Prepress Glossary

White Book Series

Prepress Glossary

Walton Mendelson

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Special references have been made to CreateSpace (CS). These have been indicated textually and by boxing notes in gray. The concepts described are, in all other respects, applicable to other printers.

walton@12on14.us

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Prepress Glossary

The Prepress Glossary is designed to help understand what is necessary to produce books, with emphasis on images and working with digital presses. References to CS (CreateSpace, a print-on-demand company) are included because the initial audience for this book is CS members. If you are working with a specific printer, consult them concerning particular requirements.

Sections on one topic, e.g. Paper, that are one or more pages are also on a gray background.

Bold words within a definition are reference to related entries.

Many words have meanings unrelated to prepress work—no attempt has been made to indicate them.

It is not as important that you know the words as it is you know the ideas. This is not a substitute for manuals on Photoshop, PaintshopPro, etc. Katrin Eismann's books on Photoshop are particularly good.

For a more complete glossary of printing terms see: http://www.printwiki.org. For more information about color and prepress techniques, Dan Margulis's books and columns are all great.

If I have misstated or overlooked anything, please let me know: walton@12on14.us

Walton Mendelson

Glossary

1-bit color: A bit is either on or off, when it describes color it can represent only two colors (2^1). Although it could be any two colors, generally it is assumed to mean black and white.

8-bit color: Eight bits offers 256 combinations, 2^8, thus when it is used to for color, it can represent 256 different colors. These could be 256 different colors, such as a VGA, or indexed color; or it could be **monochrome**.

24-bit color: Twenty-four bits offers 16,777,216 possibilities. In RGB, if the red, green, and blue channels each are 8-bit, then the total number of colors is 256 x 256 x 256, or 16+ million colors.

Absorbency: Also ink absorbency, is the paper characteristic that relates to how much ink is absorbed by paper. Too much absorbency can effect how ink that would normally air dry dries; it can result in dot gain; and it can result in a lack of gloss. It is the opposite of **holdout**.

Achromat: A camera or enlarging lens that has been modified to eliminate or reduce blurring (chromatic aberration) due to focusing on only one color. Most cameras today have achromat lenses, also called apochromatic.

Acid-free paper: A paper with either a neutral or basic pH (≥ 7). Acid in the paper breaks the long molecular chains that make up paper: causing embrittlement and yellowing. Acid comes from environmental sources as well as, and more commonly, the paper itself. Generally, museum grade, 100% rag, is made with cotton fibers. Conservation grade, acid free, is a buffered paper made with wood-based pulp, but is lignin and sulfur free. Often buffers are added to the paper to counteract any formation of acid that might start to occur.

Additive color: Colors produced by adding colors together: **RGB color space**. These are red, green, and blue, such as your monitor, scanner, or camera. See **subtractive color**, **CMYK.**

Addressable resolution: see **resolution**

Adobe Acrobat Distiller: Originally, a program used to produce high quality PDFs for print. It is no longer the only way to created print-ready PDFs. Related to it, is the Adobe PDF virtual print driver, which produces PDFs from nearly any application.

Aliasing: a distortion of the original image when it is reconstructed on screen or in print. Two common forms are **jaggies** and **Moiré patterns**.

Ambient light: the light surrounding an object or area. It effects how we see the color of things.

Analog proofing: a physical (e.g. printed) proof as opposed to a **digital proof** (e.g. a PDF) .

Anti-aliasing: is a method intended to minimize aliasing, see **jaggies**.

Aritfact: a defect in a digital images. It can be caused by hardware or software. See **aliasing**.

Banding: a defect where a gradient seems to be posterized—having perceptible steps or streaks. Here the banding is on top and a smooth gradient below. It can be caused by a variety of things, although the most common cause is a gradient that is either too long or does not have enough difference between either end.

Banding streaks: these are streaks in the printing. They can be caused by a variety of things, but generally they are a result of maintenance or setup problems on the press. In digital printing, colors made up of two or more process colors with a TIC of under 30% are suspectable to banding streaks.

Barcode: The barcode is derived from the ISBN, which every book must have. Free barcode generator: www.terryburton.co.uk/barcodewriter/generator/ or www.barcoding.com/upc/. General information: www.ggbarcode.com/ISBNinformationPage.html; color: www.barcode-us.com/upc/upcColorChart.html The price code can be 9000, which means no suggested price. Seewww.barcode-us.com/upc/upcColorChart.html

CS Guidelines: ". . . our system will place your ISBN barcode in a 2" by 1.2" white box in the lower right-hand corner of your book's back cover. . . . Images or text in the barcode location will be covered when the book is printed. . . . If you choose to provide and place your own barcode, be sure it is a high-resolution image."

Baseline: in typography this is the line on which most letters sit and below which descenders and some text figures (non-lining, old-style) extend. See **Typeface Glossary**.

Basis weight: the weight of one ream (500 sheets) of paper in pounds. In the metric system it would measured as grammage: grams /square meter (g/m2). Card stock is measure by thickness. See **Paper**.

CS uses 60lb offset text; covers are 10 pt cover stock.

Bézier curve: is a smooth, mathematically defined curve. It is controlled by creating control points and handles with when moved create the curve. It is common in most graphics programs, often called the pen tool. It is at the heart of vector graphics.

Bit depth: A bit is the smallest amount of computer information: it's a switch that is either on or off. Bit depth refers to how many bits that can be captured or displayed. A **1-bit** image is has only two colors, black and white. An **8-bit** image is 256 colors (a grayscale, for example. In RGB, there are three channels, typically 3 8-bit images/grayscales (one for the red, one for the green, one for the blue), would have 256 x 256 x 256 colors, 16+ million colors.

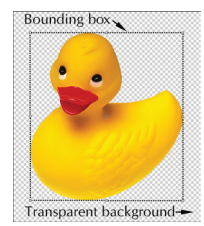
Bitmap: 1) also known as raster, if an image files where the image is composed of pixels and each pixel not only carries a discrete color but it's location is precisely mapped. 2) Photoshop refers to pure black and white images as bitmaps. 3) BMP image format is called bitmap.

Black plate: also black printer, carries the black of a CMYK separation. Aside from carrying black image formation, it is used to enhance contrast and depth.

Bleeds: an image or background that runs to the very edge of a trimmed page, is said to bleed. It may bleed on one or more edges. To do this, the actual image or background must extend beyond the trim line so that when the page is trimmed it appears to bleed off the page. Most printers use a 0.125" bleed area. A 2-page image is said to bleed across the spine or inner margins. The gray tabs and bar at the top of this page bleed.

Book block: either all of the pages and/or signatures of a book gathered prior to binding, or the print-ready file of the complete book, not including the cover.

Bounding Box: is the minimum rectangular area that includes all of an object. It can surround an image, shape, or text; and it can be dragged to move, transformed, rotated, or scaled. It is often referred to as a BBox. PDF's have five different types of boxes:



- MediaBox—all PDFs have a MediaBox, which defines the maximum size of the page: trim size plus bleed, crop marks, if used, etc. It is the largest box.

> Note: CS does not want crop or other printer's marks, consequently, for CS, the media box is the same size as the trim size·

- CropBox—is the actual page size, most often used for monitor and printing. It is not very important in prepress work.
- BleedBox—by default it is the CropBox size. It is not used often.
- TrimBox—defines the dimensions of the finished pages.
- ArtBox—defines a region within a page.

Today these are less important than they were. They come up, for example, when opening a PDF page in Photoshop, and with certain PDF issues.

Brightness: is an attribute of what we see in which the object appears to emit more (brighter) or less (less bright) light.

Less bright Normal Brighter

Burn: see Dodging and Burning

Byte: A standard digital unit comprised of 8 bit. In bitmapped or raster art, each pixel is generally defined by one byte. 8 bits, 1 byte, equals 256 steps from white to black.

Calibration: Adjusting a monitor or scanner so that the images that are seen or produced will print accurately; and because light sources change with use their regular recalibration.

Camera ready: In prepress, art (images and text) that is ready to be photographed and turned into film, then plates, to be printed from. See **print ready**.

Channels: Digital images are made up of combinations of primary colors, and each primary color is a channel. Each channel is, in fact, a 256 step grayscale image that represents the color intensity information for a specific primary. There are additional channels for transparency, paths, etc. See **color channels**.

Choke: A trapping technique, where one color is made smaller. See **Trapping**.

Chroma: 1) similar to, or even synonymous with ***hue***, depending on how it is used. 2) "Chroma is the colorfulness relative to the brightness of another color which appears white under similar viewing conditions."* 3) In painting, generally, it means the purity of the color.

Clip: To cut, as when out-of-gamut color are simply cut off to the borders of the color space.

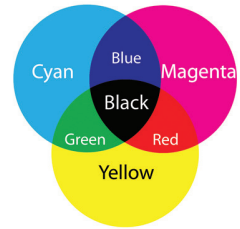
Clipping path: A vector shape or path used as a mask to cut out pixels Anything inside the path will be included (inclusive) after the clipping path is applied; anything outside the path (exclusive) will be omitted from the output. See **mask**

Cloning: In graphics programs the process of duplicating a source image area to a target area. Although these could be separate images, usually it is a way to duplicating, for example, little bits of background to remove a blemish (say a tear in a scanned image).

CMYK: a color model made of four colors: cyan, magenta, yellow, and black. It is used as the basic color model for most full color printing. In theory, CMY should produce black, but

* From <http://en.wikipedia.org/wiki/Saturation_(color_theory)> 05.07.11

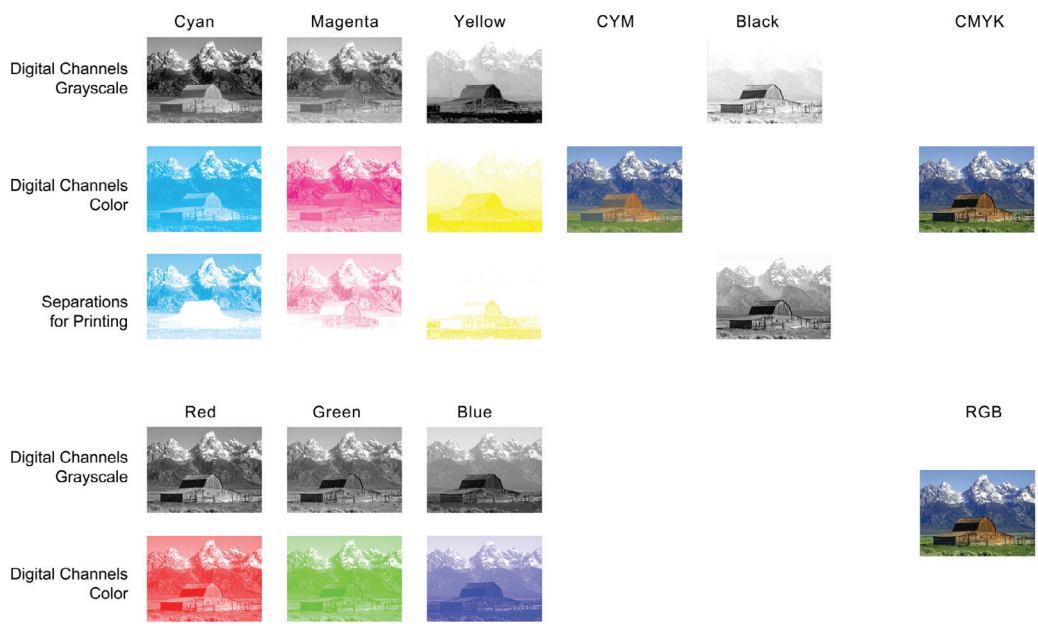
in practice it produces a weak black at best, but by adding black, not only is the black improved, but the black plate adds intensity, detail, and depth. See **RGB**.



Coated Paper: although commonly it mean a smooth, clay-coated paper, it actually means any paper with some type of coating that permits better printing. Usually coated papers are classified by the type of coating, such as clay coated.

Color: is the visual perceptual property for what we call red, orange, yellow, green, blue, indigo, violet, etc. It is perceptual because it is not an objective description. There are three attributes of color: **Hue**, **saturation**, and **lightness**. Additional descriptors: **colorfulness**, **chroma**, and **brightness**.

