

Secrets of Extreme Screen Display Legibility

Don Lancaster

Synergetics, Box 809, Thatcher, AZ 85552

copyright c2005 as GuruGram #50

<http://www.tinaja.com>

don@tinaja.com

(928) 428-4073

By suitably combining proper **.PDF** document prep techniques and a full size digitally addressable LCD display with the latest versions of **Acrobat 7** or any **Acrobat 7 Reader**, you can **now** create on-screen displays which today have **better** legibility than an ink-on-paper printed page!

And are bound to further dramatically improve in the future.

I strongly feel that a major threshold has now been crossed, and that...

Most books are NEAR CERTAIN to soon go the way of slide rules, mechanical calculators, litho cameras, or printed circuit tape and dots.

It is almost assured that the upcoming **unexpectedly sudden demise** of books will be helped further along by such events as a student revolt against backpacks, and by the emerging near universal availability of online scholarly materials.

Such as this stunning **early example**.

A Demo

Let's start off with **a demo** so you can see just how good legibility has become...

- (1) Use a hires LCD display, such as an HP pavilion vf15.
Make CERTAIN it is in its 1:1 native resolution mode.**
- (2) Install Acrobat 7 or an Acrobat 7 reader.
Make CERTAIN Cooltype and Smooth Text are on.**
- (3) View an otherwise legibility optimized .PDF file.**

Some Theory

You might reasonably ask how a large blob on a screen is going to look sharper and better than a small ink blob on a printed page.

First, on the printed page side, unless a screen is used, **only one ink color will be permitted at a time**. Further, ink is inherently analog and has lots of degradation opportunities during prepress, production, distribution, and product lifetime.

The screen blob can be **any** shade of gray (or color). Since the human eye can resolve about 64 gray levels, **we have the ability to present as much as 64 times more info in a screen blob than an ink blob**.

Further, if you have a LCD screen with individually addressable color bars, **you can have three times as many resolvable lightable elements as you do pixels**. This exciting new development goes by the name of **subpixel resolution**. I have a tutorial [here](#) and a thorough third party website appears [here](#).

The latest of subpixel algorithms virtually eliminate any color fringing effects and clearly produce stunning results. But there are some severe restrictions as to when and where subpixel resolution can be used...

- **The LCD display MUST be in its 1:1 resolution mode.**
- **Color stripes MUST follow each other HORIZONTALLY.**
- **Imaging drivers MUST be matched to display specifics.**
- **A reformatting delay MAY be needed for initial display.**
- **Subpixel resolution will NOT work on an analog CRT.**

If you try to present finer detail than the spatial resolution of the human eye can deal with, an **integration** or an **averaging** will take place. Several techniques are available to optimize text viewing and minimizing "jaggies" and other sampling artifacts. These are collectively known as **antialiasing**.

A **classic antialiasing** is simply a low pass filter. It **pre** smears out the text being displayed and **reduces** the resolution. Since jaggies and other sampling artifacts are **very high** in frequency, they get reduced a lot more than the text gets smeared, which can give a useful improvement on older displays.

Since we now need image initial display processing anyhow, we can now go to a very much better **true antialiasing**. With a true antialiasing, each pixel will get replaced by the **average** that would result **if a very high resolution display was downsampled**. For instance, we might do a temporary offscreen imaging of a font character at **four** times normal size and resolution. New samples would then be

based on an accurate average of a **4x4 array** of higher resolution pixels. And these true antialiased samples can then be imaged using subpixel resolution techniques.

The details are very much specific to who is doing what. But the bottom line is that we can now in theory make a big screen blob look better than a small ink blob. What we have right now is more than good enough to permanently blow books out of the water. And from here, higher screen resolutions and better **antialiasing/subpixel/presentation** algorithms are a near certainty.

Summarizing, our key tools to extreme screen legibility are...

