Gina:
Reflection on Practice

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Typeset with Arno Pro (Adobe) and Whitney (Hoefler & Frere-Jones).

All figures show the author's work at 100% scale unless indicated otherwise.

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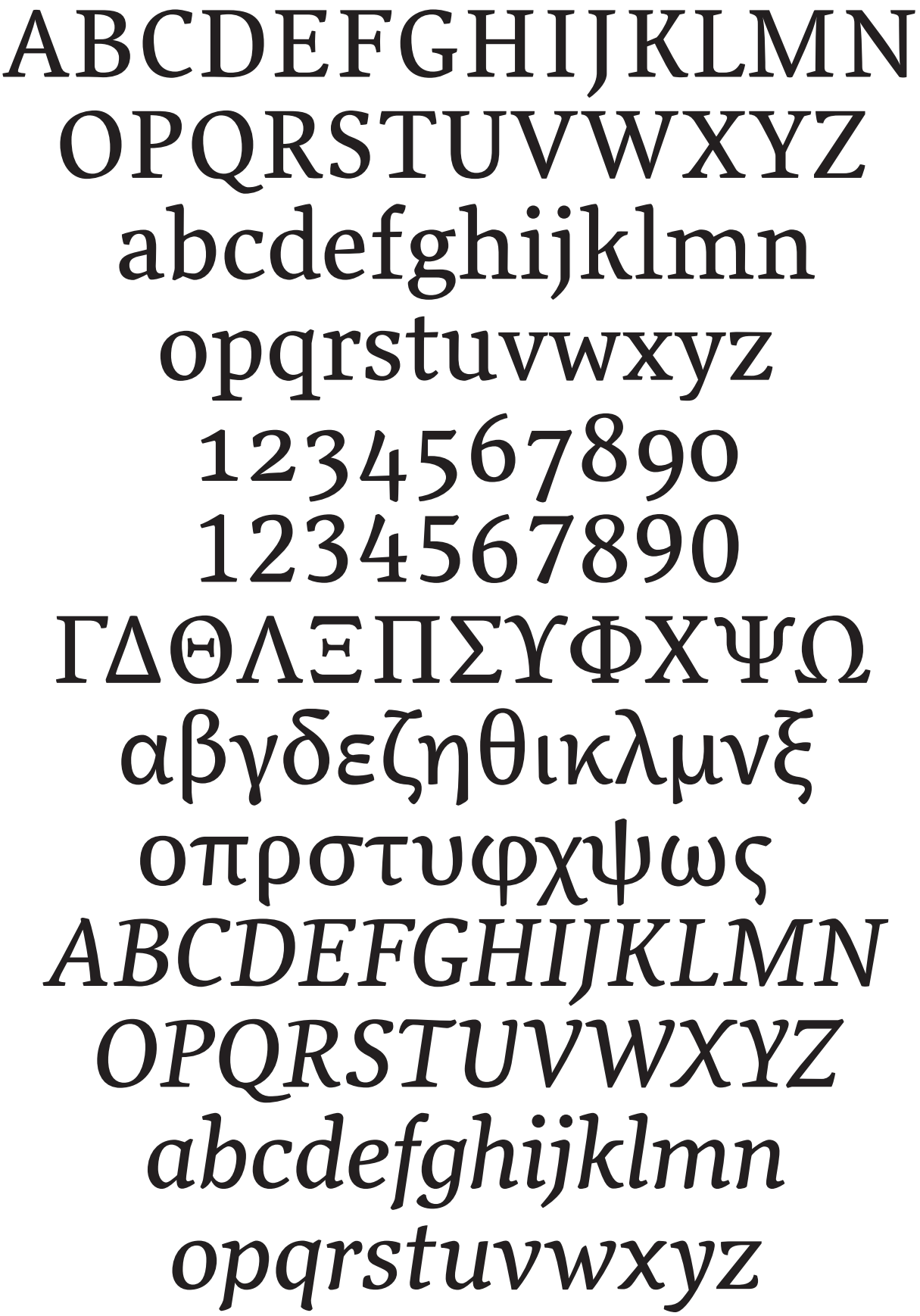

Figure 1

Samples of Gina (including Greek) and Gina Italic, set at 48 pt.

1 Introduction

This essay describes the development of Gina, a type family produced for the practical component of the MA Typeface Design program at the University of Reading. *(See figure 1.)*

Gina has been a learning exercise, and as such is essentially an experimental typeface. Designing Gina was an opportunity to understand typography in a new way and test some specific ideas about form and relationships nurtured by years of using type in a variety of contexts.

This was also an investigation into designing a typeface for the first time. A great deal of Gina's development was trial and error, some of it inadvertent and some of it an intentional way to understand the logic of certain methods. This document is more an analysis of that process of discovery than a guide to designing type. The missteps and the inefficiencies discussed, though, point the way to more sound methods for Gina's own future development as well as that of other typefaces.

Figure 2

An example of complex math mixed with text, set with Linotype Palatino, Monotype Math + Technical 03, and Linotype Mathematical Pi 1 and 3.

ASME Committee on Operation and Maintenance of Nuclear Power Plants. OM-S/G–2003, Standards and Guides for Operation and Maintenance of Nuclear Power Plants. *New York: The American Society of Mechanical Engineers (2003) p. 264*

$$\frac{y}{y_R} = \sum_j \frac{\rho Q^2 C_r(f_j)}{\rho_R Q_R^2 C_r(f_{Rj})} \left\{ \frac{M_{Rj}^2 f_{Rj}^3 \zeta_{Rj}^3}{M_j^2 f^3 \zeta_l} \right\}^{1/2} \qquad \text{(B10)}$$

where the summation is over all the important modes and subscript R denotes the reference design. $C_r(f)$ is the random turbulence excitation coefficient at frequency f. From Pettigrew's data [see para. B5(a)], an upper bound estimate for the turbulence excitation coefficient can be derived. (See Table B1.)

NOTE: As defined in Eq. (B10) and in para. B5(a), C_r has dimensions of $\sec^{-1/2}$.

If $y < y_R$ by a margin large enough to accommodate the uncertainties in the parameters that determine the responses, then testing is not necessary.

For designs that are geometrically similar but not identical to a reference design, a more detailed analysis is necessary to alleviate testing [see para. B5(b)]. Following the reference in para. B5(c), the upper bound mean square response of a multispan tube bundle is given by

$$y^2(x) = \sum_j \sum_i \frac{l_i G_\rho^{(i)}(f_j) \phi_j^2(x)}{64\pi^3 M_j^2 f_j^3 \zeta_j} \qquad \text{(B11)}$$

where

$$G_\rho^{(i)}(f) = (D/2)^2 C_r^2(f) \int_o^l {}^i [\rho(x) U^2(x)]^2 \phi_j^2(x)\, dx \qquad \text{(B12)}$$

Figure 3 *below*

An example of Computer Modern, the default font in TeX. Note the light colour and open spacing.

Thierry Bouche, "Diversity in math fonts." TUGboat, *19 (2) (1998) p. 122*

CONJECTURE 1. — *Let x, y, z, be integers; for $\alpha \in \mathbb{N}$, denote by $\Omega_\alpha \subset \mathbb{N}$ the set of prime integers p (called p-primes in the sequel) such that the following equation (known as* Frimas' last equation*) $x^p + y^p = z^p$ admits infinitely many solutions divisible by α. We conjecture:*

- $\Omega_\alpha \neq \emptyset$ (Ω_α *is* not *empty*),
- *more precisely,* $\operatorname{card} \Omega_\alpha > \mathsf{w}$ *where* w *is the well-known* WHYLLES' *constant.*

Evidence for the conjecture. — Denoted by $\mathcal{A}$, $\mathcal{M}$, $\mathcal{O}$, the famous *inferior constants of* WHYLLES, the three following formulae are *very* instructive:

(1) $$x = 2\pi z \iff \operatorname{card} \Omega_\alpha \mid \mathcal{M} \quad \text{and} \quad \varphi(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-x^2/2} dx$$

(2) $$\prod_{j \geqslant 0} \left(\sum_{k \geqslant 0} f_{jk} z^k \right) = \sum_{k \geqslant 0} z^n \left(\sum_{\substack{k_0, k_1, \ldots \geqslant 0 \\ k_0 + k_1 + \cdots = n}} f_{0k_0} f_{1k_1} \cdots \right)$$

(3) Look at the product ffi, $\{\overbrace{g, \ldots, g}^{k\ g}, \overbrace{h, \ldots, h}^{\ell\ h}\}$ *taken in the basis* $(\vec{\imath}, \vec{\jmath})$.
$\underbrace{\qquad\qquad}_{k+\ell \text{ elements}}$

Moreover, eq. (1) yields $$\pm \sqrt{\begin{vmatrix} x_1 - x_2 & y_1 - y_2 & z_1 - z_2 \\ l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \end{vmatrix}} > 0 \triangleright$$

2 The design brief

2.1 Background Gina was originally conceived as a serif typeface family for textbooks and other technical publications that may include equations, chemical formulas, tables, and other combinations of text, numerals, and symbols. Material like this requires type that will facilitate long, dense passages of text, but it must also feature glyphs with enough individual clarity that they can be easily recognized outside of typical word shapes, such as in mathematical or chemical formulae. For instance, equations may feature a mix of italic characters, Greek characters, and mathematical symbols, any of which may be shown at a typical text size or smaller. *(See figure 2.)* Since any ambiguity about which character is which may change the meaning of the equation, it is essential that all characters can be distinguished at a glance.