Color Channels: these are grayscales of the actaul pixels that make up each of the primary colors of color images (RGB or CMYK). In CMYK, they are not the same as the color separations from which the color piece is printed.



Grand Tetons Barns, the John Moulton Barn, by Jon Sullivan, from Wikipedia. < http://en.wikipedia.org/wiki/File:Barns_grand_tetons.jpg> 04.22.11

Color balance: the extent to which an image appears to have neutral lighting—the presence or absence of a color cast.

Color calibration: to fix, correct, or adjust the color on a monitor or scanner.

Color Cast: an overall tinge of color, generally unwanted, in a printed piece or photograph.

Color control strip: a series of color bars printed on the press sheet used to control the printing.

Color

CS is set up to print best from sRGB,* a specific kind of RGB (red, green, blue), which is the universal color mode used by consumer cameras, scanners, monitors, TVs, and most graphics programs. For most people, simply using the color images they have or create is all that they need to do. However, there can be significant differences between RGB and CMYK (cyan, magenta, yellow, black), which is used by most printers to print full color.

Is this RGB to CMYK conversion an issue? Here, I do not think it is:

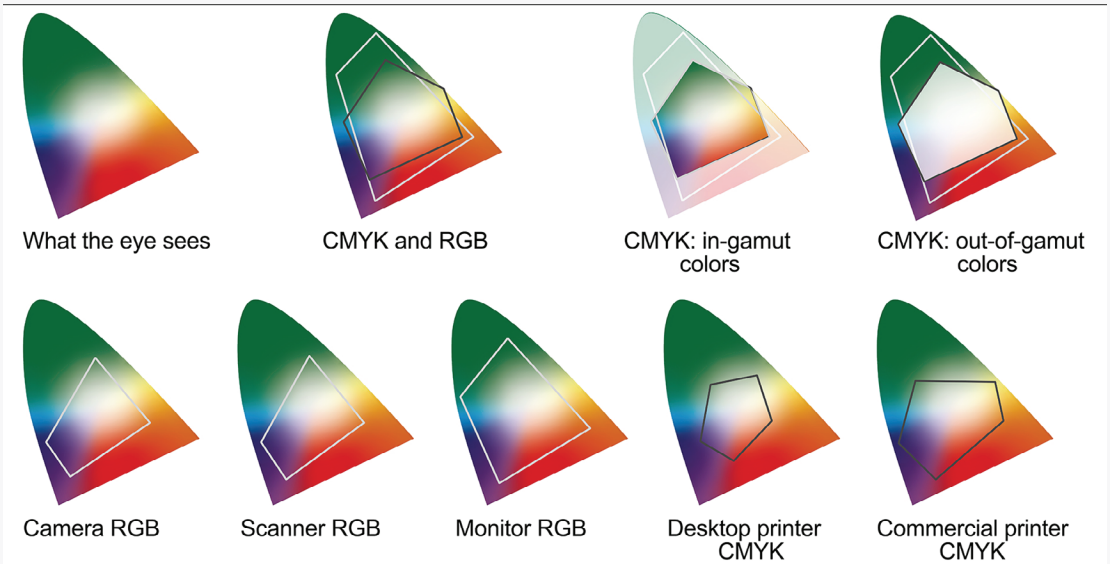
This is a screen shot† of the original RGB image on the left and the CMYK conversion on the right. Whereas, large, solid areas of bright colors like these do not convert well:

* If color corrections are made to the CMYK art, or if all the color is in-gamut, then CS prints equally well from CMYK files.

† Often the only way to show the relative color values is a side-by-side screen shot.

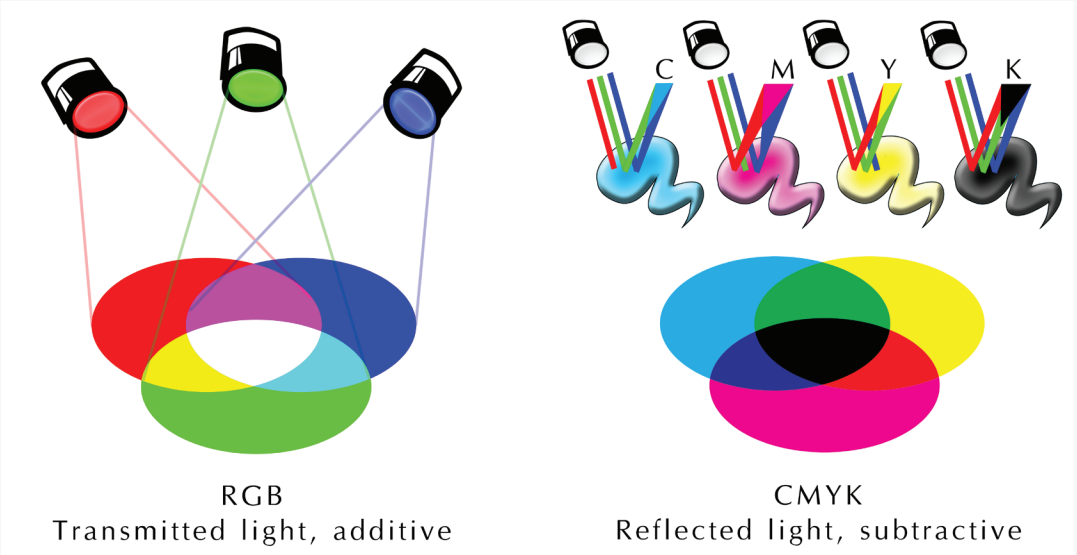
Although the montage of images above did not seem hurt by the conversion to CMYK, other images could have been: as much as the color blocks and ramp were!

To explain some of this, we need to look at color.space:



(White box is RGB. Black box is CMYK. Inside a box is in-gamut; outside is out-of-gamut.)

The eye sees light, so if you're asking what happened to black, it is the absence of light. In the upper left is a common schematic of all visible colors. What can be represented by RGB is outlined in white; and what can be represented by CMYK is outlined in black. Each outlined areas represents a color space, often called a footprint or a gamut. Colors contained within a particular outline are in-gamut, and colors that are outside that outlines are out-of-gamut: that is, they do not exist in the color space.

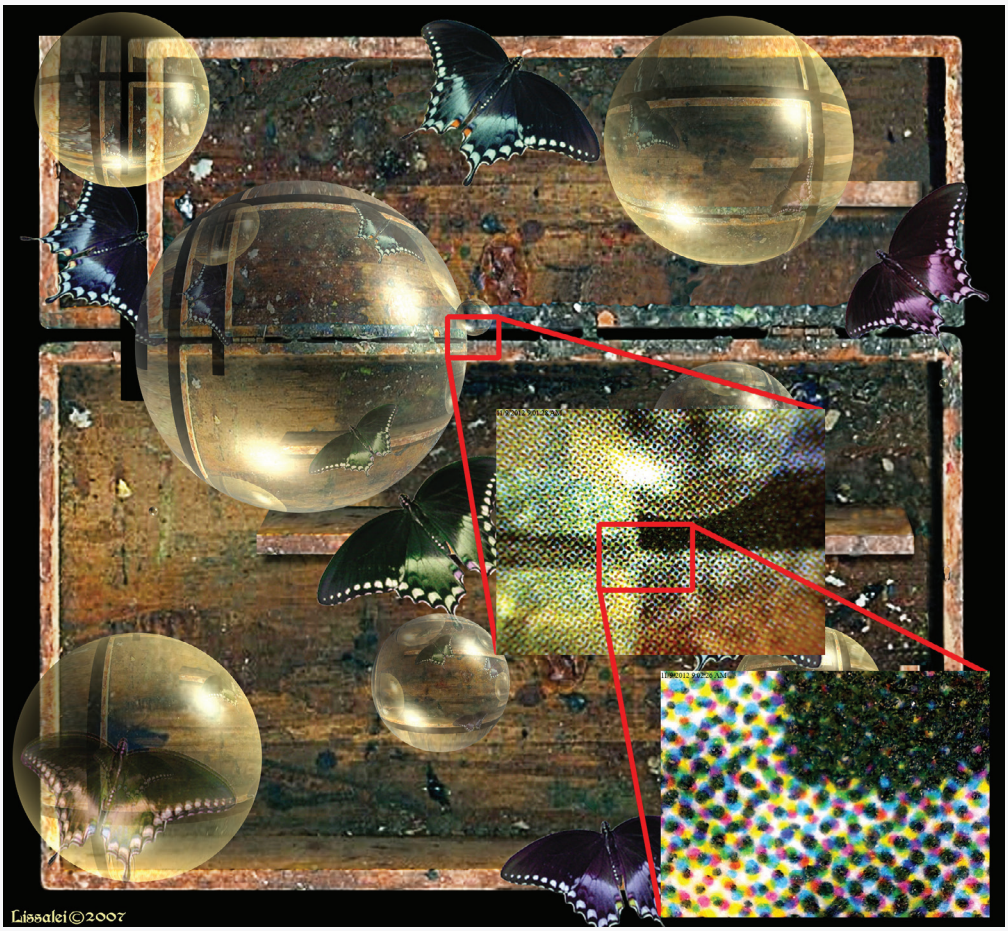


The secondary colors of RGB (those made up of equal parts of any two primary colors) are cyan, magenta, and yellow, just a little brighter and more vibrant than their primary counterparts in CMYK. And the secondary colors in CMY (those made up of equal parts of any two primary colors) are red, green, and blue, just a little duller and less vibrant than their primary counterparts in RGB.

The catch to all this is that:

- these illustrations presume pure color, pure white light, etc.—things that do not exist in practice;
- we are using multiple conversions to just discuss this:
    - the sRGB image was adjusted by the profile in my monitor and through Photoshop
    - the conversion to CMYK was created by Photoshop but is then converted to RGB to be seen on the monitor
    - I took a screen shot of the RGB and CMYK versions, in sRGB
    - CS will convert these to CMYK to print them.

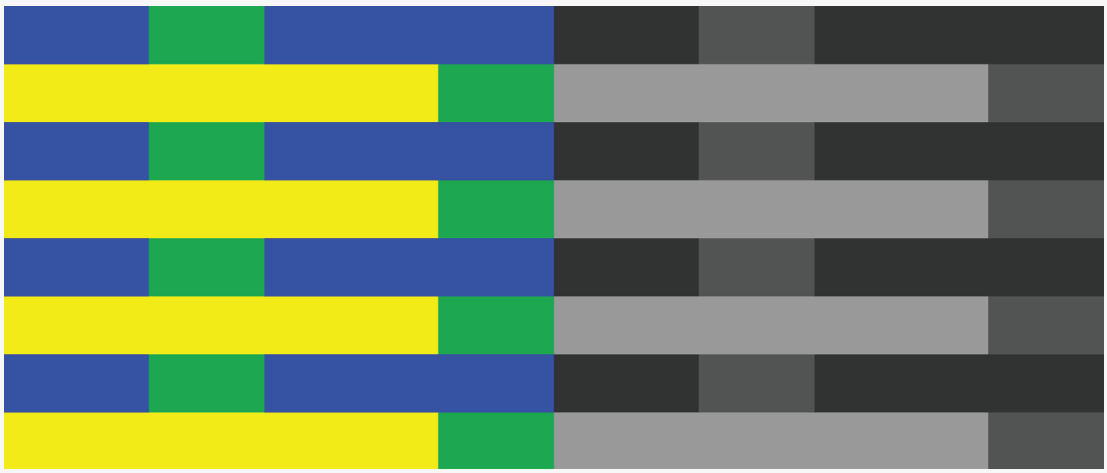
And there is a final bit of magic to what printers do. It's not just that CMYK are the four colors used to represent the world of color, but it is done with halftone screens:



Color can be very accurately measured. That is important for printers to be able to adjust the

process colors (cyan, magenta, and black); but for most of us, what we want is the overall color to look right. If some of the colors get compressed or slightly shifted to create the perception that the color is all there, we don't care—but a spectrophotometer would care.

Finally, one more bit of mischief: our brains. It's not just whether we are in some degree color blind, but how do people see in general.