- (1) **Use subpixel direct digital LCD addressing.**
- (2) **Include a post imaged true antialiasing.**
- (3) **Properly prepare the document for optimal legibility.**

Improving Your Document Legibility

If you are in total control as an original author of the document you are creating, there are many things you can do to increase its viewability and legibility. Some of these are obvious and some are subtle...

- **Use the Acrobat .PDF file format.** Nothing else comes remotely close for platform independence and superb quality.
- **Strongly encourage viewer use of Acrobat 7 along with a high resolution LCD display in its native resolution mode.** Be certain they use both the **CoolType** and **Smooth Text** options. These steps are essential for "better than a printed page" viewing.
- **Avoid any scanned bitmaps**, minimizing those that are absolutely essential. Do use **PostScript** text and **PostScript** stroked graphics when and where possible.
- **Always capture any scanned text with an OCR reader.** Then later convert to actual **Acrobat** text. This greatly improves searchability, appearance, and file sizes.
- **Use "screen optimized" fonts. Favor sans serif fonts.** **Stone** can be especially good here. As is the Adobe **Myriad** font family.
- **Use full color when and where appropriate.** It costs no more. But don't venture too far from **black text on a white background**.
- **Think "byte sized" message units.** Combine a left justification with short kerned paragraphs including extra vertical space.

- **Keep text "fairly wide"**, perhaps 43 characters per line or so.
- **Use bolding and color for emphasis**, rather than italic or underlining. But seek a balance **midway** between garish and drab.
- **Tightly link all figures, line art, or photos to their referring text.** Always placing them sequentially inline when possible.
- **Typeset first and edit last!** Always be ready to add or remove words to create visually "complete" paragraph modules that are totally free of spaciness, widows, or orphans.
- **Provide as many url links as possible.** At least **fifty** in a ten page article. Make sure your links **autotrack** with any editing.
- **NEVER hyphenate!** Change the text wording or the layout instead!
- **Use powerful layout tools.** My **Gonzo Utilities** can do outstanding layouts, text justification and figures and are device independent. But are purposely non-WYSIWYG and have a steep learning curve.
- **Use a "two stage" photo or image access.** Provide a reasonable resolution of 250 pixels or so square in the text that, when clicked on, expands to a full and glorious big hires image...



- **Use several graphic styles for emphasis.** Such as color coded spot colors (perhaps aqua for normal, purple for code, or a rare red for alerts). Seek out an attractive balance on each page that is centered between solid drab black text and grossly mismatched colors.
- **Carefully use outdents and indents to organize and separate any related message areas.** Be consistent and provide navigation aides.

- **Spend lots of extra time in photo post prep.** I prefer to pixel lock all my photos to "architects perspective" having perfect verticals, most shadows removed, and knockout done to carefully selected **backgrounds**. Plus slight sharpening and gamma correction. A few of my tools are found [here](#) and [here](#) and [here](#).
- **Have a consistent set of styles within any story.** And across any related groups of stories.
- **Use only single columns per page.** Arrange viewing continuous, 100 percent magnification and centered as defaults.
- **Make your sourcecode freely available.**
- **Be sure full text PDF indexing is provided by your web server** or other document source . This may need a special server **plugin**.
- **Allow the story to be the size it needs to be.** But always favor short over long. Crop, crop, and crop some more.
- **Carefully spell check and verify all URL's.** Always have a third party proof your final product.

For More Help

More tutorials and utilities on image prep appear in our [Auction Help](#) library.

Lots of additional uses and examples of true antialiasing are in our [Fonts and Images](#) and [Precision Bitmapped Fonts](#) library pages. More on [PostScript](#) and [Acrobat](#) in their separate resource areas. Free [Gonzo Utilities](#) and many use examples are found [here](#).

Additional consulting services are available per our [Infopack](#) services and on a contract or an hourly basis. Additional [GuruGrams](#) are found [here](#).

Further [GuruGrams](#) await your ongoing support as a [Synergetics Partner](#).