Many types currently available for maths have been adapted for use with Donald Knuth's TeX software, and tend to follow precedents set by Knuth's Computer Modern[1] fonts. Other mathematical typefaces tend toward styles based on the most common typefaces available on personal computers: Times New Roman, Helvetica, Courier, *et al.* for ease of combining maths and text. There are very few choices for truly matching math to the text, so the available typefaces simply try to approximate common characteristics. Also, equations often involve so much use of white space that the fonts used tend toward a very light colour, leading to the use of companion text faces which are also light in colour.[2] *(See figure 3.)*

2.2 Goals for the design of Gina The basic design of the Gina family is intended to anticipate the demands of setting technical works, although the primary focus will be its function as a face for body text. It should offer a wide array of distinct characters that do not sacrifice general readability. It should have an italic face with a modest degree of slant to reduce kerning problems when roman, italic, superior, and inferior glyphs are mixed together. The overall colour of Gina, including its symbols, should be heavy enough to hold up when set at the range of

1 This set also includes AMS Euler, a calligraphic font Knuth developed with Herman Zapf, but Euler only includes glyphs used for the equations themselves.

Siegel, David R. *The Euler Project at Stanford.* Stanford, CA: The Stanford University Dept. of Computer Science (1985).

2 Thierry Bouche, "Diversity in math fonts." *TUGboat,* 19 (2) (1998) p 121–123.

EXAMPLE APPLICATION: A peak stress index (C_2K_2 or $2i$) equal to 4.2, which corresponds to a girth fillet weld is incorporated into the acceleration limit equation. The acceleration limit equation should be changed accordingly when other values of C_2K_2 are applicable.

A ¾ in. Schedule 80 cantilevered branch line is accelerated by a header pipe at a peak acceleration of 1.0 g (zero to peak). The branch line contains a 15-lb valve that is 6 in. from the branch connection. It is determined that $L_E = 6$ in. and $W_T = 16.6$ lb (see Fig. I1 for determination of L_E and W_T). Determine if the measured acceleration falls within the simplified acceleration limit.

For carbon steels with a UTS ≤ 80 ksi, the equation for allowable acceleration in units of g is shown below. The equation below also assumes that $C_2K_2 = 4.2$.

$$a_A = \frac{1{,}830z}{W_T L_E}$$

$$a_A = \frac{1{,}830z}{W_T L_E} = \frac{(1{,}830 \times 0.0853)}{(16.6 \times 6)} = 1.57 \text{ g} > 1.0 \text{ g}$$

The vibration is acceptable.

A

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The vibration is acceptable.

B

Figure 4

A An example of math mixed with text, set with Linotype Palatino, Adobe Symbol, and Monotype Math + Technical 03 (8 pt. with 10.25 pt. leading).

B The same passage set at the same size with Gina.

ASME Committee on Operation and Maintenance of Nuclear Power Plants. OM-S/G–2003, Standards and Guides for Operation and Maintenance of Nuclear Power Plants. *New York: The American Society of Mechanical Engineers (2003) p. 40*

sizes often used in textbooks or technical publications. It should also feel substantial in loose settings such as tables and equations.

Ideally, Gina should meet these functional requirements while offering a degree of personality rarely found in the typefaces commonly used in technical publications, a warmth more easily found in those available for other, more general types of publication.

The family should include roman and italic faces, each with variants for use superior/inferior sizes, character sets for basic Latin (basic as well as extended sets), Greek (for mathematical symbols as well as text), general punctuation, and a range of styles for numerals and basic operators (lining and oldstyle variants, sets for both proportional and tabular spacing; and sets for small sizes positioned for fractions, superiors, and inferiors).

The roman face should also include a small-cap style for the Latin and Greek alphabets, as well as a large set of mathematical operators (generally used in an upright position only).

For this stage of their development, the fonts should be designed to perform well with common desktop applications that support OpenType features and complex text formatting, such as the Adobe Creative Suite or Quark Xpress 7.0.

Figure 5
Letters from ITC Century Schoolbook and the new shapes adapted from them, 19 October 2006 (reduced to 50%).

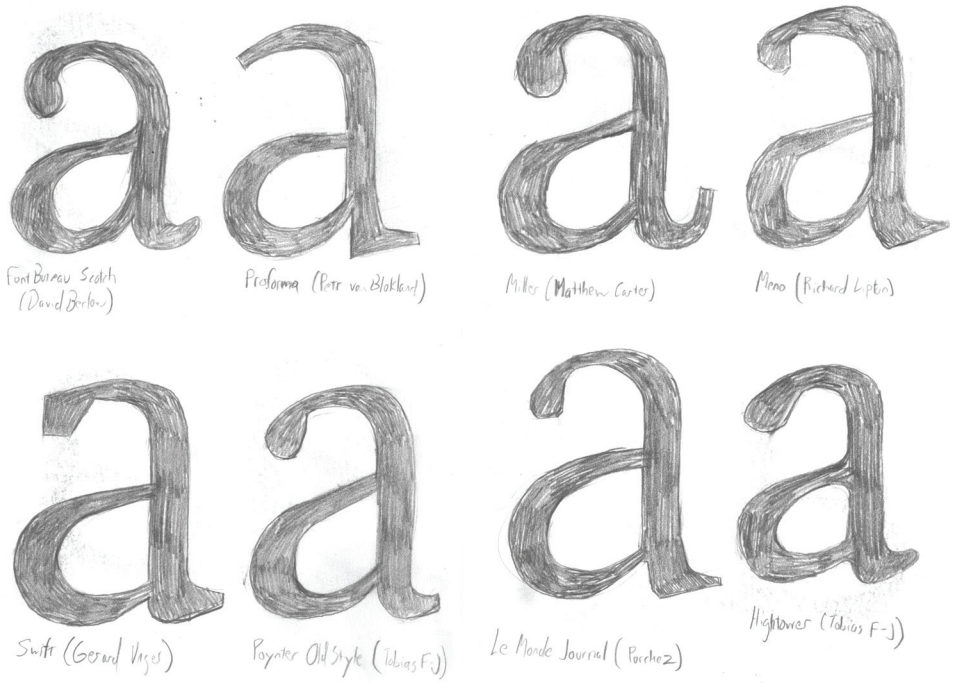


Figure 6
Sketchbook pages from 3 November 2006, showing clumsy drawings of the letter *a* from a variety of typefaces (reduced to 50%).

3 First sketches

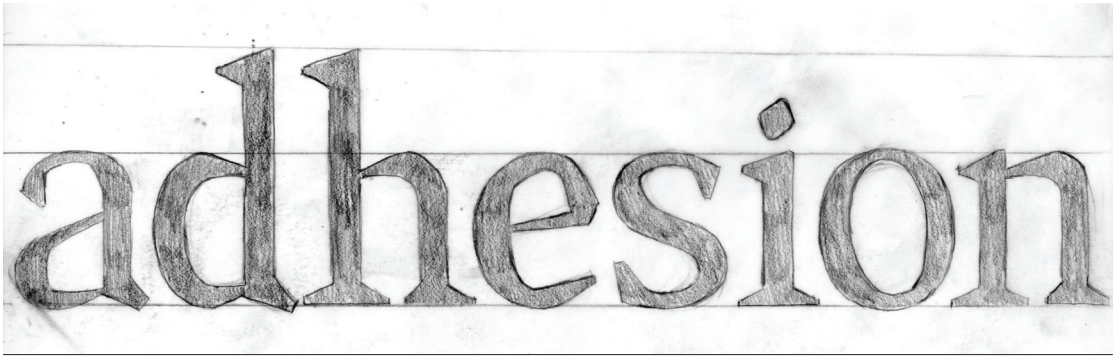
Even with a detailed brief of the necessary characteristics and features needed for Gina, the first stages of the design process were a significant challenge. The first sketches for a designer's first typeface reveal a lack of true awareness of the many details that a user—even one who is an experienced typographer—can take for granted when choosing from typefaces that have already been through a thorough design process of their own. A user will evaluate certain details and overall tone, assuming that issues like sensible widths or consistent handling of stroke weights and curve shapes have been addressed already. A type designer, however, has to worry about them from the start, getting the blunt proportions down before obsessing over the details.

