and I do not use those words lightly. We are going to run some of this film for you now. All of it was taken clandestinely, and some of it is of poor quality. Yet we here, who have just liberated our own television station, think you may see enough. More, indeed, than you might have wished."

He looked up, took a handkerchief from his sport-coat pocket, and blew his nose. Those with good color TVs could see that he looked flushed and feverish.

For all the work put into getting the fonts to look good we still have to put up with stultifying, dull, typography of e-readers. Horrible hyphenation/justification, feeble attempts at chapter navigation and the occasional flying drop capital.

If You Answer the Door for Strangers...

You see it all the time on television. There's a knock at the front door. And, on the other side, someone is waiting to tell you the news that changes everything. On television, it's usually a police chaplain or a firefighter, maybe a uniformed officer from the armed forces. But when I open the door—when I learn that everything is about to change for me—the messenger isn't a cop or a federal investigator in starched pants. It's a twelve-year-old girl, in a soccer uniform. Shin guards and all.

"Mrs. Michaels?" she says.

I hesitate before answering—the way I often do when someone asks me if that is who I am. I am and I'm not. I haven't changed my name. I was Hannah Hall for the thirty-eight years before I met Owen, and I didn't see a reason to become someone else after. But Owen and I have been married for a little over a year. And, in that time, I've learned not to correct people either way. Because what they really want to know is whether I'm Owen's wife.

It's certainly what the twelve-year-old wants to know, which leads me to explain how I can be so certain that she is twelve, having spent most of my life seeing people in two broad categories: child and adult. This change is a result of the last year and a half, a result of my husband's daughter, Bailey, being the stunningly disinviting age of sixteen. It's a result of my mistake, upon first meeting

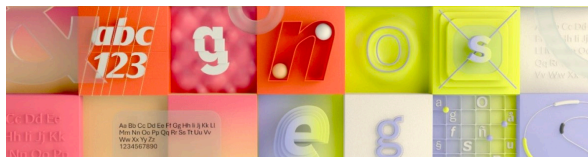
Regular Answer
 Fake Bold Answer
 Bold Answer

In the Libby library e-book application they have very few good type choices and pull out the oldest trick in the book saying they have a bold weight of a font but actually let the application alter the regular in a pseudo bold. Literally the rasterizer smears the bitmap in the x direction to appear a little darker. In this case the font gets tracked, too, or spaced out in the process. This really gets messy in the word firefighter (fourth line) where the fi ligatures look tight while the rest of the word expands.



Microsoft: BEYOND CALIBRI

Bierstadt
 Grandview
 Seaford
 Skeena
 Tenorite



For all the problems that crop up it's nice to know that companies like Microsoft still appreciate the value of good fonts. Last year they launched five new designs to augment their Office applications. And they're not just new fonts for the sake of new fonts. Their purpose is to expand their font menu into genres they didn't support well before.

Particularly appreciated is their attention to purpose. Size-specific designs are included in all of these families, including my Bierstadt. Not only is there a display version of each (most useful for PowerPoint headlines) but a focus on things like width: how much information one can fit in a spreadsheet cell vs. how legible (or illegible) the design becomes.

48pt PowerPoint Bold Display

- 24pt Bullets using semibold
- Large sizes are more compact and impactful
- Smaller sizes are spaced for greater legibility

Effective PowerPoint Slides

- Legible sub-headings
- Simple but effective hierarchy

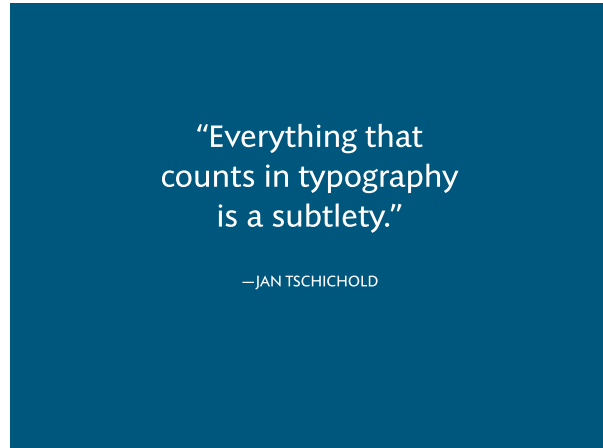
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Examples of PowerPoint with just one size font fits all (above), vs. separate display and text versions (below) to optimize the aesthetics of a PP presentation.



I'll leave you with this quote from Jan Tschichold. It is profound in many ways since type design is an aggregate of many many detailed decisions which all affect the performance of the type — be it legibility or fashion.

Though we may be armed with the most advanced fonts and authoring tools ever known, it still feels like a constant battle to raise the bar of quality, beauty and function.

With the technology landscape continually changing there will always be problems for type designers and typographers to overcome — I've barely scratched the surface here and I've not even mentioned writing systems other than Latin.

The next generation of type designers can look at Mr. Bigelow's words in 1987 and rest assured that their work is far from being finished.

◇ Steven Matteson
 mattesontypo (at) gmail dot com
 mattesontypographics.com