The Case for Cross-Breeding Fonts

Topics: Technologies that permit generating a new typeface that shares the characteristics of two or more parents.

Column first appeared: April 1994, *Computer Artist* magazine.

Source of this file: An expanded version of the column as it appeared in the 1996 book *Makeready.*

Author's comment: The idea of morphed typefaces was one whose time never came. None of the products featured here have been available in the last ten years. Even Adobe's highly-touted Multiple Master technology never made it into the mainstream.

This archive, to be released over several years, collects the columns that Dan Margulis wrote under the *Makeready* title between 1993 and 2006. In some cases the columns appear as written; in others the archive contains revised versions that appeared in later books.

Makeready in principle could cover anything related to graphic arts production, but it is best known for its contributions to Photoshop technique, particularly in the field of color correction. In its final years, the column was appearing in six different magazines worldwide (two in the United States).

Dan Margulis teaches small-group master classes in color correction. Information is available at http://www.ledet.com/margulis, which also has a selection of other articles and chapters from Dan's books, and more than a hundred edited threads from Dan's Applied Color Theory e-mail list.

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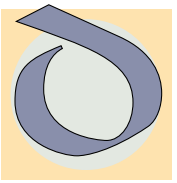
The Case for Cross-Breeding Fonts

With tens of thousands of typefaces on the market, why in the world would one want to morph existing ones? The creative designer may find some reasons.



aniel Berkeley Updike, the foremost type historian of this or any other century, would be appalled at the thought of the proliferation of fonts we have available today. Nearly 100,000 faces are now being marketed, and even though many are the same fonts issued under different names by different vendors, the number of discrete families of type must be close to five figures.

Updike, writing in 1922, took the view that *seven* families of type (and he named them) were all a composing room needed. He was full of scorn for anyone thinking that more are necessary.

"We are told that if we know the truth, it will make us free; and *it will,*" he seethed. "If we know the truth typographically we shall be freed from using the many poor types that are offered us. There are hundreds of pages in founders' specimen-books; and yet examples of almost every type that the world ought ever to have seen could be shown in a thin pamphlet."

Figure 11.1. *Multiple Master fonts allow virtually unlimited, first-generation variants of a single design. Everything on the opposite page derives from four Adobe originals. At left, Ex Ponto, a script, varies as to boldness only. Bottom right, 1996's Adobe Jenson adds an optical-sizing axis: as the sample moves left to right, the type becomes thinner and more elegant, more suitable for larger-size printing; as the sample moves down, the type gets bolder. Scattered throughout the page in blue is Jimbo, and in red is Nueva. Both of these vary not only in weight but in width.*

It is with no small amount of trepidation that I risk rousing Updike's ghost by discussing an even more incendiary means of feeding the typeface explosion.

In the same way that our friends in the motion picture industry can "morph" images—that is, create intermediate versions of two endpoints—technology now allows us to create hybrid typefaces that bear some of the characteristics of two different parents. Consequently, it is now possible, with some difficulty, to generate a nearly infinite number of typefaces, of which 99 percent are entirely useless.

This column is about the other one percent.

In the approximately two years since this column was written, the situation has not changed. There are still only two non-Adobe Multiple Master faces available as far as I know, and non-Mac users are out of luck.

Those wishing to embark on this dubious adventure have three different tools at hand. Of these, the purest and cleanest is to use a Multiple Master font, if you can find one. Unfortunately, less than a dozen exist now, they only work on the Macintosh, and only two, to my knowledge, are available from any source other than Adobe.

Masochistic readers may try their luck with a dedicated font editor such as Macromedia's Fontographer. This program allows us to mix any two typefaces in any format in any percentage. The technical results are, to put it as charitably as possible, highly variable, and a good knowledge of the editing features of the program is necessary to clean up the inevitable bad or missing characters in the hybrid face.

FontChameleon was discontinued in June, 1996, when Adobe purchased Ares. See the Afterword to this Column.