Additionally, an even greater problem hampered Gina in its earliest days: a lack experience drawing type either on paper or on screen.

3.1 Structured exercises At the start of the first term, Gerard Unger leads the MA typeface designers in an exercise to begin experimenting with forms based on an existing model. Specimens of Morris Fuller Benton's New Century Schoolbook are partially traced as a guide for new drawings of a bold weight with new formal details. This allows the designer to rely on the vertical proportions of an existing typeface while experimenting with other shapes. Even though the results were generally crude and few of altered forms made their way into the design of the final typeface, it was a useful way get past the intimidating blankness of the sketch pad and begin experimenting with typographic forms. *(See figure 5.)*

Sketching glyphs of existing types was another helpful technique for becoming familiar with letterforms and developing hand skills required to make original drawings. Looking closely at types with specific qualities that could work for Gina—open counters, contrast in stroke weight, some angularity to the serifs, curves meeting straight lines—was the first step in understanding those concepts as structures rather than ideas. The repetitive nature of making detailed drawings over and over again was also a necessary step toward creating original drawings of sufficient quality to express design concepts as they developed. *(See figure 6.)*

A



B

adhesion

C

Figure 7
Three stages of a sketchng experiment from 29 October 2006 (reduced to 50%): a loose sketch (**A**) is traced and refined (**B**) and then scanned and traced in FontLab to be set as text (**C**).

3.2 Drawing experiments Despite the benefits of those more structured exercises, the act of making precise, controlled contour drawings was a slow and awkward means of trying out original ideas. Concentrating on the outlines often resulted in clear details but distorted characters overall. Calligraphy exercises, attempted without much experience using a broad-nib pen, resulted in letters too crude to be helpful. Drawing directly in FontLab[3] was just as awkward at this beginning stage.

A technique of jotting down some key positions on paper before connecting parts of the contours—building up from gestural lines and basic proportions to overall shapes and then on to finer elements, refining the good lines and slowly eliminating the bad ones —was somewhat more helpful. Rather than a collage of connected details, these drawings produced an overall sense of mass and relationships between parts. Made with larger motions of the arm and the hand, the straight lines had a more tension and the curves had more swing than the slower, more deliberate contour drawings.

Each of these drawing techniques was the first step of a method to rapidly test the suitability of the letterforms for performance within text. Each set of rough sketches was cleaned up, traced and refined further, and then scanned and traced within FontLab to produce a basic font with a few characters that could be typeset at text sizes. Unfortunately, the refined drawings kept eliminating the best features emerging from the rough sketches, as the more precise renderings required attention to specific details, thereby neglecting more basic proportional issues like consistent x-heights and relative character widths. *(See figure 7.)*

These early sketches also suffered from a lack of understanding of how the parts of a letterform interacted. These letters were still awkward combinations of parts—simple skeletons with shapes attached rather than integrated forms.

3.3 Non-Latin workshops and calligraphy Two introductory workshops about non-Latin scripts—one with Fiona Ross on northern Indic scripts such as Bengali and Devanagari, followed by another on Greek with Gerry Leonidas—produced a significant breakthrough in Gina's development. In both workshops, lectures on the history and the basic characteristics of each script complemented days of studying specimens and drawing glyphs.

3 FontLab Studio 5.0.2 was the software used for design and production of Gina.

Figure 8
Bengali characters drawn with pen and ink on 16 November 2006. The arrows indicate the glyphs which best captured the motion of that character.

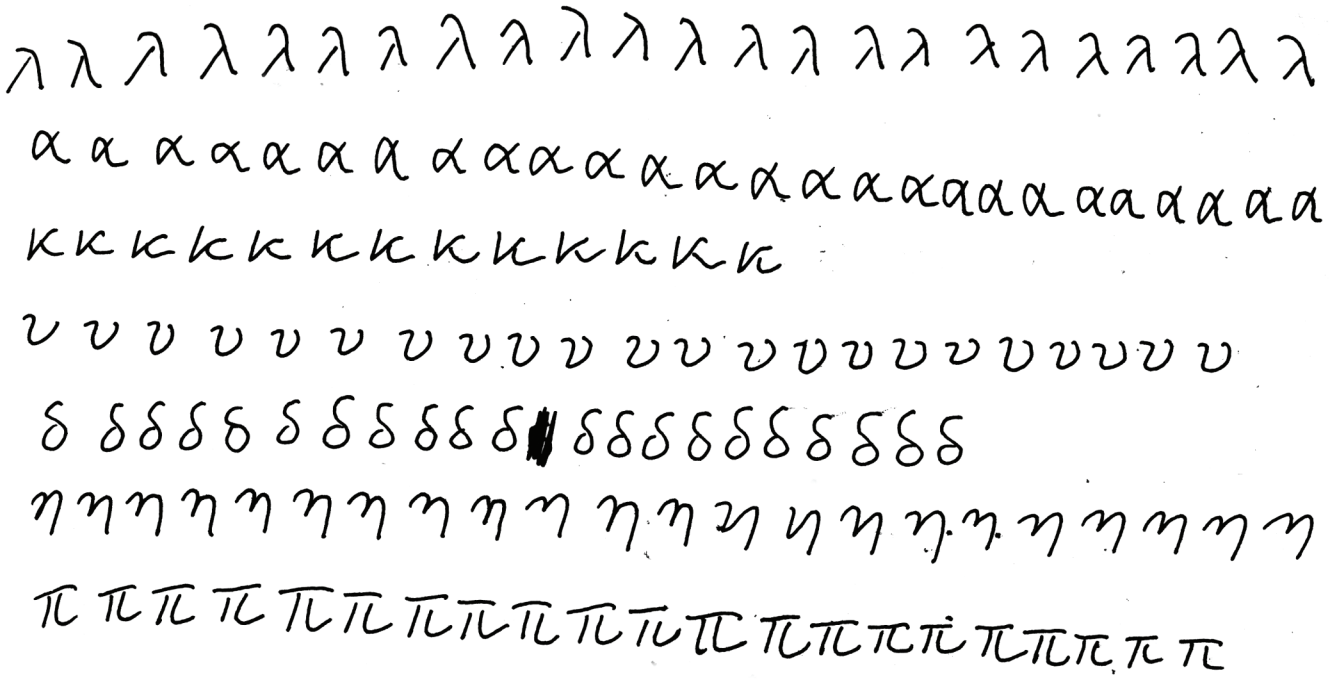


Figure 9
A very basic Greek writing exercise from 21 November 2006 produced some insights into the development of character shapes.

Using a broad-nibbed pen to draw many pages of Bengali and Devanagari characters became a way to explore how strokes behaved in an abstract way, unencumbered by preconceived notions of how the shapes "should" look. Even with samples of Linotype Indic fonts for reference, drawing the characters required sensitivity to the overall shape patterns in the scripts. It was more helpful to explore form by thinking of how one stroke could change direction without creating too dark a shape at the corner, for instance, than to think "this is how a letter *ka* should look". *(See figure 8.)*

With Greek, where the alphabet was slightly more familiar, the writing exercises were a lesson in how a different writing style produced its own kinds of form. *(See figure 9.)* With the Greek lowercase letters, traditionally written with a rounder tool than the Indic scripts, the speed of the stroke influences a character's weight more than a pen angle, leading to a pattern of shapes that is rounder, with fewer and softer changes in direction. As with the Indic scripts, writing without the distraction of familiarity finally made it possible to concentrate on the purely visual patterns of letters and text.

The insights from these two workshops into the relationship of action and form led to some different sketching techniques—particularly use of pen and ink to experiment with discrete shapes as well as entire letters—that fed into Gina's eventual design. *(See figures 10 and 11.)* They also led to a means of distinguishing similar forms in the roman, italic, and Greek glyphs: using the writing tradition to guide the overall look of each set of shapes in a slightly different direction.