Due to something called simultaneous contrast we perceive two greens on the left had graphic, and on the grayscale version of it, we perceive two different grays in the same relative place as the greens were. Three colors in one, and three grays in the other. Our brains manufacture the fourth.

Working with CS

As a practical matter, CS is set up to accept RGB work (sRGB is best, and most common form of RGB). Most images will print well with CS's stronger cyan and redder magenta.

Print out all or at least several images: your desktop printer is CMYK, you'll get a reasonable feel for CMYK conversions and the lightness/darkness of your image.*

If you use large solid areas of bright color, try to anticipate problems: avoid deeply saturated and bright colors.

Highlight detail tends to burn out and shadow detail tends to plug up—try to open of shadow details and enhance highlight detail.

If you've got what should be pure white and pure black in your image, try to set those points—do not bring them in 5-10 points from each end, a common practice that muddies images.

If you are in doubt about how your images will print, make a test book. Use a throw-away title, free ISBN, 24 pages, label every image if you try different ways to prepare them for print—$10 and you'll have an answer in a week.

If you plan to print with a different printer, ask them about profiles, color modes, PDF presets, etc.

* Most monitors are not well calibrated if at all: they often have shifts in color and are usually way too bright.

Color correction: The process of adjusting colors in an images because of a defect in the original art, to enhance the image, or to prepare the image for printing.

Colorfulness: is the difference between a color set against gray.

Color management: generally the use of some kind of software or hardware intended to make color match between two different kinds of devices; for example, between the monitor (RGB) and the printer (CMYK). It is vital at the system level (operating system, video card, etc.). It can help in soft proofing. How effective color management can be is debatable, especially if the calibration is not correct.

> CS does not make make known it's profile or any other relevant printing information.*

Color model (mode): is a system for describing color. Most importantly to this book are RGB (Red, Green, and Blue transmitted light, additive (all light is white, no light is black), and CMYK (Cyan, Magenta, Yellow, and Black, ink on paper, reflective light, subtractive (all color is black, no color is white). See **CMYK**, **Lab**, **RGB**, **Grayscale**.

Color Profile: profiles are look-up tables that describe a specific color space. If your monitor profile is entered into Photoshop and my monitor profile is entered into Photoshop, we will probably see the same color if we enter, for example, it's RGB value.

> In the context of color books printed by CS, I found that the whatever color profiles CS uses to print (CMYK screened on paper) from sRGB images (input, PDF) produces images that seem to perceptually match nearly perfectly: however, we do not know what those profiles are.

ICC Profiles are standards for color characteristics for input and output devices established by the International Color Consortium.

Color separation: separating and image or file into its CMYK components. This can be digital or film. See **color channels** and **screen**.

Color Space: can be general as in CMYK, RGB, LAB, or device specific a Sony Trinitron monitor, an Epson 7600 Ultrachrome printer. A specific color space can be referred to as the gamut or footprint. Simplistically, all CMYK color is contained in RGB, but not all RGB colors exist in CMYK. See **out-of-gamut**, **CMYK**, **Lab**, **RGB**, **Grayscale.**

Color Spectrum Wedge: see **step wedge.**

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* I believe that CS uses Indigo presses. A 2009 press release connects Amazon, BookSurge (the precursor to CS) and the Indigo 5000 series presses. Amazon purchased BookSurge, in Charleston, SC, 2005, the same year it purchased CustomFlix (an on-demand video company), later renamed CreateSpace. Several companies have referred to Amazon using Inigo presses, including HP Indigo.

Compression: is a process designed to reduce a file's size. Very generally, this can be done by removing statistical redundancies, where no data is lost (lossless), or removing marginally important information (lossy). See **jpg**, **lossless**, **lossy**.

Continuous tone: images that contain continuous gradations of shade and hue (e.g.photographs and paintings). These have to be converted into halftone screens (or the equivalent) for commercial offset printing. Sometimes called *contone*. See **halftone**, **line art**.

Contact Proof: a proof made directly from the film.

Contract proof: is a color proof (or grayscale for grayscale work) that is itself viewed as a contract between printer and client as the final proof. This may be a laminate proof such as a Matchprint or Chromalin, or a press proof.

> CS (as well as other p-o-d printers) supplies a printed, bound, and trimmed copy of the book itself as a proof. Not only does it give the author or publisher a chance to look for problems and correct them, it represents how the book will look printed from the submitted files.

Contrast: the amount of gradation between tones.

Less contrast Normal More contrast

Cover stock: heavy paper (card) used for the covers of paperbacks, brochures, etc.

Curves: remap tonal values for image enhancement. Generally "curves" implies a Photoshop feature, or the equivalent in other graphics programs.

Delta E: the term used to describe color differences. Specifically, it was developed to work in LAB color space. Ideally, it would provide a quantifiable number that would enable defining how much variation in color printing is or is not acceptable. See **simultaneous contrast**.

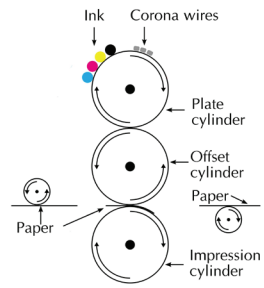
Densitometer: a device that measures reflected or transmitted light for measuring the optical density of colors. It is used to help maintain consistency in a print run.

Desaturate: is to remove or decrease color value, by adding white, gray, or black. See **saturation**.

Device Gray: The process color mode for black and white digital files that relies on the color profile of the device, to be processed—in the context of prepress, that is the printing press.

Device resolution: A device is any piece of hardware added to a computer; and device resolution is the resolution of an output device, such as a monitor or printer. See **resolution.**

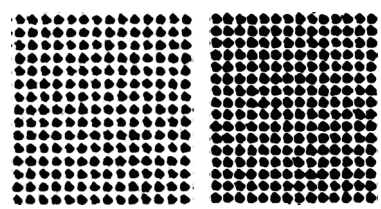
Digital printing: Is not photomechanical; the color is separated into CMYK digitally. The most common digital printing is inkjet and laser printers. However, HP's Indigo press, for example, is digital in that it generates an image or image separation digitally, but the printing process is offset: the image/separation is created electrostatically (with the corona wires) on a plate cylinder that picks up the ink, one color per pass; the image is transferred to a blanket cylinder; and that transfers to the paper, which is being carried through the print engine by the impression cylinder.



Digital proof: A proof created from a digital file using inkjet, laserjet, etc. It is intended to produce an approximation of what the printed piece will look like. It can also mean an on-screen (monitor) proof. See **analog proof**, **contract proof, soft proof**.

Dodging and burning: In photography, dodging shields selected areas from light during printing, resulting in lighter tonalities, and burning exposes selected areas to additional light during printing, resulting in darker tonalities. Photoshop and other graphics programs use these terms for tools the selectively lighten or darken areas.

Dot gain: The physical gain is size of a dot when ink is applied to paper caused by the ink sinking into the fibers of the paper and spreading out. When the halftone dots increase in size, the image will look darker and softer. The dot pattern on the right has about a 20% dot gain. Establishing the dot gain and compensating for it permits better printing. The Photoshop default is a 20% dot gain, which is appropriate for most offset printing; however, Indigo digital presses have a dot gain of 9-12%. See **Ghosting**.



Downsize: When an image's resolution is reduced, e.g. 300dpi to 200dpi, that is called downsizing.

Some versions of Word will downsize images unless the file is set not to prior to inserting the images. (2010: *Options > Advanced > Image Size and Quality > Do not compress images in file*. 2007: *Tools> Compress Pictures > Options . . .* Untick *"Automatically Perform Basic Compression"*) Word calls this "compression," but it is actually downsizing; Word's Save As PDF feature also downsizes images).

DPI: Dots per inch. Generally and incorrectly, this refers to the resolution of an image, which should be pixels per inch (ppi). The dpi of a printer, dpi, is the number of droplets of ink that can be controlled, or addressed. For example, the Pixma 882 inkjet has 9600 dpi x 2400 dpi addressable dots, so a single color pixel at 300 ppi could have up to 256 dots of ink. See **Resolution**.

Drop shadow: see **Transparency** > **Drop shdow**.

Embed: See **Font Embedding**.

Eps: Encapsulated PostScript. A graphics file format based on PostScript. When an EPS file containing vector graphics is opened in a program like Photoshop, it is rasterizes the vector graphics to pixels. It does not support alpha channels.

Faux font: Each font is a complete set of characters of one species (regular, or italic, or bold, etc.) of a typeface. Most word processors can produce bold, italic, and bold italic even if you do not have those fonts.

True italic: *abcdefghijklmnopqrstuvwxyz*
Faux italic: *abcdefghijklmnopqrstuvwxyz*
Regular: abcdefghijklmnopqrstuvwxyz

In most word processors, a faux font is designated as real font, e.g. Bembo Italics, when there is no Bembo Italics, but a word was slanted to create the effect. When this is to be printed, a commercial press will look for Bembo Italics and not find it (it was not embedded), thus causing problems. However, Bembo Regular could be slanted, e.g. in Indesign, instructing the program to slant a word, and that could be printed because it was not been labeled italic.

Flatten: In files with multiple layers, merging all visible layers into one layer and, generally, discarding invisible layers. Converting an image to JPG, for example, flattens an image. Flattening an image makes editing it difficult—after saving and closing, flattening cannot be reversed—so a good workflow is to flatten a copy of a multi-layered file. Flattening may remove transparency, depending on the graphics program and how it is done. See **Layers, Transparency**.

Font: Originally, with metal type, a font was a specific typeface from a type family, in one size only. Today, font is synonymous with typeface.

Font embedding: To include the font, either in its entirety or as a subset of only the glyphs used, in a document. This enables the recipient of the document to view, print or edit it with the original font(s), even if they are not on the recipient's computer. There are four main levels of font embedding (which were defined in the font itself when it was created): 1) Print and preview: fonts can be embedded however, the recipient cannot edit the content. 2) Editable: fonts can be embedded and the recipient can edit the document, but

Image File Formats

Most graphics programs have their own, native file formats: Photoshop—PSD, GIMP—XCF, PaintShop Pro—PSP, etc. These hold things that are unique to each program. Camera raw files—image files that have minimally processed data—are often in native file formats unique to a specific brand of camera, Olympus—ORF, Nikon—NEF, Canon—CR2, etc. While useful within specific applications, image files in these formats must be changed to be accessible in other applications or more general use.

Image files are of two general type, lossless, where no image data is lost, and lossee, where some image data is lost. The most common image format is JPG, which is lossee, and TIFF, which is lossless. As noted under **JPG**, with maximum quality (85-100% or 10-12 on Adobe's scale) image degradation is virtually nonexistent, unless the images is opened/saved/closed many times.

PDF's hold images as JPGs or TIFFs. Acrobat gives you the choice, most other common conversion programs do not. To put file size and print quality into perspective, for a recent job I did an image with a 1.7 GB size (300 dpi, multiple layers, approximately 12 x 20 inches), but the finished, print-ready file, JPG was 13.9 MB, and if the overall file size for the book had been a problem that could have been reduced to 3 MB with negligible effect. Why use the larger JPG: because size was not a problem and I did not want even a negligible loss, let alone the possibility of loosing more—a 46 MB TIFF file was absolutely unnecessary for a halftone image.

A sample 5 x 8 inch image at 300 dpi saved in different file formats:

Format	Compression	Color Mode	File size	
TIFF	—	CMYK	14.6 MB	Lossless
PSD—Photoshop	—	CMYK	13.6 MB	Lossless
TIFF	—	RGB	10.6 MB	Lossless
PSD—Photoshop	—	RGB	10.6 MB	Lossless
XCF—GIMP	—	RGB	10.6 MB	Lossless
PSP—PaintShopPro	—	RGB	7.9 MB	Lossless
JPG`	100% / 12	CMYK	6.5 MB	Lossee
JPG	92% / 11	CMYK	4.3 MB	Lossee
JPG	**100% / 12**	**RGB**	**3.2 MB**	**Lossee**
JPG	83% / 10	CMYK	3.1 MB	Lossee
JPG	92% / 11	RGB	1.8 MB	Lossee
JPG	83% / 10	RGB	1.3 MB	Lossee

Working with CS

Except for art prints, specialty printing, etc.—things where higher resolution and greater image information is essential: not things CS does—300 dpi images saved as JPGs at maximum quality/minimum compression are adequate, and little if anything is gained above that.

the fonts cannot be installed permanently on his computer. 3) Installable: fonts within a document can be installed by the recipient, for editing the document or permanently. 4) No embedding: these fonts cannot be embedded. Most printers require that all fonts be embedded (completely or subsetted) in the PDF.