A third alternative is about to be released by Ares Software. Its FontChameleon program (available for either Mac or Windows at about $200 street price) carries descriptors of 200 standard fonts in a proprietary format, set up to match their Adobe equivalents for spacing. The actual fonts can be generated as is, or obliqued, and/or condensed or expanded, and/or with a larger x-height, or as morphs with other Chameleon faces. Non-Ares faces don't work, and at present there are no italic faces or scripts.

When Chameleon first was announced, breathless press releases trumpeted the fact that we now could make a typeface that was a cross between Avant Garde and ITC Bookman. When I read this, I thought of the old drinking song, mourning the loss of a comrade who was

> *Regrettably, no longer here:*
> *He tried to mix Cointreau and beer.*

WHAT IF THE HEADLINE DOESN'T FI

Figure 11.2. *Futura Bold Condensed all caps, the style of the headline of the author's magazine column.*

The Squeeze is On

Many has been the time, over these past years of writing, that I have visualized with some pleasure my hands around the neck of the individual who decided that the headline of my *Computer Artist* column would consist of one line of 30 point Futura Bold Condensed caps, set to a maximum width of 33 picas. That miserable excuse for a design allows me around five words for a title. Writing something to fit the space of Figure 11.2 is child's play by comparison.

This is a more realistic example of where one might want a hybrid face. Since the style of this headline is supposed to match others in the magazine, we can't change its specs very much. Nobody will notice if the point size is reduced by one, and we can tighten letterspacing a little, but we can only get so far with these measures.

We can gain quite a bit more by condensing the shapes of the letters themselves. Just about every desktop application permits changing width without affecting height.

Doing that without torpedoing quality is not so simple. Futura Bold Condensed is what typographers call a "grotesque" sans-serif. There is nothing derogatory about this term; most popular sans-serif faces, such as Helvetica, Franklin Gothic, and Univers, are grotesques too. The defining characteristic of these faces is that the weight of the stroke is the same everywhere.

It follows that if we change width without changing the height, the whole identity of the face goes down the tubes.

Consider "Helvetica Narrow," a standard "font" on almost every printer. The reason for the quotation marks is, Helvetica Narrow is not a true face at all; it is just Helvetica, with width reduced to 82% of normal.

In Figure 11.3, observe how the tops and bottoms of the rounded letters on the third line are thicker than the sides. Forget about it! A real typographer cannot use an atrocity like this.

As the second line of that sample shows, a condensed version of Helvetica exists that is faithful to the original. That isn't big news, but what *is* big news is that we can now create any number of intermediate semi-condensed faces that split the

difference, and there should be little or no deterioration in quality. This approach could also be used to create a face darker than Helvetica, yet lighter than Helvetica Medium.

If the font we want to use is one of the few available in Multiple Master format, that is the best option. All of the sans-serifs currently on the market are two-axis fonts, meaning that one can produce correctly proportioned faces that differ not only in width but weight. This yields a frightening variety of fonts: Adobe's Myriad face lives up to its name by offering 247,016 possible variations. More frightening still is the inability to name the results sensibly. If we generate a font that is roughly Myriad Semibold Semicondensed, its name is going to be something like MyriaMM_504 wt 420 wd, so if we use more than one of these hybrids, telling them apart will not be easy.

Crossbreeding a typeface with a different member of its own family, as Futura with Futura Condensed, frequently works without a hitch in Fontographer. Things get tougher if the two parent fonts are not related. Even slight variations in the way characters are drawn cause undesirable artifacts, as in Figure 11.4. If the shapes of the letters are completely different—which often happens with *a, g, W,* and others—the program gives up.

FontChameleon niftily finesses this problem, allowing the user to specify which of the two parent fonts will take precedence if there are characters that are completely incompatible. This allows us to undertake the dangerous but occasionally rewarding task of making a true hybrid out of two unlike faces.

Moderation and Mugwumps

The most obvious reason for morphing faces from two different families is when there is no choice. If a face ranges from book weight to bold we can create many different versions, but only at points between the two. If we are looking for a light or an ultra weight we are out of luck.