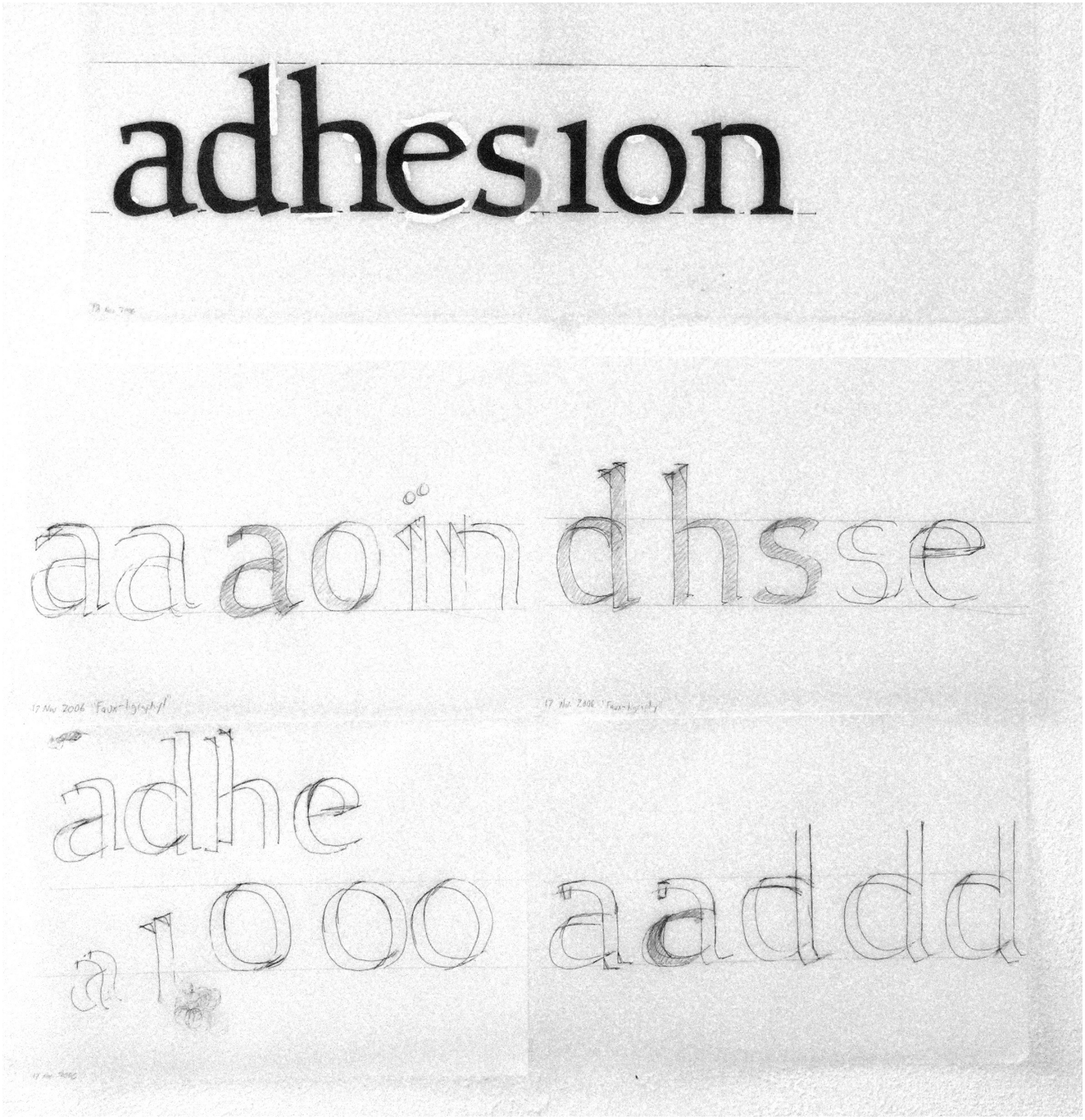


Figure 10
Sketches made with two pencils fastened together to simulate a broad-nib pen, showing how the stroke contours overlap as the stroke changes direction, 18 November 2006.

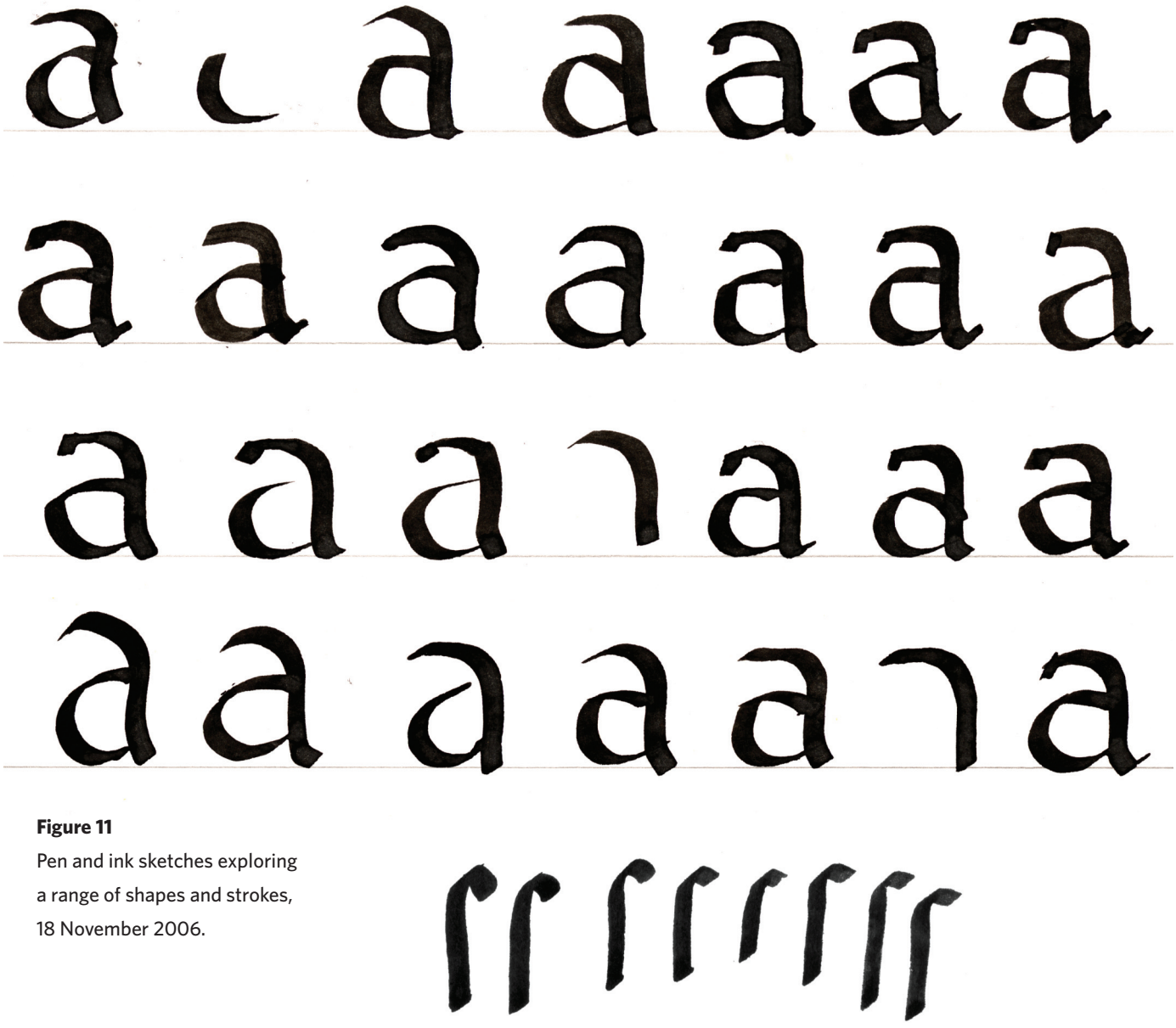


Figure 11
Pen and ink sketches exploring a range of shapes and strokes, 18 November 2006.

Figure 12

Sketches made on 13 October 2006, copying experimental characters drawn by W. A. Dwiggins in 1937. These seemed to be pure constructions until later in the term, when a closer look at more types by Dwiggins made it clear that he was manipulating details to provide an even stronger sense of the pen stroke in small point sizes.

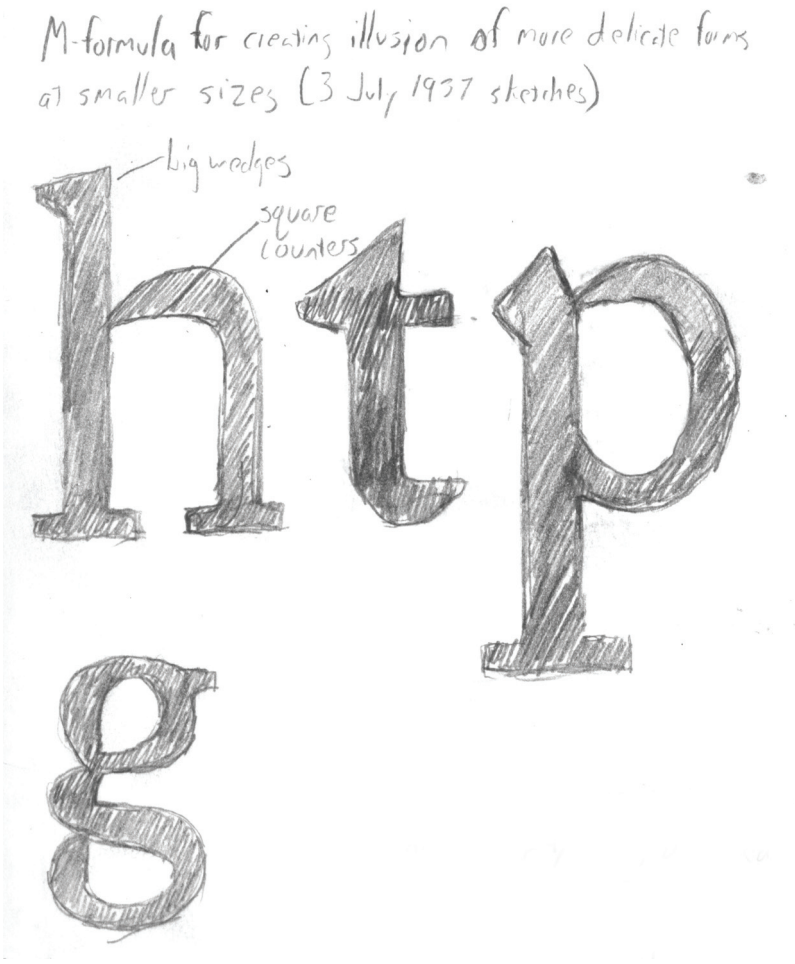


Figure 13

A proof from 14 December 2006 shows Gina starting to incorporate calligraphic touches.