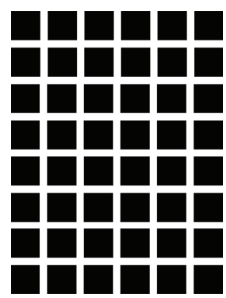
Format: In typography, the combination of type (size, typeface etc), line length, placement, letter and word spacing, etc., that produces the specific look of a page, or any part of a page. In computers, format refers to the type of file used for a document or image, or the preparation of a storage device to receive data.

Four color printing: Means CMYK printing.

Full Color: In reproducing an image or a scene, it is means that all colors in that scene or image are represented. In the context of most printing, this is done by using CMYK with halftone screen separations. RGB is used in monitors, cameras, scanners.

Ghosting: artifacts that appear when a solid or screened image is interrupted by the uneven distribution of ink. This is mechanical ghosting. Another form of ghosting is optical.

Mechanical
(darker orange)



Optical
(light gray spots)

Optical ghosting can also be called optical dot gain. There are other forms of ghosting, for example, show-through caused by the volatiles in the ink being trapped by an overcoat of varnish, changing the opacity of the paper.

Gamut: Refers to all the colors in a specific color space or output device (for example, printer or monitor) that can be represented. A specific color may be in-gamut (included in the color space) or it could be out-of-gamut (excluded from the color space).

Glyph: A visual symbol of a letter, character, or symbol in a specific font.

Gradient: See **Vignette**

Grayscale: An image in which each pixel carries only an intensity or luminance value, no color information. Also known as black and white, or **monochrome** .

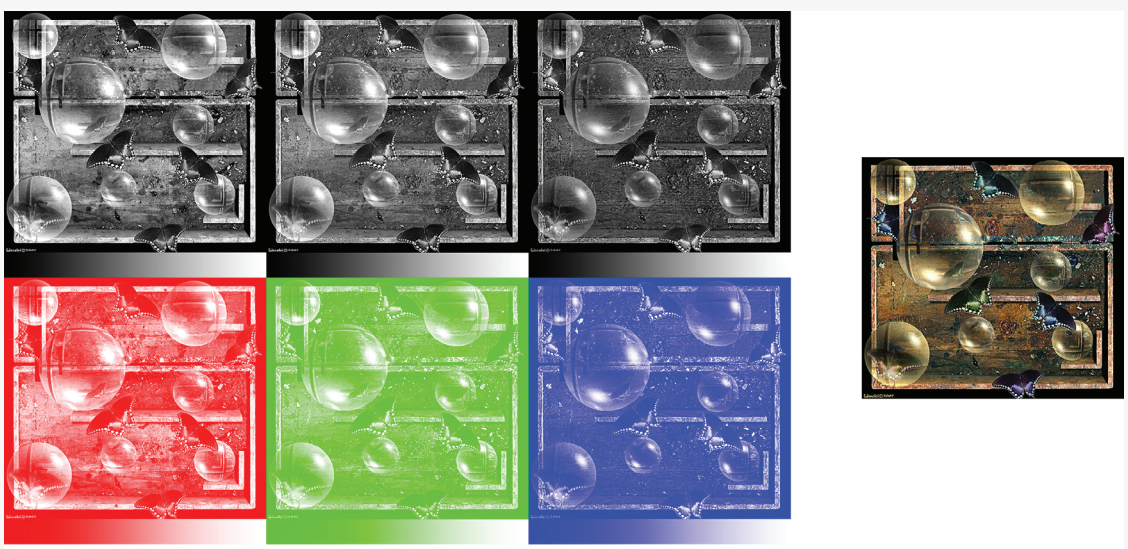
GCR: Gray Component Replacement. In CMY, any two colors produce another color, introducing the third color has the effect of graying the color (gray component)—changing the saturation. However, since that third color is a color, it introduces a cast. To more effectively change the saturation without altering the color is to substitute some Black for all or some of the third color. This helps increase shadow detail. Different inksets and profiles will have different GCR settings.

Grayscale

Here is a pure grayscale, from 0-255 steps (256 bits), 256 steps from pure white to pure black. It is followed by the same grayscale shown in 26 steps. Finally, the same grayscale in 1-bit (2 steps):

Doing this to an image, we would get this:

All is grayscale in your PC. Each channel in RGB, is a grayscale (top), colorized (bottom):



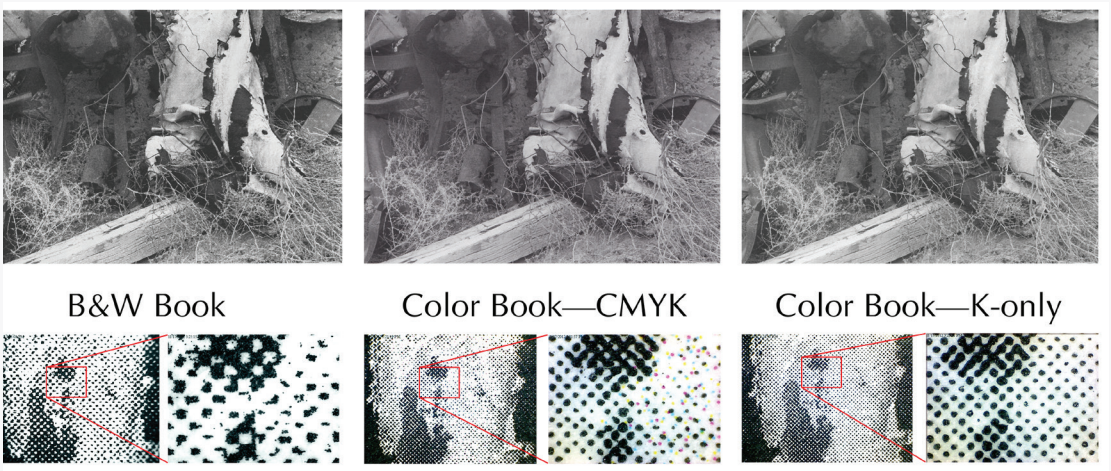
Red Chanel Green Channel Blue Channel RGB Original

In the pure grayscale, first example on the previous page,there might be some banding, not unlike the 26 step example beneath it. This is due to printing anomalies.

If you wonder about the 16+ million colors you can get on your monitor, first, no one counted them. Each grayscale above shows 256 steps, and colors are made up of varying amounts of red, green, and blue. So if we what to know how many possible combinations there are, we can multiply the number of reds, greens, and blues together: 256 x 256 x 256 = 16,777,216 possible colors. Now, how many colors can be actually see? The best, most accurate estimate is millions and millions. Some studies suggest around 2.4 million colors, others, putting chromaticity and luminosity together suggest a number between 10-100 million. Most references suggest around 10 million colors.

Here is a rhetorical question, in the set of grayscale images above, there are 256 steps in the first one, but only 26 in the second. Do we need all 256?

You might want a grayscale image in your book, either to keep costs down in a black and white book, or you have art work that was created as grayscale, like a black and white photograph or a charcoal drawing.



These three versions are remarkably close despite the rather large differences:* the black and white book prints at 106 lpi, where as the color book prints with 170 lpi screens. The CMYK version prints with some color, which gives it a slight reddish/purplish cast, compared tot he black only printing of the other two.

If you want a grayscale image in a book (B&W Book and Color Book—K-only above), you can submit color and have CS convert it on the fly as it prints, or you can create your own grayscale images. CS does a decent job of converting color to grayscale—except: a lot depends on the images themselves. If you have a red logo with green or blue type then any conversion method

* Like showing CMYK on a monitor or RGB in a book, showing the printed versions of an images requires some adjustments: scans are not 100% identical from image to image, and reprinting a halftone (applying a halftone to a halftone) will create a moiré pattern that not only creates a wave-like pattern, but it also changes the densities. To reduce the moiré problem, the images were blurred the same amount.

that alters that relationship would be unacceptable. In the following examples, it will be clear that just pushing a button—whether it's a "button" in CS's printing process or in Photoshop—might be okay and might not be.

The two easiest ways to convert an image to grayscale is to desaturate the colors, or to rely on what your graphics program uses to change the color mode to grayscale: in some programs these are the same, in other not.

Looking at the color channels on the first page of this section, we could see choosing one of the channels to be the grayscale, or on more careful analysis, we might take part some of each and combine them. The most common formula is Red 30% Green 60% Blue 10%. This might be used by a particular program, or it is a place you could start in a Channel Mixer component of a graphics programs (setting the output to monochrome/grayscale if necessary).

Using the luminosity blending mode produces a grayscale images, which approximates the luminosity channel in Lab (a color mode available in some graphics programs), although not exactly. And some people convert the image to Lab and use the L or luminosity channel, however, without any additional work, this tends to be flat.

In a graphics program, you can create layers, and each layer could be a different grayscale, and with the opacity slider, which can control the opacity of each layer from 0% to 100%, and with blending modes, it is possible to use several methods and combine them.

In fact, the next step would be to combine them selectively by masking in or out areas you do or do not want. You can also apply various adjustments (curves, levels, etc.) to entire layers or parts of layers with masks, or selections, which function like masks: the image on the previous page from the B&W book was prepared this way, so that I could compensate for the coarser screen, the paper, and the lack of additional color dots.

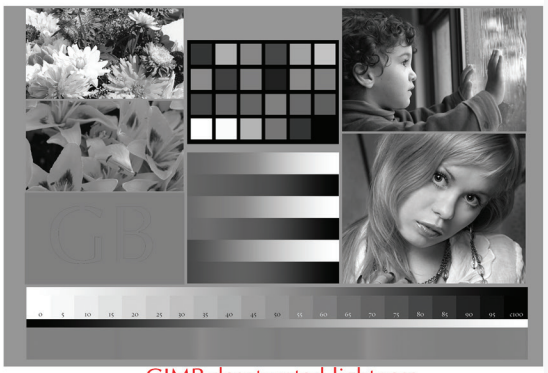
Fine art photography is usually printed as at least a duotone: two colors (these could be two blacks, or a black and a gray, where one often prints the darkest tones, and the other the highest tones.). By changing the gray or black to a warmer or cooler shade, reproductions can capture the subtleties of paper color or toning. With CS, if you need this, then scanning and printing in color is the only way to go. The third example on the previous page (Color Book—K-only) would be unusual because with all four process colors available using them generally leads to a richer, more accurate print, although at the risk of some misregistration (always a possibility with multi-colored printing.

The great leveler is, of course, the halftone screen. It breaks the image up into only so many halftone dots per inch, although within each dot there can be up to 14 tiny dots of ink.

I cannot say how CS converts RGB or CMYK images to grayscale—I would assume it uses something like the grayscale mode, in the examples below; although I can say that it will add a little more contrast if the images are in CMYK.

Here are examples of using desaturation and changing the color mode to grayscale from an sRGB test image in several common graphics programs:

GIMP desaturated average

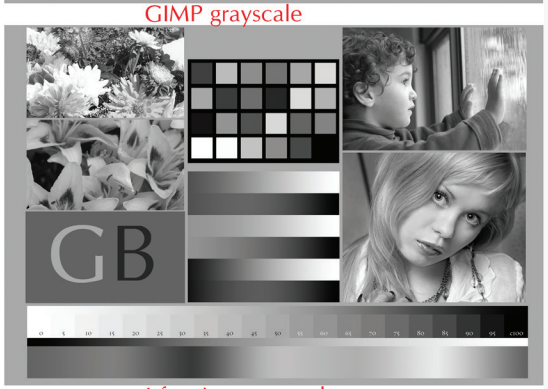


GIMP desaturated lightness

GIMP desaturated luminosity

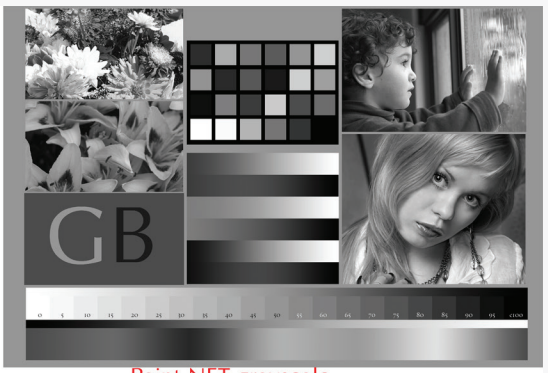
GIMP grayscale

Irfanview desaturate



Irfanview grayscale

Paint.NET desaturated



Paint.NET grayscale

PaintShop Pro desaturated

PaintShop Pro grayscale

Photoshop desaturated

Photoshop grayscale

Xnview desaturate

Xnview grayscale

Grayscales are also different if they are produced in RGB, CMYK, or CMYK K-only.