Going back to Figure 11.2: we may need to condense the face to fit an occasional extra letter, but there is no member of the Futura family narrower than the one we are currently using. Therefore, nothing to cross-breed with—except a

Figure 11.3. *Artificially condensed faces, such as Helvetica Narrow (third line) can be detected by an unnatural narrowness at the sides. Contrast the shape of the o with that of the true Helvetica Condensed (second line) and the base face (first line).*

Worse,
Worse than
Grotesque

member of another type family. Univers, which *does* have an ultra-condensed cut, is a clear choice. Cheating by mixing 85 percent Futura Condensed and 15 percent Univers Ultra-Condensed should not be detectable.

Fifteen percent is a good maximum to keep in mind for blends. The dangers of going higher are clearly seen in Figure 11.5 in the four letters set in a face I call Mugwump Roman, a 50–50 FontChameleon split between Times Roman and Bodoni.

Even forgetting the problem at the base of the *b*, this typeface is worthless. It can be printed, it can even be technically classified as a transitional face, in the same group as Baskerville and Fournier. But overall it merits the name I have given it. It straddles the fence between two contradictory positions, with its mug on one side and its wump on the other, looking forlornly in every direction at once, without a future because it has no past, an ugly child tormented by competing, incompatible memories of its elegant, eminent parents.

And yet, blending in moderation can be a positive thing. The face we now call Caslon No. 540, one of the Updike Seven, shares a drawback with most of its eighteenth-century brethren. They were designed for exactly what the main use for them then was: printing in books. Naturally, since coated paper did not exist at the time, Caslon judged how good his design was by how good it looked when printed on uncoated paper.

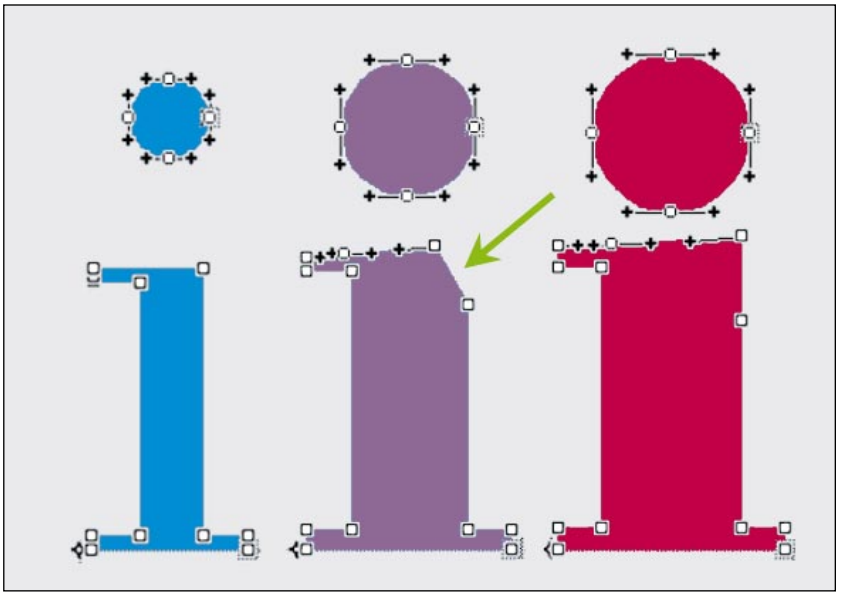


Figure 11.4. *A slight variation in letterform can be enough to throw off a program's morphing capability. Faces in the same family should work well, but here Fontographer's attempt to generate an intermediate weight (center) of Bodoni Antiqua is derailed by the slightly different shapes of the top of the letter in the two parents on either side of it.*

Those working with halftones know that dot gain is much less on coated than uncoated paper. Nobody who knows what they're doing would dream of printing the same color picture on both sheets without compensation. The same principle holds in type. When Caslon No. 540 prints on an uncoated sheet, it spreads. But on a coated stock, such as in a magazine, it looks peculiarly insubstantial.