4 Fine-tuning the concept

4.1 Influences The more direct understanding of writing and calligraphy introduced in the non-Latin workshops was reinforced by a closer look at the work of W. A. Dwiggins. His types captured the dynamic tension of the pen stroke, balanced with an understanding of how letterforms on the printed page were perceived.[4] Instead of merely recreating written forms, he experimented with unconventional details that still produced the desired effect in print.[5] *(See figure 12.)*

Both these aspects of his work influenced Gina as its strokes developed more calligraphic shapes. *(See figure 13.)* The notion of an angled pen gives structure to the change of stroke weights in each character, producing an underlying pattern from one to the next. The pen metaphor was only a starting point, though, as other details were adapted to distribute weight or clarify shapes in other ways .

4.2 Establishing a workflow A methodical workflow became critical as the design developed a direction and proofs became more iterative and less haphazard.

From the beginning each day's work in FontLab was saved as a separate file and all prints and sketches were dated, but as more of the drawing was done directly in FontLab the electronic file became a more important record of progress than the paper sketches.

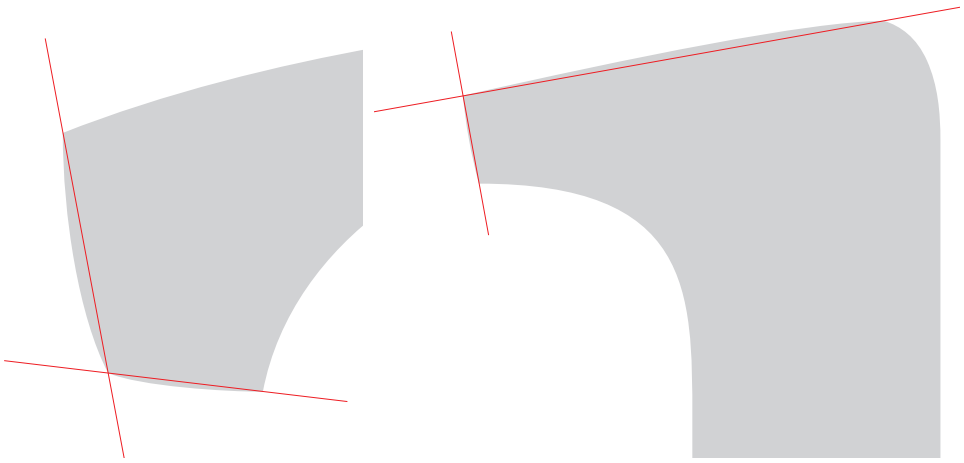
FontLab's mask layer was used extensively as a guide when constructing forms that were repeated in more than one glyph, but it was also used as a repository for the evolving versions of individual glyphs. A back-up copy of a glyph's outline was made in the mask layer before

4 'Unlike drawn letters those made with the pen, especially the broad-edge pen, are characterized by "snap." "The weighted top serifs of the straight letters of the lowercase: that is a thing that occurs when you are making formal letters with a pen, writing quickly. And the flat way the curves get away from the straight stems: that is a speed product." It is this abrupt shift from curves to straights, and back again, that creates the sense of "snap." Consequently, motion in Dwiggins's letterforms is not fluid but nervous and energetic: alive.'

Shaw, Paul. *A tribute to William Addison Dwiggins on the hundredth anniversary of his birth.* Privately printed for the friends of Hermann Püterschein, Inkwell Press, New York (1980).

5 Unger, Gerard. "Experimental No. 223, a newspaper typeface, designed by W. A. Dwiggins", *Quaerendo*. 11 (3) (1981).

Figure 14
1000-point-high *a* and *i* from 20 February 2007 show how the square terminals and serifs are slightly convex.



A

B

Figure 15
Pen sketches (**A**) from 1 February 2007 show the search for a serif structure that relates to the overall gesture of the stems. This basic gesture still influenced the shapes in the final version of Gina (**B**).

Figure 16
When capitals were added in late February, they were drawn noticeably shorter than the ascender height.

any major changes, and versions from older files were regularly pasted in for reference.

Each version of the FontLab file reflects a version of Gina in a fairly consistent state. If any major changes to the overall design were made within a day—a new approach to general features, a global change to weight or proportions—than a second iteration for that day would be made to record all work done before such widespread alterations.

4.3 Articulating the details As specific details evolved from day to day, certain characteristics became central to Gina's design.

A key element of Gina's look and feel came in the form of a slight curvature to the edges of square terminals and serifs, a way to add softness to shapes without rounding them altogether. *(See figure 14.)* This tendency to swell along contours also provided more opportunities to add and subtract weight in a subtler, more controlled manner in glyphs that needed it. Manipulating the degree of curvature also proved to be a way to manage the overall softness of Gina's texture when set in a body of text.

Another concern as Gina developed was the construction of serifs that felt integral to the glyph rather than merely applied to stroke endings. Again, the calligraphic model led to a solution that later evolved into something slightly different. The gesture of the pen pulling a short stroke across the end of a longer one produced asymmetric serifs, blending from the main stroke to the serif on one side and sharply crossing it on the other. *(See figure 15.)* As the design developed these shapes were flattened across their bottom edges to make the overall texture crisper, but the mix of corner and curve still helped suggest a dynamic rather than a static ending to each stroke.

The height of capitals (and later the lining figures) was set notably lower than that of the lowercase ascenders *(see figure 16)* to help text maintain an even texture despite frequent use of abbreviations, numerical references, proper names, chemical abbreviations, formulae, etc. The capitals also developed somewhat narrow proportions to keep their counters from introducing excessive white space into the overall texture. Numerous test prints of mixed-case text samples accompanied these developments to ensure that a suitable balance between emphasis and even colour could be achieved for the capitals.

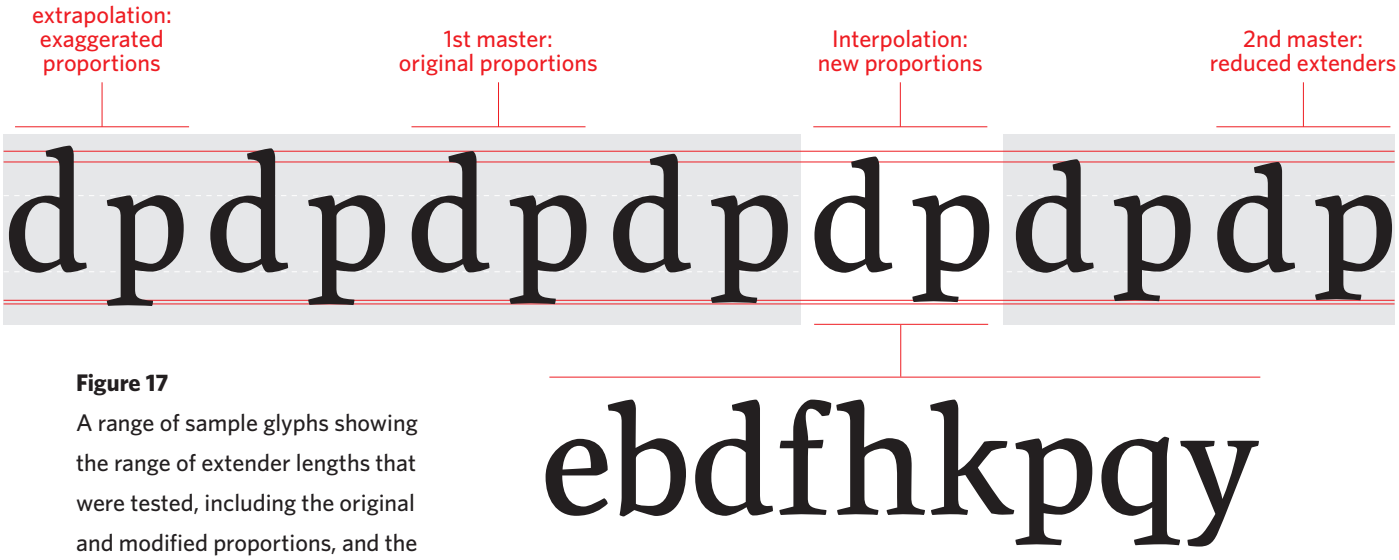


Figure 17
A range of sample glyphs showing the range of extender lengths that were tested, including the original and modified proportions, and the versions generated by FontLab.