RGB Grayscale Mode CMYK Grayscale Mode CMYK K-only

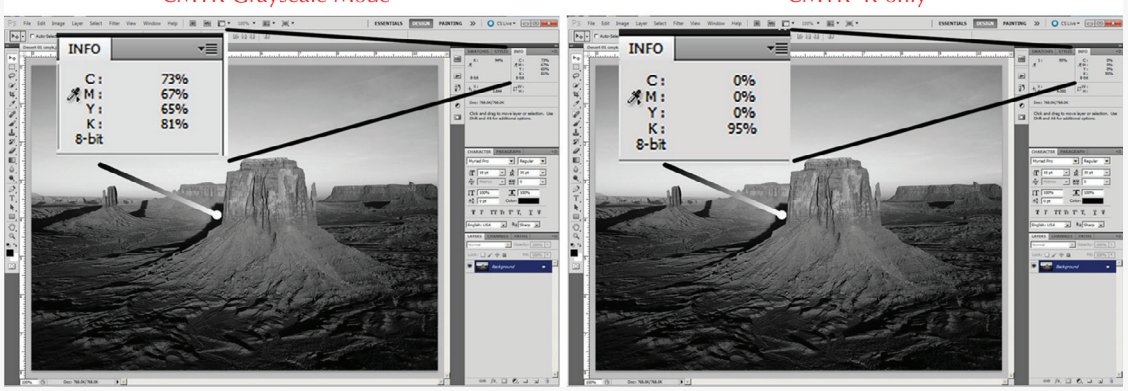
These may look almost identical, and by the time they've been reduced to 25% their original size and printed, the point here is nearly lost. But in this example both the blacks and the contrast are different between them. Screening them to print will reduce the differences.

Certainly examples like the disappearing G and B on the previous pages, shows the potential for some problems to be far worse for some images and conversion methods.

K-only is, perhaps the most reliable conversion because it requires the least conversion by the output device: CS's printer. There are two methods, setting the PDF for printing Device gray and converting the image to K-only prior to creating the PDF. I believe these are available in Photoshop and Acrobat

K-only: means black ink only; so whether printing in CMYK or not, only K values print. Grayscale images, that is monochromatic images in black only (right below), could be printed with CMYK values (left below).

CMYK Grayscale Mode CMYK K-only



This is the same basic issue as Device gray below; however, this K-only was achieved inside Photoshop and was thus able to be adjusted there before it's incorporation into a PDF—which is to say, the graphics manipulations to prepare the image were live and editable in Photoshop (no alterations were made to either image in this example).

To create a K-only image in Photoshop:

- Convert the image to grayscale (ultimately* by *Image > Mode > Grayscale*)
- Convert the image to CMYK (*Image > Mode > CMYK*)
- Convert the image to monotone (*Image > Mode > Duotone*)
- Create a custom color setting and apply it to the image:
  Edit > Color Settings > CMYK > Custom CMYK > Separation Options > Black Generation > Maximum

Again, this will be a K-only image, in CMYK, that can be adjusted in Photoshop before inserting or converting into a PDF.

Device gray: refers to the color model and destination for black and white printing. In the PDF, before it enters the RIP, all color will have been mapped to black only. Printing is done with CMYK inks. Grayscale values could be made up of CMYK. By selecting device gray, all color is converted into values of black only (K-only), when the PDF is created, thus removing the need for the RIP to convert. These grayscale colors have no C, Y, or M color.

In the entirety of both the Acrobat and InDesign help manuals, over 1200 pages, only half a dozen lines are devoted to Device gray. From them only and without boundless curiosity, it is not easy to find Device gray. In InDesign, go to *File > Print* select Adobe PDF.

1) *Color Panel options: . . . Convert All Colors To CMYK: Converts color spaces to DeviceGray or DeviceCMYK according to the options specified in the Working Spaces menu. All Working Spaces must be specified. [page 85, Acrobat _X_pro_help.pdf]*

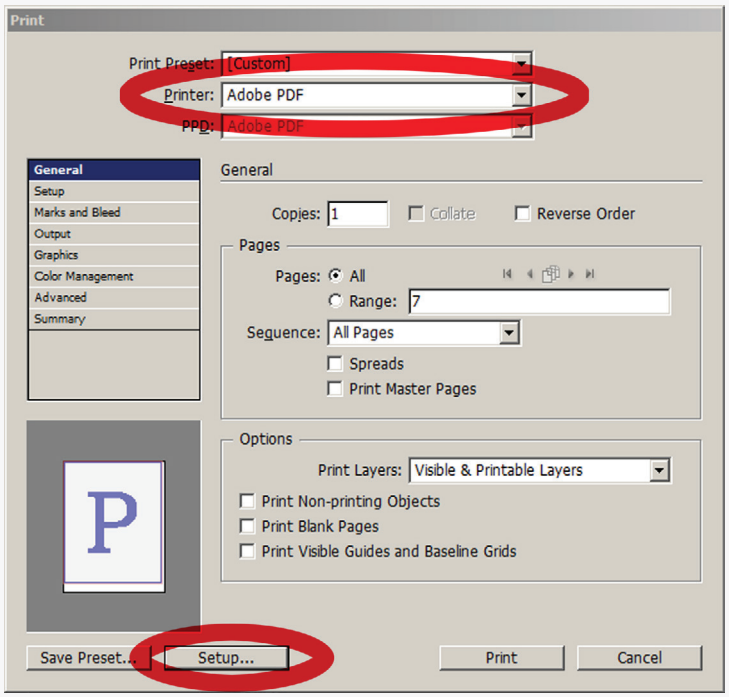
2) *Convert document colors . . . Promote Gray To CMYK Black: Converts device gray to CMYK.[page 434 Acrobat _X_pro_help.pdf]*

3) *Convert colors to a different color space: Depending on the color spaces you select, color conversion preserves, converts, or maps (aliases) color values from the source color space to the destination space as follows:*

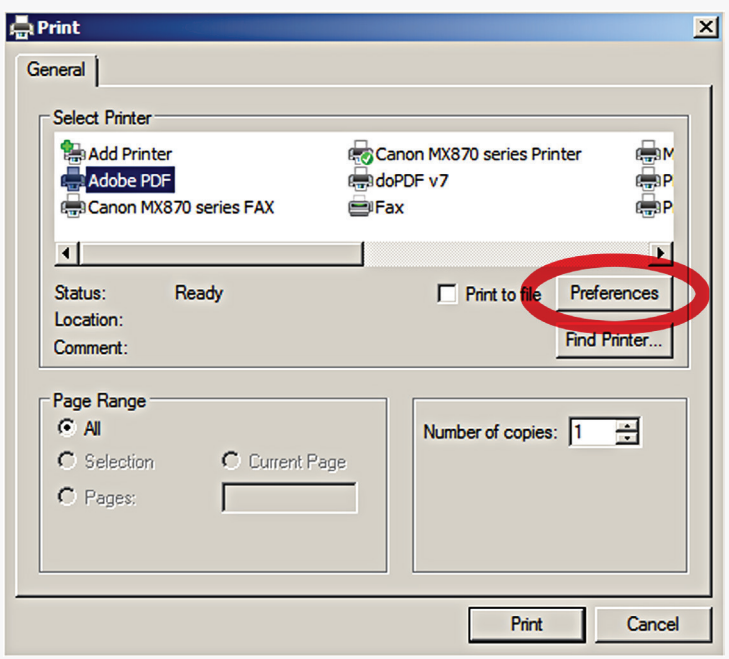
Objects with untagged RGB data (DeviceRGB) convert from the working space RGB profile to the CMYK gamut of the destination space. The same is done with untagged CMYK (DeviceCMYK) and grayscale (DeviceGray) values.[page 433, Acrobat _X_pro_help.pdf]

* There are many things that can be done to the image in terms of grayscale prior to deleting the color information.

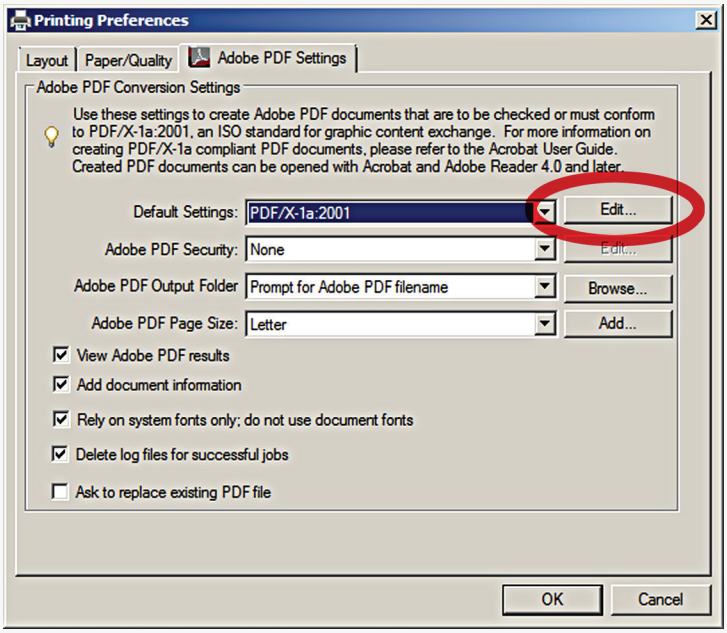
This uses Acrobat Distiller: the Working Spaces dialogue is only accessible through Distiller. Depending on what other software is being used, you will probably go directly to this screen:



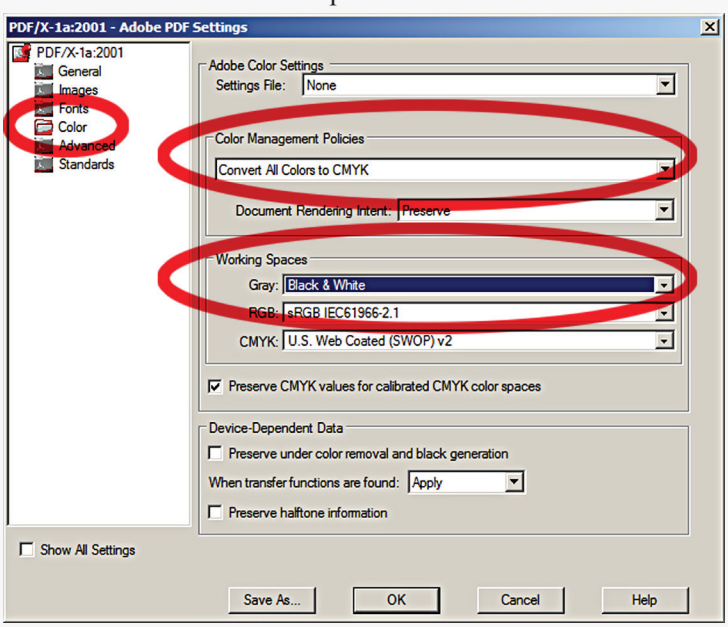
Or:



Click on Edit.



You do not have to use PDF/X-1a. But you must convert to CMYK, and then in Working Space select Gray > Black and White. This will map all color to values of black.



The downside to producing grayscale, K-only, images this way is that the conversion is done when creating the PDF, not when actually adjusting the image for printing. Thus, you see the conversion after it has been made in a non-live state. Be that as it may, many people routinely use device gray when printing black and white books.