If we compensate for this by generating a new font that is 95 percent Caslon No. 540 and five percent some bolder face, not only will we have a better type for a magazine, but we will actually be indulging in one of typography's best traditions, the modification of form to take account of adverse conditions.

Using 9-point or smaller type is an adverse condition. Having newsprint as the paper is an adverse condition. Being forced to use a laser printer rather than a high-resolution imagesetter is an adverse condition. And, with the wide variety of color and graphic effects we now can achieve, there is every opportunity for designers to engineer in further adverse conditions, such as printing across images, or in light colors, or over a similar color,

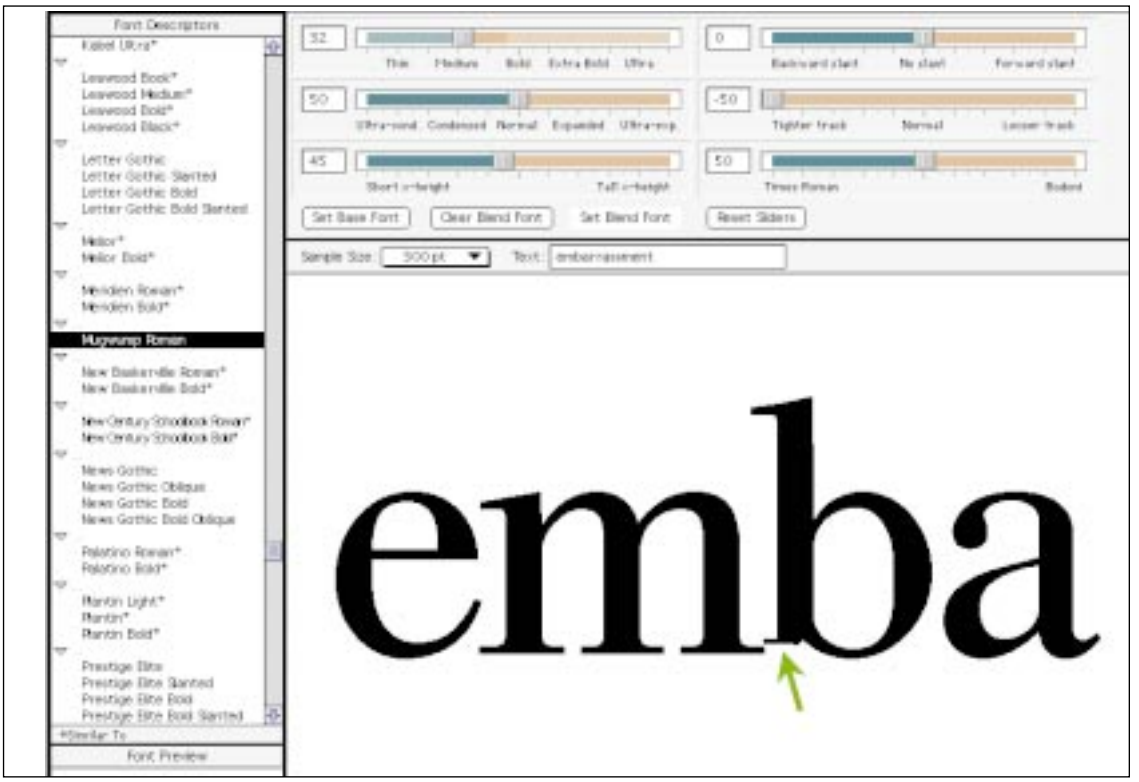


Figure 11.5. *Blending typefaces runs into problems where the two parents have different characteristics. Here, FontChameleon attempts to combine Bodoni, which has a spur at the base of the lower case b, with Times, which doesn't. The combined letter is therefore not a success.*

in addition to the old reliables, knocking out of a dark background or setting in all capital letters.

The sensitive typographer responds to adverse conditions by emphasizing legibility. That usually means some sacrifice of elegance and style.