Crazy Fredericka bought many very exquisite opal jewels. Back in June we delivered oxygen equipment of the same size. A quick movement of the enemy will jeopardize six gunboats. All questions asked by five watch experts amazed the judge. Sixty zippers were quickly picked from the woven jute bag. Big July earthquakes confound zany experimental vow. Six big devils from Japan quickly forgot how to waltz. My girl wove six dozen plaid jackets before she quit.

A

Crazy Fredericka bought many very exquisite opal jewels. Back in June we delivered oxygen equipment of the same size. A quick movement of the enemy will jeopardize six gunboats. All questions asked by five watch experts amazed the judge. Sixty zippers were quickly picked from the woven jute bag. Big July earthquakes confound zany experimental vow. Six big devils from Japan quickly forgot how to waltz. My girl wove six dozen plaid jackets before she quit.

B

Figure 18
Sample text set 10/13 shows how adjusting the vertical proportions opened up the spacing between lines to improve the horizontal flow of the text.

A The original proportions

B The interpolated proportions that were chosen

4.4 Testing proportions With a design direction falling into place, it was time to test the overall proportions before the character set grew too quickly. The ratio of the x-height to the ascenders and descenders was adjusted periodically in the earlier stages of development, but it was hard to evaluate the effect of these sporadic manual changes to a limited character set.

FontLab's "multiple master" capabilities were used to create a series of fonts with extenders ranging from very long to very short.[6] Text was still readable at the far end of the scale, with the very short descenders and caps, but such compressed strokes would produce flatter word shapes that would be too impractical for book-length text passages.

There also seemed to be a point at which individual glyphs became less distinct. Even though they might combine into recognizable word shapes, as stand-alone symbols they could be difficult to identify readily.

Halfway between the two master versions, the extenders felt sufficiently prominent, with just enough room for the caps—slightly lower than ascenders—to feel less condensed than in the original. *(See figures 17 and 18.)*

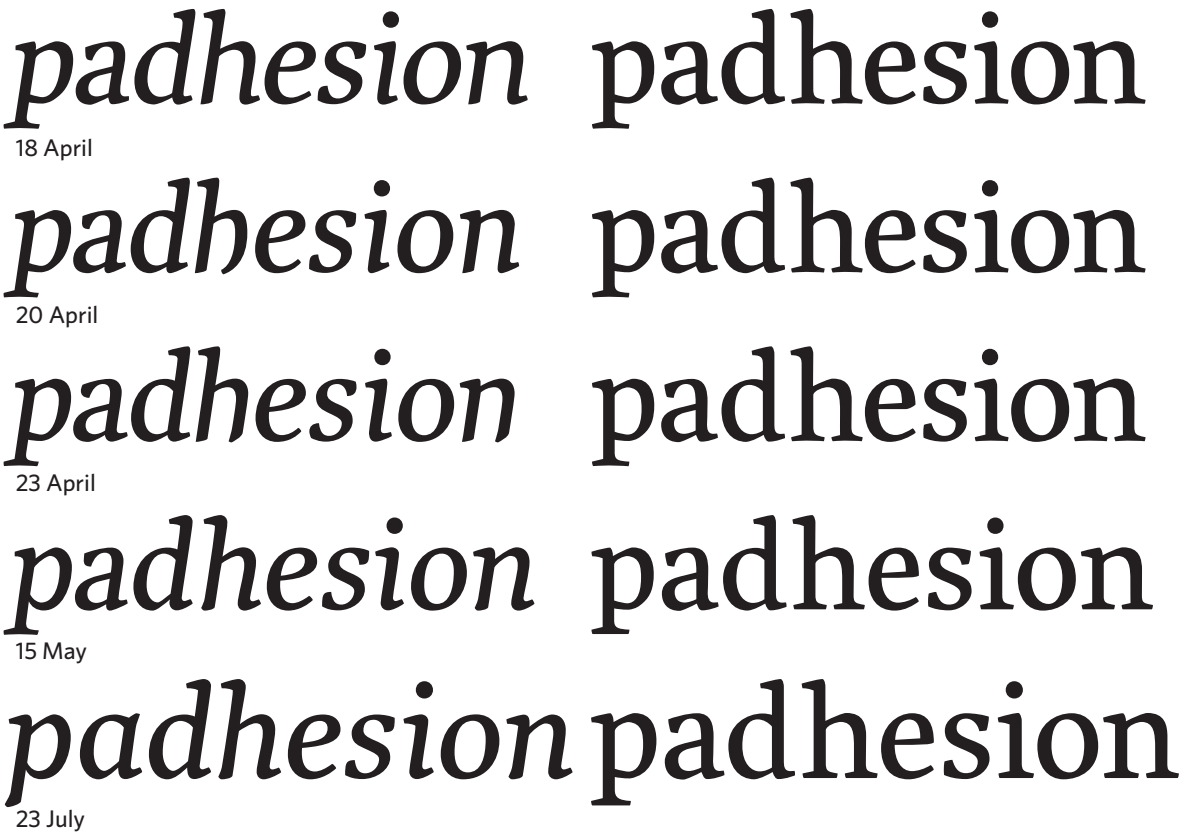
6 To create the master versions, the most recent version of the font was copied and then some adjustments made to glyphs of the second file:

- Overall size increased by 110%
- Ascenders and descenders manually moved back to their original coördinates
- Overall size decreased by 90.91% to restore the original x-height and horizontal metrics, now with short extenders

The two versions were then combined into a multiple master with an optical scaling axis to compare the extender lengths along a sliding scale, extrapolating past the base versions to create additional options. A number of instances were exported as fonts so they could then be printed and compared to one another. *(See figures 17 and 18.)*

Figure 19 *right*
Comparison of transformations (9° slant, 95% horizontal scale) made in FontLab with the final forms of italic glyphs (72 pt.).

Figure 20 *below*
Comparisons of the italic and roman faces as they developed (48 pt.).



5 Designing the secondary alphabets

The italic and Greek glyphs took cues from a tradition of written forms just as Gina's roman did. Although none of the styles would slavishly follow calligraphic shapes, using these three distinct writing styles as a point of departure for the design provided a means to distinguish the forms from one another in text.

The long process of learning to draw in FontLab and understand the behavior of proportions and details in the roman came to fruition when it was time to start the other styles. Decisions came more easily, and they could be implemented more rapidly. It was easier to maintain consistency across the entire set of glyphs, even while refining finer points of stroke weight and clarity of small details. By this point it was much more effective to draw directly in FontLab, referring to rough sketches without actually copying or tracing them, steps that were so counterproductive earlier.

5.1 Italic The first step in developing the italic was to determine a suitable slant angle and whether or not any horizontal scaling would be appropriate. Text set in Gina was condensed and sloped to varying degrees within Adobe InDesign. Once appropriate values were determined they were built into a set of FontLab transformations to create an altered copy of the roman whose characters could then be refined. *(See figure 19.)*

Always starting with a transformed version of the roman, a few different design concepts for the italic were attempted before arriving at a solution. In each, the x-height and ascender serifs became rounder and more clearly defined as instrokes. Foot serifs that were not needed as corresponding outstrokes were eliminated, changing the overall spacing and visual texture. *(See figure 20.)*

In the final version, the glyphs of the italic were a close match to the roman in terms of weight, but a different approach to the forms themselves produced a contrasting texture. The ends of many strokes were given a slight flare to add weight along the baseline, and the curves of serifs on the ascenders and at the x-height were exaggerated along the top while retaining abrupt connections along their underside. Most sharp corners along the outer contours were made round, and strokes that were diagonal in the roman version were given more curvature to compensate for their exaggerated angles in the italic.

ABMTVZ *ABMTVZ*

Figure 21
Comparison of roman and italic capitals (48 pt.).

ηρεμια adhesion
30 November
ηρεμια adhesion
9 May
ηρεμια adhesion
23 July

Figure 22
Comparison of Greek and roman scripts as they developed (48 pt.).

Figure 23
Gina set 10/15, showing a mixture of roman, Greek, and italic.

"Pangram", Wikipedia, http://en.wikipedia.org/wiki/Pangram, (6 August 2007)

Greek pangrams: Γαζίες και μυρτιές δεν θα βρω πια στο χρυσαφί ξέφωτο. No more shall I see acacias or myrtles in the golden clearing. Ξεσκεπάζω την ψυχοφθόρα βδελυγμία. I uncover the soul-destroying abhorrence. Ζαφείρι δέξου πάγκαλο, βαθών ψυχής το σήμα. Receive an excellent sapphire, denoting profundity of soul.