Every image is different and every preset does different things. One or more of presets or modes

might be acceptable. Without actually seeing and playing with a specific image, it is impossible to say, "Just convert to grayscale this way."

Scanning & Shooting for Grayscale

If you are going to scan or shot something that is to be in grayscale:

- Scan or shoot in color: get as much image information as possible, convert it yourself, not in the scanner or in the camera.
- Scan or shoot at the highest optical resolution and/or size as is practicable
- For maximum control, adjust things like sharpness, contrast, color, etc., in a graphics program

Working with CS

This is probably way more information that most people will ever need, but having at least a general idea of what lurks about helps to make reasonable decisions.

CS prints grayscale images in black and white books at 106 lpi and 176 lpi in color:

As a practical matter, what I recommend is this—if possible convert your image using grayscale mode, and see if it is okay or if something lost: like the GB on Red, or flesh tones go too dark. Then from easiest/quickest to hardest/most time consuming:

- Submit RGB art and let CS convert to grayscale
- Convert the RGB art to CMYK, submit it, and let CS convert it to grayscale: it will have a little more snap than converting from RGB.
- Convert to grayscale using grayscale mode or a preset.
- Convert to grayscale using channel mixer
- Convert to grayscale and finesse the image:
  - the blackest black should be black and the whitest white should be white*
    - this can be done with curves or levels, with or without masking
  - increase shadow and highlight details
    - this generally requires masking
- Convert to K-only, then finesse the image.

As with working with color, print out your images, or at a minimum a few. Your desktop printer is likely to be more accurate than your monitor.

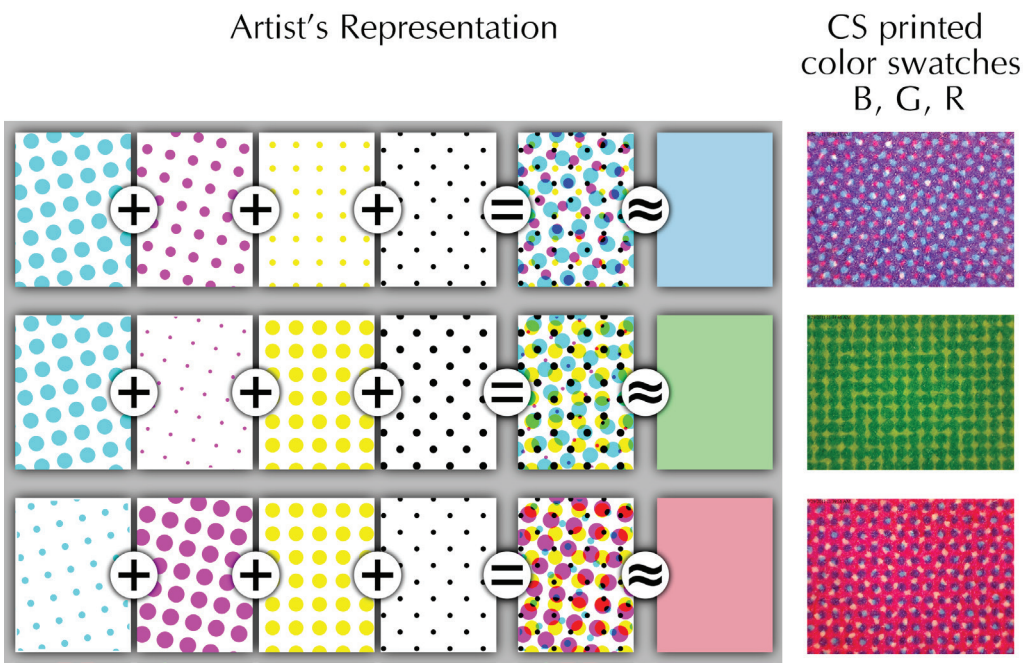
---

* If your images actually do not have a true highlight (white) or a true shadow (black) then do not artificially change the image. However, print your image to see. Most images benefit by setting the white and black points.

Gutter: 1) The combined inner margins of two facing pages; 2) the space between two columns of text, more properly a column gutter. See **Inner Margin**.

> "Gutter" is often used incorrectly, generally to indicate an additional amount of inner margin added to compensate for binding. In Word it is best set the gutter to 0", then set the inner or inside margin to what you want.

Halftone: a reprographic technique of using dots of varying sizes to create the illusion of continuous tone (such is in photography or painting), in both black and white and color printing. Often referred to as a **screen**.



Left side only: < http://en.wikipedia.org/wiki/File:Halftoningcolor.svg>
04.22.11 Derivative work Pbroks13

Hickey: A spot, ring, or similar imperfection in the printing caused by particle of some sort adhering to a printing plate.

Hinting: A way to help type look smoother and clearer when displayed at low resolutions. In practice this looks like anti-aliasing (see **jaggies**), or it could be subpixel rendering on LCD or LED displays.

High key: High, low, and average key refer to images where the majority of tones are either high, low, or in the middle (average). Often this means no dark tones or shadows in high key images, and no highlights or high tone in low key images. However, it can also simply mean that the preponderance of tonality lies in the low, middle, or high area. These terms can also be used to describe lighting techniques.

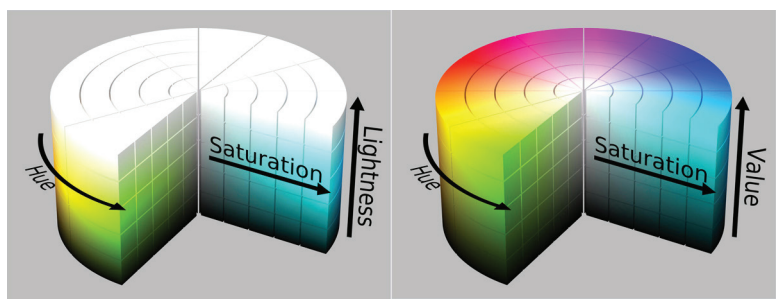
Low Key Average Key High Key

Highlight: 1) The lightest areas of an image; or the brightest part of an image as opposed to the shadow. 2) Specular light. If used to set a base point for setting range and color balance, it should/must be white.

Highlight value: The lightest value that can still retain some detail.

Holdout: Or ink holdout is the ability of a paper to prevent ink from being absorbed (absorbency). It is necessary for good halftone printing; however, too much holdout can result in setoff. It is the opposite of **absorbency**.

HSB and HSV: Cylindrical geometric representations of RGB color space.



<http://en.wikipedia.org/wiki/File:HSV_color_solid_cylinder_alpha_lowgamma.png> SharkD CC and GNU copyright

Hue: That property that can be described as similar to or different from red, green, yellow, or blue. In painting hue refers to pure color, that is, without tint or shade.

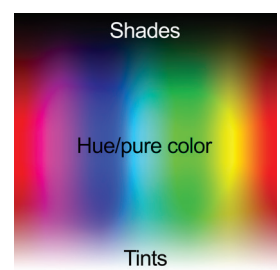


Image area: The area of a press sheet that can be printed.

Image enhancement: Involves manipulating the pixels of an image to achieve an effect. In prepress work that would mean adjusting it to print in CMYK the best. Generally, however, this involves: crop, rotate, color, brightness and contrast, lighten/darken, painting/cloning, levels, curves, and sharpening.

Impose: To arrange and position pages for a given press sheet size to meet printing specification.

> With most p-o-d printers, we don't have to worry about imposition or **signatures**. We can add single leaves to a book.

Ink holdout: A characteristic of a paper surface that keeps ink for sinking into the paper. Good ink holdout, keeping the in on the surface of the paper gives better color saturation and detail. Too much holdout and there is a risk of **setoff**. See **dot gain**.

Inner margins: Page margins on the inside of the page, between the spine edge and the inside edge of the text block or image.

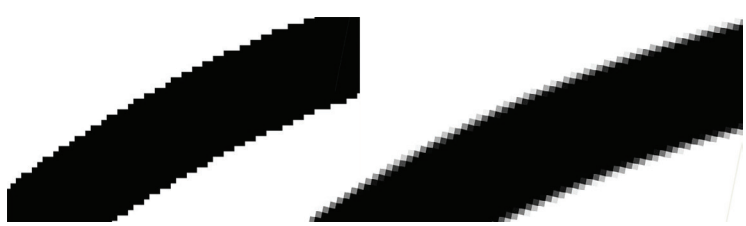
> In Word, the Inner Margin setting in Page Setup is available when the margins are set to Mirror Margins.

> Because of the tight binding, CS has minimum inner margins based on the page count:
>
> | Page Count | Inner Margin | Outside Margins |
> |---|---|---|
> | 24 to 150 | 0.375″ | at least 0.25″ |
> | 151 to 300 | 0.5″ | at least 0.25″ |
> | 301 to 500 | 0.625″ | at least 0.25″ |
> | 501 to 700 | 0.75″ | at least 0.25″ |
> | 701 to 828 | 0.875″ | at least 0.25″ |
>
> However, precisely because the binding is tight, wider inside margins between 0.875″ to 1.25″ are worth considering.

ISBN: International Standard Book Number is an identifying number that ties the book's title, author, and publisher together in a database. See **barcode**.

> CS offers two types of ISBN: 1) Free: CS is the publisher of record; 2) Custom Universal ISBN (US members only):is an ISBN that may be used with any printer.

Jaggies: A form of aliasing caused by trying to create a curve or diagonal with square pixels. On the left is an example of jaggies. On the right is a section of the same curve with antialiasing:



JPG: An image format that uses an adjustable, lossy, compression. Image file size and quality can be varied from very compressed with poor image quality to little compression and maximum image quality. It does not support transparency.
The following example uses an 11.52″ x 7.68″ @300dpi image taken with a mediocre camera using medium quality setting was 3.63MB:

Original Size in camera	Open	Tiff No compression	Tiff Compressed	JPG	
				Max Quality	Max Compression
3.63MB	22.8MB	23.3MB	10.3MB	6.0MB	0.3MB

When an image is compressed with JPG, the color values of an 8 x 8 px blocks are averaged then the 8 x 8 px block is divided by an quantization matrix; and the original image data is discarded. When the image is opened, it is reconstructed. A jpg can be opened and closed a million times with no problems. When it is opened, *saved*, and closed, it has been compressed (data is lost), reconstructed (data is invented), and compressed again (data is lost).

Original 6.0MB image

Opened/saved/closed 100 times

The biggest losses in this image (mediocre snapshot) are in the highlight details. The bottom row shows the effects at 300% magnification (34.56″ x 23.04″ overall image size). Arguably, image degradation begins to be visible at between 5 and 10 open/save/close cycles. In other tests, high quality images could survive 50 cycles. A JPG used in a PDF for printing is never opened/saved/closed, so there is no image degradation.

Here is a close up of the original on the left and the same image saved at maximum compression (minimum quality). Notice how the image is beginning to pixelate (broken into squares):

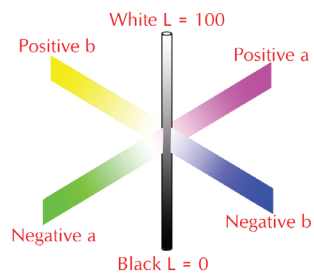
Kerning: The space between letters. To kern is to adjust the space between certain letters to improve how they fit. For example: AV or AV, AT or AT, Toyota or Toyota. Kerning should not be mistaken for **tracking.**

Kerning pairs: Two letters that have been moved close together. Although there are theoretically thousands of possible pairs, many digital fonts have a much smaller number of pre-kerned pairs.

Knockout: When the foreground object meets the background without any overlap, such as have a colored background with text over it, normally this is printed with the background knocked out. See **Trap**.

K-only: In CMYK printing, eliminating the printing of CMY, and only printing in K (black) only.

LAB: An opponent color space. It was designed to model color **opponent theory** of human vision. L is the luminance channel, which looks like a B&W, desaturated version of an image. A and B channels are color information: A is green to red, and B is blue to yellow. Each involves imaginary colors: each color is 0 ,or "white" in the middle, and 99,"black," at the most saturated outside. The fully saturated darkest colors at the ends are imaginary: imagine a black red or a black yellow.