C.H. Griffith's 1931 face Excelsior, shown in Figure 11.6, typifies a group of faces—Corona, Gazette, Imperial, Ionic, Textype—that were designed for the most horrible of all printing conditions, namely, a newspaper. Standard book faces were not legible enough for the demands of newspaper publishers. This class of faces therefore avoids subtle detailing. There are no fine lines that might fail to print. X-heights are large, enhancing readability at small sizes. Acutely angled stroke intersections, where ink could build up into a blotch, are ruthlessly excised.

Technology changes terminology. In the metal days, "font" meant a single size of a single face. Although one still sees that definition from time to time, it is obsolete: now, "font" is synonymous with "typeface." Prior to Multiple Master, one could redefine "font" as meaning the minimum package that one could purchase from a type vendor. That inclusive definition would have covered the metal days, when one had to buy different sizes separately. Adobe prefers to use the term "instance" for an individual face that has been generated by a Multiple Master, but a lot of people call it a "font" anyway.

Excelsior and its prewar kin succeed in doing what they were designed for. They are, however, so lacking in style and grace that it is extremely unusual for anyone to want to use them for any other purpose than newspaper text. Up until now, that is. If we'd like to make a face more legible, what could be better than blending in five percent Excelsior, the champion of clarity?

The Size-Dependent Design

This brings us to the lost art of optical scaling. When type was set in metal, a "font" meant one size of a given typeface. Each size had to be mastered individually, instead of generating every size from the same design, as we do today. There was thus no technical reason for 6-point Times Roman to be the same typeface as 12-point Times Roman—and a persuasive artistic reason, the difficulty of printing at small sizes, for it *not* to be.

Consequently, the designers of metal faces used the dinosaur equivalent of blending with Excelsior. That is, they made the x-height larger as size decreased; they cut down on contrast between thick and thin strokes; they lessened inktraps; and they put more space between letters.

In the desktop world, these nuances were nonexistent until the release of Adobe's Minion Multiple Master face. This font adds a third axis, optical scaling, to width and weight. Figure 11.6 displays three of the 2,792,292 possible Minion variants that this Multiple Master can spit out.

Note how the "72 point" sample at bottom, like the Galliard below it, has a stylized, sculpted look. Very elegant—as long

as the type is large enough for us to appreciate it. At smaller sizes, the sculpting detracts from legibility. Neither face is effective at 10 point or smaller, in my opinion.

In the early nineteenth century, typographic fashion called for simple, classic letters with no diagonal stress, and for extreme, not to say ridiculous, contrast between the lightest and thickest parts of the stroke. The principal practitioners of this "modern" style, Italy's Giambatista Bodoni and France's Firmin Didot, took advantage of advances in metal-cutting technology to create such thin lines in their designs that printers have been cursing their names ever since.