Notable pangrams found occurring in ancient Greek literature include: *Odyssey* 9.179–181; *Homeric Hymn to Hermes* 22–24; Pindar, *Olympian 6* 21–24; Aeschylus, *Agamemnon* 439–444; Euripides, *Alcestis* 169–172, *Hercules* 927–930, *Bacchae* 719b–723a; Isaeus, *De Hagnia*, section 31 (ελέλυθεν...λήψεσθαι); Lycurgus, *Against Leocrates* 100.3–6; *Lysias* 12.93.3–5; Thucydides, from the last four words of 4.115.2 through the first ten words of 4.115.3.

It was relatively straightforward to set the italic lowercase apart from the roman, but more difficult to adapt the uppercase forms in a manner other than a simple oblique transformation. In the end some characters lent themselves to a more dynamic translation with serifs that changed into subtle swashes, producing an overall feeling in the italic that was looser and more fluid than the roman. *(See figure 21.)*

5.2 Greek The first step in developing Greek for Gina was to take a few characters drawn during the Greek workshop and update them to harmonize with Gina's weight and proportions. Where the italic could be developed from glyphs of the roman, the Greek called for original outlines to prevent its characters from relying too heavily on the Latin forms.

Inspection of numerous samples of printed Greek — at Reading, at the Enschedé Museum in Haarlem, at the Plantin-Moretus Museum in Antwerp — contributed to a greater understanding of the rhythms of the Greek alphabet and the variations of legible forms. It took time (and a good deal of additional feedback from Gerry Leonidas) to understand some of the subtleties of the script, but it was more of a challenge to get the Greek characters to blend with Gina than it was to keep them true to their origins. *(See figure 22.)*

Whereas the italic is an exaggeration of the roman forms in many ways, the Greek is built from an entirely different vocabulary of strokes and contrast. While this helped the Greek distinguish itself from the other text, it made it difficult to complement it. In the end, the best techniques from getting the Greek to work well with the roman and italic was to set similar proportions for the round characters in the lowercase alphabets and then fit each alphabet well enough to produce a similar colour. *(See figure 23.)*

5.3 Figures and Mathematical operators In many respects, the figures and symbols are another complementary script within Gina, much like the italic and Greek.

The figures — in all their various forms within each font — need to share proportions, patterns of contrasts, and other formal qualities with the alphabetic glyphs. However, the numbers do not share many recurring shapes with the letters, so adding them to the font was less straightforward than adding letters. Determining a direction that fit well with the rest of the characters became a longer process than expected, with many false starts.

1234567890 1234567890

1234567890 1234567890

Figure 24

Lining and oldstyle figures in both Gina and Gina Italic show how the oldstyle figures behave like lowercase characters: some are reduced in size, and forms that extend beyond the baseline or the x-height have less emphasis than those within.

8704∀8705∁8706∂8707∃8708∄8709∅8710∆8711∇8712∈8713∉8714∊8715∋8716∌8717∍8718∎8719∏8720∐8721∑8722
−8723∓8724∔8725∕8726∖8727∗8728∘8729∙8730√8731∛8732∜8733∝8734∞8735∟8736∠8737∡8738∢8739∣8740∤8741∥
8742∦8743∧8744∨8745∩8746∪8747∫8748∬8749∭8750∮8751∯8752∰8753∱8754∲8755∳8756∴8757∵8758∶8759∷8760
∸8761∹8762∺8763∻8764∼8765∽8766∾8767∿8768≀8769≁8770≂8771≃8772≄8773≅8774≆8775≇8776≈8777≉8778≊8779≋878
0≌8781≍8782≎8783≏8784≐8785≑8786≒8787≓8788≔8789≕8790≖8791≗8792≘8793≙8794≚8795≛8796≜8797≝8798≞879
9≟8800≠8801≡8802≢8803≣8804≤8805≥8806≦8807≧8808≨8809≩8810≪8811≫8812≬8813≭8814≮8815≯8816≰8817≱88
18≲8819≳8820≴8821≵8822≶8823≷8824≸8825≹8826≺8827≻8828≼8829≽8830≾8831≿8832⊀8833⊁8834⊂8835⊃8836⊄8
837⊅8838⊆8839⊇8840⊈8841⊉8842⊊8843⊋8844⊌8845⊍8846⊎8847⊏8848⊐8849⊑8850⊒8851⊓8852⊔8853⊕8854⊖
8855⊗8856⊘8857⊙8858⊚8859⊛8860⊜8861⊝8862⊞8863⊟8864⊠8865⊡8866⊢8867⊣8868⊤8869⊥8870⊦8871⊧88
72⊨8873⊩8874⊪8875⊫8876⊬8877⊭8878⊮8879⊯8880⊰8881⊱8882⊲8883⊳8884⊴8885⊵8886⊶8887⊷8888⊸8889⊹88
90⊺8891⊻8892⊼8893⊽8894⊾8895⊿8896⋀8897⋁8898⋂8899⋃8900⋄8901⋅8902⋆8903⋇8904⋈8905⋉8906⋊8907⋋890
8⋌8909⋍8910⋎8911⋏8912⋐8913⋑8914⋒8915⋓8916⋔8917⋕8918⋖8919⋗8920⋘8921⋙8922⋚8923⋛8924⋜8925⋝8926
⋞8927⋟8928⋠8929⋡8930⋢8931⋣8932⋤8933⋥8934⋦8935⋧8936⋨8937⋩8938⋪8939⋫8940⋬8941⋭8942⋮8943⋯8944⋰89
45⋱8946⋲8947⋳8948⋴8949⋵8950⋶8951⋷8952⋸8953⋹8954⋺8955⋻8956⋼8957⋽8958⋾8959⋿10885⪅10886⪆10887⪇10
888⪈10889⪉10890⪊10891⪋10892⪌10927⪯10928⪰10929⪱10930⪲10931⪳10932⪴10933⪵10934⪶10935⪷10936⪸10937⪹1093
8⪺10949⫅10950⫆10955⫋10956⫌

100,000 Digits of π: 3.14159265358979323846264338327950288419716939937510582097494459230781640628620899
86280348253421170679821480865132823066470938446095505822317253594081284811174502841027019385211055596
4462294895493038196442881097566593344612847564823378678316527120190914564856692346034861045432664821
3393607260249141273724587006606315588174881520920962829254091715364367892590360011330530548820466521
384146951941511609433057270365759591953092186117381932611793105118548074462379962749567351885752724891
2279381830119491298336733624406566430860213949463952247371907021798609437027705392171762931767523846
74818467669405132000568127145263560827785771342757789609173637178721468440901224953430146549585371050
7922796892589235420199561121290219608640344181598136297747713099605187072113499999983729780499510597
31732816096318595024459455346908302642522308253344685035261931188171010003137838752886587533208381420
6171776691473035982534904287554687311595628638823537875937519577818577805321712268066130019278766111959
0921642019893809525720106548586327886593615338182796823030195203530185296899577362259941389124972177
52834791315155748572424541506959508295331168617278558890750983817546374649393192550604009277016711390
0984882401285836160356370766010471018194295559619894676783744944825537977472684710404753464620804668
425906949129331367702898915210475216205696602405803815019351125338243003558764024749647326391419927260

Figure 25

Dense blocks of figures and symbols set 9/12 create patterns that help to identify characters with incongruous stroke weights.

The figures have many variants in each font: tabular and proportional spacing; lining and oldstyle forms; and small forms in different vertical positions for use as superiors, inferiors, numerators, and denominators. The versions that differed only in their spacing or their vertical position could be made with components, but the original outlines all required testing and adjustments of their own. *(See figure 24.)*

The priority for the mathematical operators was to determine stroke weights and proportions that would blend well with a text face like Gina. Using the glyphs contained within only one of the Unicode sections covering math symbols as proof of concept, a distinction could be seen between the symbols that were taken from text forms — alternate versions of Greek characters, primarily — and those that were largely combinations of geometric forms. Rather than give the geometric forms too calligraphic a treatment, it made more sense to establish proportions that allowed them mix well with Gina's numbers and then apply monolinear weight to the strokes. Even with this simplification of Gina's overall approach to form and contrast, all the symbols still needed some adjustments to produce an even texture. Vertical strokes had to be made slightly thicker than horizontal ones to compensate for optical distortion, for instance, and distracting dark spots resulting from the intersection of certain elements had to be corrected. *(See figure 25.)*

àáâãäåāăǎảầấậắằẳẵặ
àáâãäåāăǎảầấậắằẳẵặ

Figure 26

All the glyphs in each row of accented characters share a common base glyph with one or more combining accents added as components. Although the component information and most of the marks could be copied directly to the italic without any transformation, the horizontal positioning had to be adjusted for each glyph.