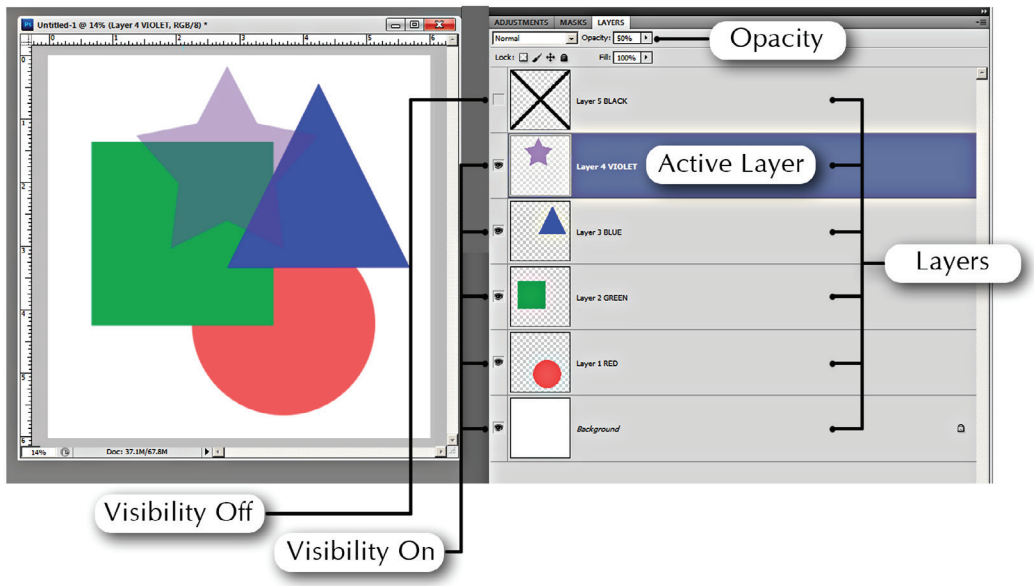


Laminate: 1) The process of adding a plastic film for protection or appearance to a printed piece. 2) The plastic film itself.

Landscape: An aspect ratio where the width is greater than the height. Images can be landscape or portrait.

> Most CS books are portrait, but CS does do landscape anywhere from 6" to 8.5" high, by up to 8.5" wide. A variation on it with the binding along the top (like a scenic calendar) is possible: the PDF must be rotated 90°, so that the edge to be bound (the top) is the right, long, edge. You should inform Customer Support that the book will be top bound before you upload the PDF.

Layer: In word processing, graphics, and publishing programs, text and images can be placed on separate layers, like the separate acetate cells in analog cartoon making. Generally, each layer can be manipulated separately from the other layers. Here are six layers in a graphics program. Next to the image is the layers palette.



Visibility—is controlled by turning on or off the little eyes. Then what we see is order from top to bottom in the layer stack. *Transparency*— is noted by the checkerboard. The Background layer has no transparency, but the other layers do. Active layer—any layer can be the active layer. Here the active layer is the star shape, and it has been made 50% opaque with the *Opacity* slider, which adjust the layer that is active, although all the layers could be adjusted, one at a time. *Layers*—are shown both with layers in the layers palette and also graphically with the little thumbnails. *Layer order*—each layer can be dragged up and down in the layer stack: thus, the red circle, if dragged to the top, could cover parts of all the other layers.

Saved in its native file format, all the layers remain intact. Saved as a jpg, flattened, or printed, invisible layers, the top layer, a black X in this example, will either be removed or won't print. One or more layers can be invisible.

Leading: The spacing between lines of text, measured from base line to base line, thus 12 point type with 2 points of line spacing would be called 14 points; and this would be specified as 12 on 14. Pronounced "ledding," it comes from the use of thin lead shims inserted between lines of type for spacing. Also called interlinear or interline spacing, or simply line spacing.

Word set to Single (*Paragraph > Indents and Spacing > Spacing > Line Spacing > Single*) adds 15% of the fonts size for leading: therefore single spacing is 12/13.8, 14/16.1, 20/23, etc.

Leaf: A single sheet of paper bound into a book. Each leaf is two pages.

Levels: A graphics program tool that adjusts the black, white and gray points of an image.

Ligature: Two or more letters combined into one glyph. From Minion Pro—

Th fb ff ffb ffh ffi ffj ffk ffl fft fh fi fj fk fl ft ct sp st

Some ligatures are applied automatically (e.g. Th or fl), while others, called discretionary (e.g. ct, or st) are not. Not all fonts have ligatures.

Light fastness: The quality of colored ink or paint, etc. to resist changing in due to the effects of UV in light.

Lightness: A property of a color, describing color along a light-dark axis, also called *value* (Munsel or HSL) or tone. Here is a grayscale step wedge going from light to dark.

Line art: An image made up of distinct lines (curved or straight), generally on a plain background, with no gradations in shade or hue. It can be vector or raster. Also called *line drawing*.

Lpi: Lines per inch. This refers to the number of dots or line per inch in a **halftone** screen.

Live: A live area is that portion of a layout or press sheet that prints. Also known as the safe area or image area.

CS: "out-of-live" and "live elements" refer to text and/or images of text (a logo on a box, a stop sign, Pharsi graffiti, etc.) even if they are in the background of a picture). CS has an out-of-live margin for covers and interior pages.

Lossless: An image compression method, to make a smaller size file, where there is no image degradation, it is called lossless compression, **PNG**, for example.

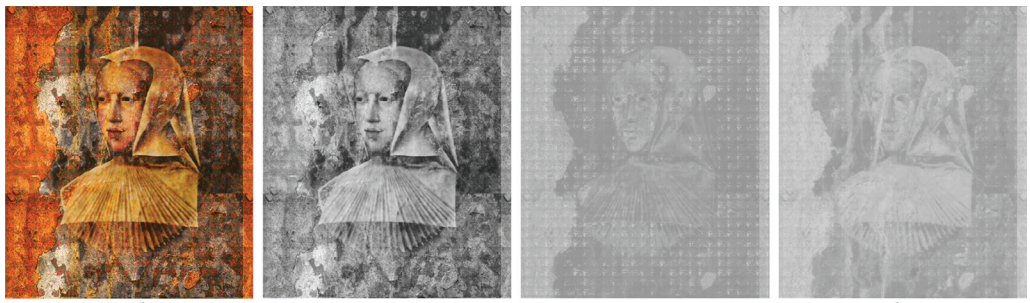
Lossy (lossee): An image compression method, to make a smaller size file, where there is image degradation, it is called lossy compression. An image can be opened and closed a thousand times with no additional degradation; however, each time it is opened and saved, there is some degradation. As a practical matter, images saved as JPGs at maximum quality (10-12 using Photoshop's system, or roughly 85%–100% quality) should not show artifacts of compression. See **JPG** for examples.

Low key: see **High Key**

Lpi: Lines per inch. Lpi is used to designate the number of dots per inch in a **halftone** screen.

CS uses 106 lpi for black and white, and 170 lpi for color.

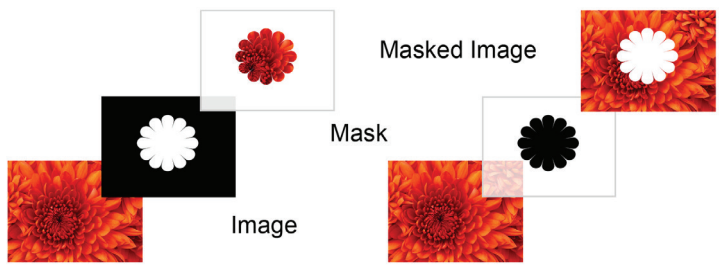
Luminance: 1) A measure of light energy radiating from a subject or color. See **Brightness**. 2) The luminance channel, L, in Lab. Below: full color, L (luminance), a and b channels.



Make-ready: The steps necessary to get a press ready to print.

Map: To take specific pixel values and systematically adjust them, as when out-of-gamut colors are mapped to different values.

Mask: A mask is like a stencil—it protects specific image areas from being changed or allows specific areas to be altered. See **Selection**, **Clipping path**



Mechanical: The complete camera or print-ready art (text and images in position). It can be used to refer to both paper and digital work.

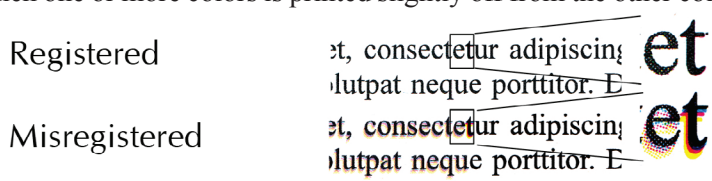
Merge: When working with multi-layered images, merging combines all the visible information into one layer, but it leaves untouched other layers that are not visible. See **layers**.

Metamerism: The apparent matching (to the human eye) of colors made up of different spectral qualities—colors that match are called metamers. Illuminant metameric failure (colloquially, often just called "metamerisim") occurs when two matching colors viewed under one light source do not match under a different light source.

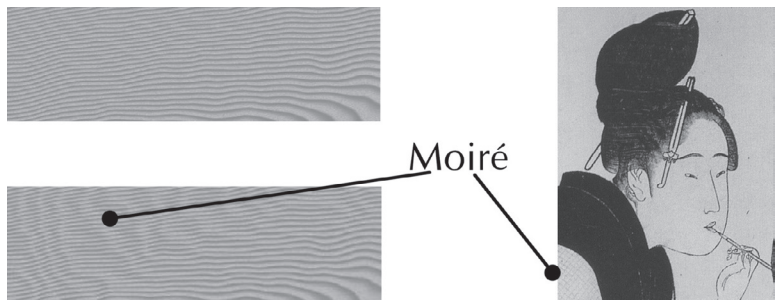
Mirror Margins: A setting that flips the margins set on one page to the other, so that both pages have the same outer and inner margin settings.

Midtone: The range of tones between the shadows and the highlights.

Misregistration: When one or more colors is printed slightly off from the other colors. See **Trap.**



Moiré Pattern: An interference pattern, most often it is caused when a pattern is used over a pattern: two misaligned halftone screens; or patterns that are scanned at certain dpi settings.



Monochrome: A one color image. Most commonly this is used to describe a grayscales, but it could be the range of 0% to 100% of any color, below right is a blue monochrome.

Mottle: A printing defect where solid areas of a color appear spotty and uneven.

Neutral: 1) White, grays, and black; 2) An image or part of an image that does not appear to have prevailing color.

Newton's Rings: Irregularly shaped rings of color occurring when images are scanned. This happens with film or glossy images that are not is firm contact with the transparent platen or drum of a scanner.

Noise: The presence of pixels that have nothing to do with either the detail or color of an image—similar to film grain. Generally, noise is undesirable and is due to low image quality, see **Jpg**. Sometimes, however, it might be desirable, and could be added to break up a flat, smooth solid area or to prevent banding in gradients or banding streaks in light, solid, colors.

Non-lining figures: Resemble text by having various heights. Compare non-lining/old style 0 1 2 3 4 5 6 7 8 9 to lining figures: 0 1 2 3 4 5 6 7 8 9. These are used to permit the use of figures in text without drawing too much attention to themselves. They are not used in tables. Also called old style figures.

Offset printing: A form of printing where the inked image is transferred (offset) from a plate to a rubber blanket to the printing surface. Commonly it is used with the lithographic process which is based on the repulsion of oil and water, where ink is applied to a flat

image carrier (plate), while a water based film is applied to the non-printing areas, keeping them ink-free. Non-digital offset printing uses film or digital image files, from which metal plates that will carry the inked image are made (some presses use short-run, throw-away, plastic plates). See **Digital printing**.

One-up: Printing only one item (generally a page) on a press sheet.

Opacity: The ability of a paper preventing **show-through**.

Open type: see **type**

Opponent Process: A color theory based on the visual system of the human eye. There are thee types of cone: long, medium, and short (rods, a photoreceptor cell, is primarily responsible for night or low light vision). The differences between them result in three component channels red/green, blue/yellow, black/white (luminance). Responses to one color of an opponent channel (red/green, or blue/yellow) are antagonistic to those to the other color: opposite opponent colors are never perceived together – there is no blueish yellow or greenish red. See **LAB**.

Out of Gamut: color that will not print. Many RGB colors are out of gamut in CMYK. See pg. 13.