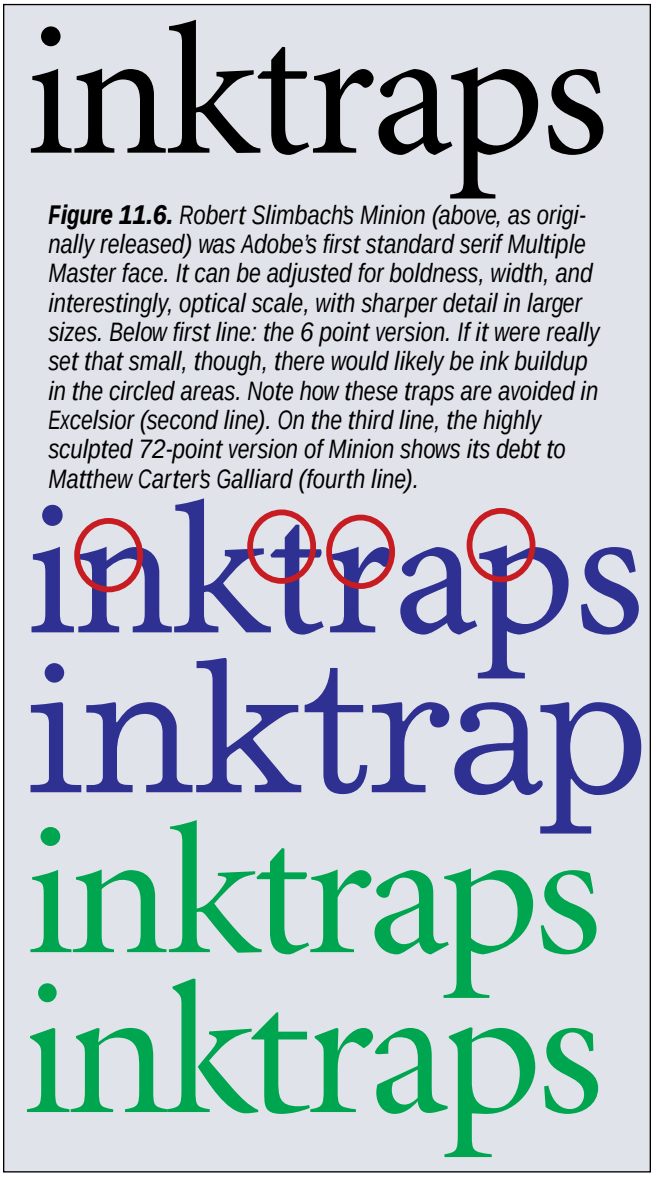


Figure 11.6. *Robert Slimbach's Minion (above, as originally released) was Adobe's first standard serif Multiple Master face. It can be adjusted for boldness, width, and interestingly, optical scale, with sharper detail in larger sizes. Below first line: the 6 point version. If it were really set that small, though, there would likely be ink buildup in the circled areas. Note how these traps are avoided in Excelsior (second line). On the third line, the highly sculpted 72-point version of Minion shows its debt to Matthew Carter's Galliard (fourth line).*

After being dormant for most of the century, there has been a recent revival of interest in these faces for advertising use. IBM, Delta Airlines, and Hilton Hotels, among others, use "modern" faces as their corporate identity fonts.

Modern faces are the obvious argument in favor of optical scaling. Having only one base drawing will either get lines that are too thin to print in text sizes, or that are too thick in large sizes (let alone a letter as large as that of Figure 11.8), or, more commonly, both problems at once.

Holding the fine lines of modern faces is trying enough when dealing with black type on a white background. Under any other circumstances acceptably

Figure 11.7. *Art directors for Apple Computer conceived of cross-breeding ITC Garamond and ITC Garamond Condensed, and wound up with one of the world's best known advertising looks. The morphed face, originally called Apple Garamond, was some years later released under the name ITC Garamond Narrow.*

legible printing becomes impossible, as Figure 11.9 indicates.

It is tempting to attack this problem by cross-breeding Bauer Bodoni and Bauer Bodoni Bold. That might work if the entire typeface were too light, but not here. Bauer Bodoni Bold has the same thin areas as the text weight. Blending with it will leave us as badly off as before.

What we really need for this is a typeface with no thin strokes. There is exactly such a class of typefaces, the Egyptians or slab serifs. Like the grotesques, these faces have no variation at all in stroke weight. The only difference is that they have serifs. Examples of this kind of face are Memphis, Rockwell, and Stymie. For the comparison in Figure 11.9, I used a more recent face, Glypha, which also has the plus of a large x-height. I hoped to retain the overall feel of Bodoni while beefing up the lighter areas.

Knowledge and Taste

Further growth of these technologies will depend on how important a force they become in the design community. There have been few Multiple Master font releases, presumably because they are hideously difficult for the designer to create.

Fontographer and its competitors will likely get more intelligent in their abilities to morph unlike faces; for the time being, considerable typographic expertise, not to mention intestinal fortitude, is required to even think about using this method.