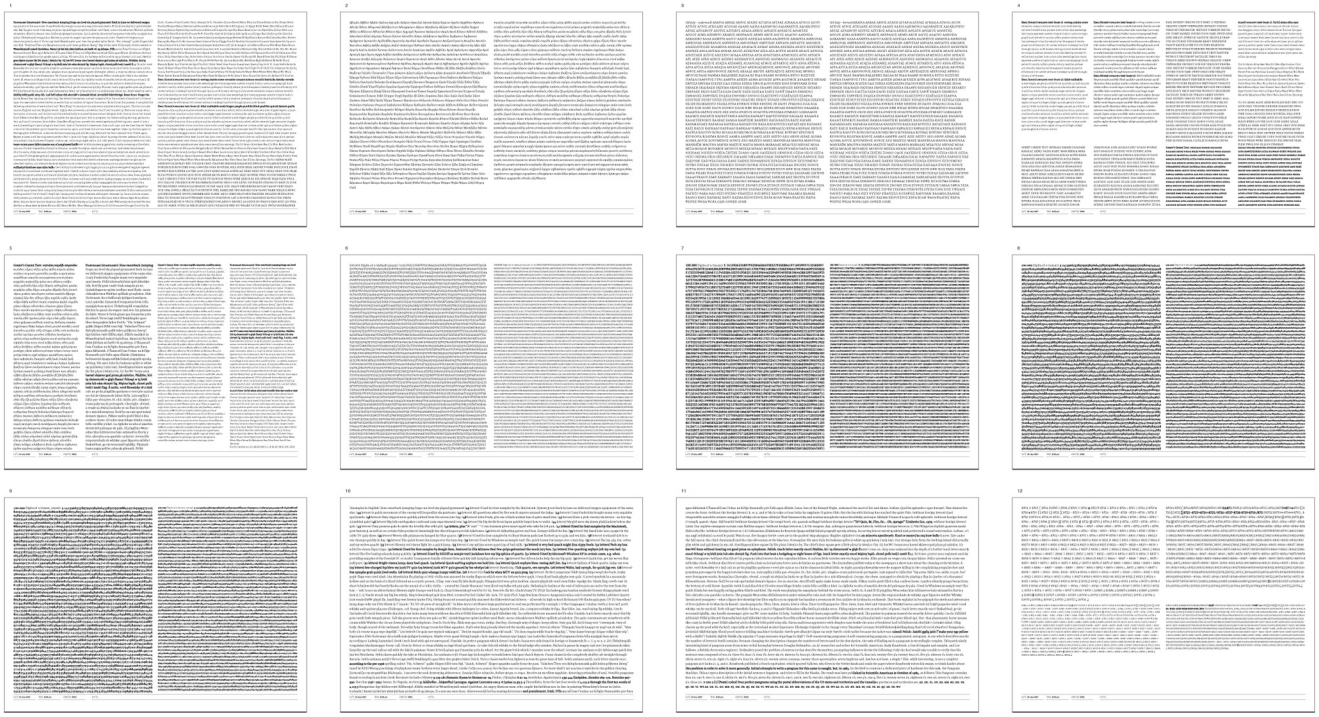


Figure 27

Page thumbnails from a typical spacing test on 21 July 2007 suggest the amount of material that had to be produced and evaluated in order to check the form and fit of the hundreds of unique glyphs in both Gina and Gina Italic. Lengthy text samples like this were especially necessary to look for aberrations in the overall page colour caused by problematic glyphs.

6 Extending the character set

Adding punctuation, accented glyphs, symbols, and stylistic alternates to Gina and Gina Italic demanded a much more methodical approach than the earlier phases of the fonts' design. While it was possible to tinker with the basic glyphs as the design developed, the extended character sets included groups of glyphs that required systematic handling of some kind or another, or combinations of existing glyphs that were precariously linked together within FontLab.

Despite the challenges of a few tricky glyphs, extending the character set was a straightforward design task that built upon the formal conventions established within the basic alphabet. New glyphs shared the same use of the pen metaphor and the same handling of details. The same techniques for correcting light or dark spots within a character could be used. The difficulty was keeping track of any changes to these supplementary marks, since most changes made to the roman version had to be duplicated in the italic, and most of the extended characters (aside from punctuation marks) shared component elements that were affected by any changes to a glyph's outlines.

Adding characters allowed Gina's design brief to evolve beyond its original scope, but adding them sporadically rather than according to a predetermined plan made it difficult to manage the increasing complexity of the fonts. Fortunately, designing and building new glyphs and writing new OpenType features to access them in small bursts led to a much greater understanding of how all these pieces connect within FontLab, and certainly led to a better idea of how to simplify the process.

The most difficult aspect of the ever-expanding assortment of glyphs, however, was constructing test documents in Adobe InDesign to review the fonts as they grew. Character indices were sufficient to test the basic appearance of glyphs, but did not show how well glyphs combined with others and affected the overall colour of text. For Gina, a typeface intended from the start to work for lengthy texts set in fairly small sizes, it was important to see how glyphs performed in context. Therefore, the daily updates to the fonts were accompanied by a swiftly growing set of test documents incorporating foreign languages, in-line and display equations, structured texts articulated with multiple type styles, lists of words testing specific character combinations, dense blocks of text meant to uncover textural anomalies, and so on.

7 Future development

Gina is unfinished. The work completed this past year is in many ways a series of tests establishing a direction for developing Gina into a larger family that can fulfill the more ambitious implications of its brief.

In its current state, Gina is a functional typeface that can be used to set dense, readable passages of text. It has a personality of its own. It embodies an approach to the design of scripts and symbols that allows them to relate to one another in a way that is complementary yet distinct. But there is still much to do.

7.1 Gina Italic Gina Italic still needs to be developed to the same level as the roman. Although the roman face benefits from the development and testing of extensive kerning, there was not sufficient time to repeat that process with the italic. Kerning the roman resulted in numerous, subtle changes to its fit and even some of its outlines, and the end result significantly enhanced the look of text set with the face. Gina Italic will remain a second-rate face until it can be fine-tuned in a similar manner.

Less critically, the italic still needs a few more glyphs to serve as a proper complement to the roman. Although it would be redundant to duplicate the full set of upright mathematical symbols, the italic could still use its own set of small capitals and a Greek alphabet more distinct from its upright style.

7.2 Mathematical symbols The current set of mathematical symbols embodies one full codepage from the Unicode standard, but not a fully functional set of marks. The available symbols are varied enough to establish how different shapes could be constructed to mix well with Gina, but another, more extensive phase of research will be needed to refine and extend this set to reflect the operators that would actually be most useful for a wide variety of mathematical texts.

Just as Latin letters were made available in small optical sizes, it would be useful to have the full set of Greek glyphs available for equations requiring alphabetic superiors and inferiors.

This version of Gina was optimised for common desktop publishing software (primarily so testing could be restricted to a manageable set of technical issues). In reality those are not the tools commonly used to typeset mathematics, and in the end Gina will probably need to be reëngineered for a different production environment.

7.3 Extending the family Gina's suitability for most publishing needs will be limited until it has complementary bold and bold italic faces to round out the family. For even more sensitive typesetting, it would be helpful to have bold variants that distinguish between the weights that work best for emphasis within text and those for display text. In either case, it will be useful to set up a multiple-master workflow so the most desirable weights can be explored and tested. Gina's text weight developed slowly alongside the many iterations of its overall design, but a more systematic method of exploring weights would make it easier to expand the overall range.

Also, the fonts contain a vast array of accented characters to set many languages, but those forms have been constructed according to the bias of a native speaker of English. Another phase of research would be needed to review how the available glyphs compare with a broader range of linguistic and visual conventions.

8 Conclusion

Gina took a long, meandering path to its current state. As an academic project, it was reasonable — if not preferable — to stop along the way and explore variations, do additional research, or experiment with techniques for design or production that might not be fruitful. Future typeface projects may not offer the same luxuries.

Fortunately, taking on challenges a few at a time — discovering how each decision and each task prepares the way to the next — made it possible to learn how to plan a better typeface. If accented characters are needed, for example, the breadth of that set should be determined early so that glyphs may be assembled rapidly and efficiently. Implementing multiple masters to test a variety of formal ranges will make it much easier to expand a typeface into a larger family. Many repetitive tasks such as repositioning components or adjusting the stem weights of new optical sizes are instructional the first few times, but better handled with automation once the principles are understood.

Gina provided less concrete and perhaps more critical lessons as well. Learning to perceive and manipulate subtle variations in shape, in weight, and in proportion was the most difficult part of this past year. It is easy to see improvement in these areas, though, if only by looking back at how rapidly Gina improved in the later stages of its development compared to its awkward early days. Learning how to discern — and hopefully enhance — the relationships within a set of shapes became an entirely new way to understand not only typefaces, but also typography in a broader sense. Tapping into these skills, ones that will apply to typeface design and more, were the real result of Gina's design brief.

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