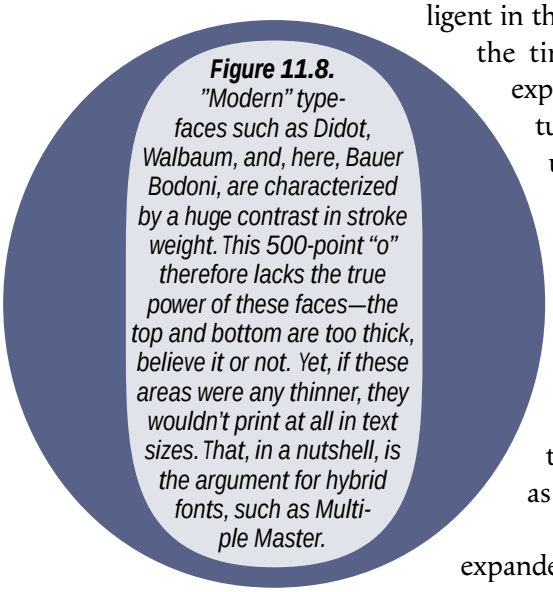


Figure 11.8. *"Modern" typefaces such as Didot, Walbaum, and, here, Bauer Bodoni, are characterized by a huge contrast in stroke weight. This 500-point "o" therefore lacks the true power of these faces—the top and bottom are too thick, believe it or not. Yet, if these areas were any thinner, they wouldn't print at all in text sizes. That, in a nutshell, is the argument for hybrid fonts, such as Multiple Master.*

FontChameleon, the simplest tool to use by far, produces fonts of reasonable but variable quality from its proprietary outlines. In its first release, its lack of any italic faces prevents its use as a low-cost method of acquiring a type library. (Ares states that italics and scripts will be released as an upgrade later this year.)

It would be much more useful if it expanded the range of available morphs by

exaggerating the cuts of some of its types. Instead of bundling a face with its standard condensed and bold partners, Ares would be better advised to release it with a super-condensed and an ultrabold. A Bodoni-like face with thin areas optimized for 100-point and up would also be helpful in generating new fonts for use at large size.

Millions upon millions of new typefaces. When will we ever have enough?

The slogan in Figure 11.7, as familiar to graphic artists as the half-breed typeface that states it, suggests an answer.

Or, to look at it another way, one of Updike's seven base fonts was a Scotch-style roman called Oxford, dating from 1798. He used it for the text of his seminal book *Printing Types,* explaining "It seems to me a type of real distinction." In 1946, Griffith

Figure 11.9. *The thin lines of Bauer Bodoni (left; and top sample below) invite disaster if knocked out of a colored or black background, such as the one below. A font cross-bred with something more legible (right; and bottom sample below) preserves the flavor, not the problem. The quotations are from Daniel Berkeley Updike.*

There is, therefore, little excuse for thinking that conditions of labour to-day are very different from those that long preceded them; and it is important to realize that these conditions were all along factors, as they are now, in the problem of turning out good printing. Types and books reflect the state of the arts around them, because on one side typography is an art; but they are influenced by trade conditions, because it is also a trade. Not to face these two facts, or to neglect either one or the other, is merely to fool one's self!

The outlook for typography is as good as ever it was—and much the same. Its future depends largely on the knowledge and taste of educated men. For a printer there are two camps, and only two, to be in: one, the camp of things as they are; the other that of things as they should be. The first camp is on a level and extensive plain, and many eminently respectable persons lead lives of comfort therein; the sport is, however, inferior! The other camp is more interesting. Though on an inconvenient hill, it commands a wide view of typography, and in it are the class that help on sound taste in printing, because they are willing to make sacrifices for it.

reworked Oxford for use in a biography of Thomas Jefferson. He called the revised face Monticello, and it was a remarkably fine effort, later marketed by Mergenthaler.

You guessed it. For all the superabundance of faces on the market today, you can't find either Oxford or Monticello.

No matter how many new faces may be released, no matter how many hybrids we create, the best artists will always be plagued by the nagging suspicion that, maybe, just maybe, somewhere in history—or somewhere in the future—there is a type that is the one and only right one for the next job. ●

Afterword

The secret of FontChameleon's great flexibility was an extremely compact and efficient way of storing font descriptions electronically. Typically, a Chameleon base font description was less than a tenth the size of an equivalent PostScript Type 1 printer font.

This fact was not lost on industry leader Adobe, which in June 1996 bought FontChameleon's parent, Ares, largely for its font compression technology—and promptly scuttled Chameleon.

Though Chameleon may be dead, its influence will therefore presumably live on in future generations of laser printers. It never made much of a dent in the market in its nearly three years of existence, a testimonial to the difficulty of the cross-breeding field.

Multiple Masters, despite enthusiastic support from Adobe, have not caught on either. It is correct that many of Adobe's best-selling font packages are Multiple Masters. On the other hand, nobody else is manufacturing them, although anyone who uses Fontographer, which supports the creation of Multiple Master faces, could conceivably do so. And shockingly, Multiple Master fonts still work on Macintosh only.

Font blending, however, remains a hot topic for the serious typographer. In his 1995 book on type design, *Fontographer,* Stephen Moye includes not just a section on how to do it in Fontographer but also one on Chameleon. He concludes that regardless of how one starts, final touchup in Fontographer is almost inevitable. If so (and I agree that it is) that is a pretty severe limitation for those who aren't type specialists.

Moye has little use for the intricacies of Multiple Master. His only practical suggestion for the format was to use it to impose heavier kerning and tighter letterspacing as the font increases in size—without risking the consequences of altering the shape of the characters.

The two most ambitious and widely publicized type design projects of our decade each, in its own way, demonstrated the frustrations and dangers that go hand in hand with the undoubted virtues of Multiple Master.

The two projects resembled one another, in that the foremost American typographers of our time headed teams trying to produce updated versions of the works of classic Italian designers; that extended trips to Europe were taken to investigate the typographical detritus left by the Italians; that the projects were hyped as being the last word in historically informed type design, combining the brilliance of the old masters with the advantages of the Bézier curve; and that those who were waiting for results from all this research were in danger of dying of old age before finding any.

For the reasons stated in Figure 11.8, Bodoni faces seem like the most tempting possible target for Multiple Master treatment. So, when International Typeface Corp. commissioned a team led by Sumner Stone for a remake, to be called ITC Bodoni, it announced that the final product would be a Multiple Master.

Several years and lots of dollars later, a pretty decent series of faces emerged, but *not* as Multiple Masters. There were in fact multiple versions of each face, each with its thinnest areas optimized for a certain range of sizes, but the execution of the Multiple Master was evidently too difficult even for so august a group.

Column 12 will give you an idea of how much I admire the designs of Adobe's Robert Slimbach. Nevertheless, had I written Column 2 ("The Curse of Trying Too Hard") after the 1996 release of Slimbach's Adobe Jenson, I'd have used Adobe Jenson as an example of where too much sophistication hurts.

Nicolas Jenson (1420–1480), a Frenchman known mostly for his work in Venice, was the first to make successful use of what we now call Roman type. His designs were the clear forerunners of the faces now classified as Venetian Old Style. Francesco Griffo's 1492 Jenson remake, now known as Bembo, is the oldest face still in common use.

Jenson paid the price for being first; his types were pleasing but inconsistent and difficult to read. That's virtually the opposite of Slimbach, whose style is one one of smooth precision. In trying to reconcile the two, Slimbach was seduced by the Multiple Master format into leaving in too many of the eccentricities of Jenson's experiment. For example, in the bottom half of Figure 11.1, you can see in the Adobe Jenson *e* a useless spur on the outside of the cross-stroke. Elegant in very large sizes, perhaps, but counterproductive in the overwhelming majority of uses. The overall design was nice, but Slimbach would have been better off releasing two separate cuts than a single Multiple Master.

Bleeding-edge font morphing may not be for everyone. The idea of modifying existing fonts, though, is decidedly mainstream. Nowadays, it is commonplace for designers to use an illustration program to convert the shapes of existing types into editable outlines, so as to alter them for use, say, in a corporate logo. And diehard type aficionados who design full alphabets in Fontographer often begin by opening and using a complete existing font as a base, which is then modified extensively.

Updike and Jenson must be turning over in their graves. ●