Outside margins: The page margin opposite of the binding, sometimes called the *thumb edge* or *front*.

Out of register: see **misregistration**

Output device: Printer, monitor, imagesetter, etc.

Overprint: In appearance, this is similar to knockout, where a foreground object is printed over a background, but the difference is that unlike the knockout, here the background remains underneath the foreground object, also surprint.

Page: One side of a leaf, or bound sheet of paper; each leaf has two pages.

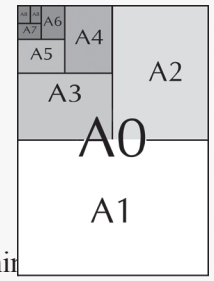
Pagination: Traditionally the division or arrangement of content in discrete pages. Commonly, it now means the process or system by which pages are numbered.

Paper: Paper is a thin material used for writing, drawing, printing, and packaging. Most commonly it is made from wet organic fibers, usually cellulose pulp from wood, rags, and various grasses. Lignin and cellulose are the major components, and although Lignin is a vital part of plant life, it is one of the chief reasons for paper yellowing and becoming brittle. Ideally it is removed during what is called the pulping stage of paper making.

Fillers—minerals, starches, brighteners, bleaches, etc.—are added to the pulp. The pulp is fed into a machine that form the paper, which is dried through evaporation and/or heat and/or pressure. After the paper is formed, it is finished. This can involved coating, sizing, calendering, etc.

Paper

A4: The most common paper size in the world: 210 mm x 297 mm (8.27″ x 11.69″), the two major exceptions are the US and Canada that still use letter size (8.5 x 11). See **A series**.



A series: An international paper size standard. The basic sheet size, A0, is 841 mm x 1,189 mm (33.11″ x 46.81″). Each successive size is made by halving the long dimension of the preceding paper size:

Acid free: Papers having a that have no acid in the pulp

Archival Paper: Generally any relatively colorfast paper that is acid and lignin

Basic size: The standard size of a specific paper grade:

Paper Grade	Size in inches
Bond, ledger, manifold, mimeo, railroad manila, writing	17 x 22
Blotting	19 x 24
Box cover, cover	20 x 26
Manuscript cover	18 x 31
Blanks, tough check	22 x 28
Mill bristol, postcard, tag, wedding bristol	22.5 x 28.5
Index bristol	25.5 x 28.5
Mill bristol	22.5 x 35
Box cover, glassine, hanging, newsprint, poster, tag, tissues, waxing tissues, wrapping, wrapping tissues	24 x 36
Bible, book, box cover, gummed, offset	25 x 38

Basis Weight: The weight of a ream (500 sheets) of paper at its **basic size**.

Bond: Strong, durable paper used for letterheads, copiers, printers, stationary, etc., consisting of wood, cotton, or both.

Book: A general classification for papers that are suitable for books and other graphic arts. Book paper can be coated or uncoated; it is equivalent to text paper in weight.

Brightness: The measurement of light reflected back from paper. It can be used to gauge how much lignin is in a paper. Paper manufacturers uses fillers to increase the brightness. It is based on the 100% reflectance of a magnesium oxide tile. This is not the same thing as **whiteness**.

Buffering: An alkaline substance add to the paper pulp. It acts to protect against acid formation in the paper or from the environment.

Bulk: The thickness of paper. High bulk papers have fewer sheets per inch than low bulk sheets. Bulk is not necessarily related to weight.

Calendering: In paper making, a process of running paper through steel rollers (calenders), giving it a more uniform thickness and varying degrees of smoothness.

Caliper: The thickness of the paper in thousandths of an inch, 0.001″, also mil.

Card stock: A paper stock that is generally thicker and more durable than bond, book, or offset paper. Also called c*over stock* or *pasteboard*.

Cast Coated: A high gloss paper made by casting the coated paper against highly polished, heated

Cellulose: The main part of the cell walls of all plants. Cotton is 91% and is the purest form of natural cellulose.

Coated: Paper made with a surface coating designed to enhance printing—generally by increasing the smoothness and ink holdout. Coated papers can run from dull to matte to high gloss.

Cold Pressed: A slightly textured paper surface produced by finishing the paper between cold calenders. A finer harder surface is achieved using hot calenders: **hot press**.

Cover stock: Also called card stock. It can be coated or uncoated. It is often referred to by the thickness in points.

Deckle Edge: The feathered edge of a piece of paper, used for aesthetic reasons for stationary and books.

Fiber: The small strands of wood, cotton or other cellulose materials that are used to make the paper. Premium paper is **lignin** free. See **pulp**.

Filler: Natural or man made minerals, such as clay, added to pulp to improve the opacity, smoothness, brightness, and printing characteristics of paper.

Grade: The classification of various types of paper due to their individual characteristics—brightness, opacity, cotton content, etc., such as book, bible, etc.

Grain: *Against the grain*: at right angles to the paper grain. Folds are best made with the grain, not against it. *Direction of the grain*: the direction of the fibers in paper. *Grain long*: the grain is parallel to the longest edge of the paper. *Grain short*: the grain is parallel to the shortest edge of the paper.

Grammage: The basis weight of paper stated in metric terms of grams per square meter and expressed as g/m2.

Handmade: paper made by hand as opposed to being machine made. These are general papers used for crafts or painting, not for commercial printing.

Laid Paper: A paper with finely spaced lines pressed into it.

Lignin: the organic material in wood that holds cellulose fibers together. It is directly related to the lack of durability in paper, causing yellowing and embrittlement due to production of acids.

Lint: Fibers from the paper that can buildup on various parts of the press and cause printing problems.

Paper weight conversion: These values are general: each paper company may have its own specifications.

Equivalent Weight in Pounds					Equivalent Thickness			
Bond Ledger	Offset Text	Cover	Tag	Index	Points	Thickness inches	Thickness mm	G/M^2
16	40	22	37	33	3.2	0.0032	0.081	60.20
18	45	24	41	37	3.6	0.0036	0.092	67.72
20	50	28	46	42	3.8	0.0038	0.097	75.20
24	60	33	56	50	4.8	0.0048	0.120	90.30
28	70	39	62	58	5.8	0.0058	0.147	105.35
29	73	40	64	60	6.0	0.0060	0.152	109.11
31	81	45	73	66	6.1	0.0061	0.155	116.63
35	90	48	80	74	6.2	0.0062	0.157	131.68
36	90	50	82	75	6.8	0.0068	0.173	135.45
39	100	54	90	81	7.2	0.0072	0.183	146.73
40	100	56	93	83	7.3	0.0073	0.185	150.50
43	110	60	100	90	7.4	0.0074	0.188	161.78
44	110	61	102	92	7.6	0.0076	0.193	165.55
47	120	65	108	97	8.0	0.0078	0.198	176.83
53	135	74	122	110	9.0	0.0085	0.216	199.41
54	137	75	125	113	9.0	0.0090	0.229	203.17
58	146	80	134	120	9.5	0.0092	0.234	218.22
65	165	90	150	135	10.0	0.0095	0.241	244.56
67	170	93	156	140	10.5	0.0100	0.250	252.08
72	183	100	166	150	11.0	0.0110	0.289	270.90
76	192	105	175	158	13.0	0.0130	0.330	285.95
82	208	114	189	170	14.0	0.0140	0.356	308.52
87	220	120	200	180	15.0	0.0150	0.380	312.00
105	267	146	244	220	18.0	0.175	0.445	385.06

To use the chart, for example, CS uses 60 offset, to get an equivalent of that, the chart indicates that 24 lb bond paper would be similar.

Picking: A deformation of the paper surface caused during ink transfer by the force of sticky ink that either separates layers of the paper, or removing chunks of the paper coating. Pick resistance is thus a description an important aspect of paper in the printing process.

Ply: A single layer or sheet of paper.

Porosity: The more porous a paper is the less the **ink holdout**, the poorer images will print, the greater the **dot gain**.

Printability: The interrelationships of paper properties—surface (finish, gloss, ink absorbency, etc.) and structural (bulk, dimensional stability, weight, pick resistance, etc.)—that result in high-quality printed images.

Pulp: The fibrous material used to make paper. It can be made from wood, cotton, or linen, for example. The higher the **cellulose** content of a paper, the better the quality, so cotton, almost 100% cellulose, produces the best pulp, as do linens, and other textile materials. Wood, with a lower cellulose content, produces pulp that is not as good as cotton, or, but with chemical treatment the quality of paper made from wood pulp can be greatly improved.

Pulping: the process of preparing the pulp for paper making, by removing the lignin and other impurities.

Rag: *Rag paper*—paper made from cotton. *Rag pulp*—paper pulp made from new or old cotton or linen rags.

Runability: The qualities of a paper that determines how well it performs. Not just how well it prints, see **printability**, but that it does not cause problems on press. Loose fibers, dust, coatings and fillers that remain intact, or not, curling, etc. can effect how well a paper handles on a particular press.

Size: Any substance mixed into the paper pulp or sometimes by coating that improves printing qualities. Most commonly these are starches or latex.

Watermark: 1) A design, symbol, or pattern applied to the surface of the paper while it is being formed. This is usually done by having the pattern on the wire support for the paper or by passing the paper through a metal roll with the corresponding mark on the surface of the roll (*dandy roll*), usually with a wire pattern on the wire. 2) A feint printed mark on the surface on image or behind the text, used to identify the owner, the copyright, that it's a copy, or proof, etc.

Web: 1) The name for the paper as it is formed on a paper making machine. 2) Paper sent as a roll to be printed.

Whiteness: An optical property of paper that describes the quality of reflected light, compared to the ideal white standard (a powder of barium sulfate) that reflects 100% of all light falling on it. Generally, there are three shades of white paper: balanced white, warm white, and blue white. Most paper are manufactured with a blue white because to the human eye, this appears whiter.

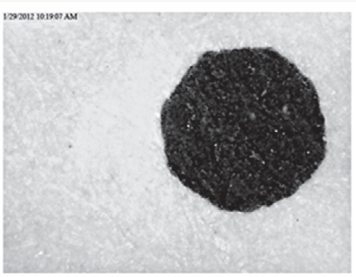
Working with CS

CS offers these papers:

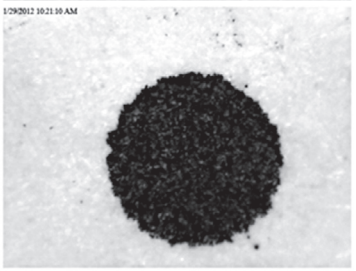
Color Books: 60# smooth bright white off-set
Black and White:
White paper: 60# off-set
Off-white paper: 60# cream off-set
Cover stock: 10pt C1S

That is the full description, verbatim, which is not very helpful. Offset, which is often synonymous with book paper, simply means that it is suitable for offset printing. It can be coated or uncoated. All of the papers are approximately the equivalent thickness of the 24 lb bond paper we buy for our desktop printers. People are often shocked by the white paper for books, but I think that is more because books from most traditional publishing companies are on a cream stock. The cream is a little more yellow than most, but a casual visual comparison of ten novel chosen as representing a range of off-white papers, CS fell about equal to the sixth or seventh. However, both the white (black and white book) and cream stocks vary enough that to give a color equivalent could be misleading.

The color book stock has been treated to make color printing—halftones—clearer, sharper, brighter. Arguably this has been done in part with a coating. While, then this could be a coated stock, it is not enameled, clay, cast, or blade coated. Unlike the white and cream stocks, which, as mentioned above, vary in color, samples of the color book paper going back to 2002 (with BookSurge) have not appeared to vary at all.



K-only 12pt middle dot in color book



K-only 12 pt middle dot in black & white book

PDF: Portable Document Format. Originally a proprietary format of Adobe's, it became an open standard in 2008. This is a file format that preserves as much information about a document as possible (depending on the chosen preset). There are two main ISO standards:

- **PDF/X**, also known as PDF exchange, meets various graphics standards, including embedding fonts, removing transparency, converting all images to CMYK, defining the output device standard, etc.
- **PDF/A**, also known as PDF archive, retains RGB and CMYK images, but embeds fonts, and removes transparency.

Other presets (to my knowledge only found in Acrobat Pro):

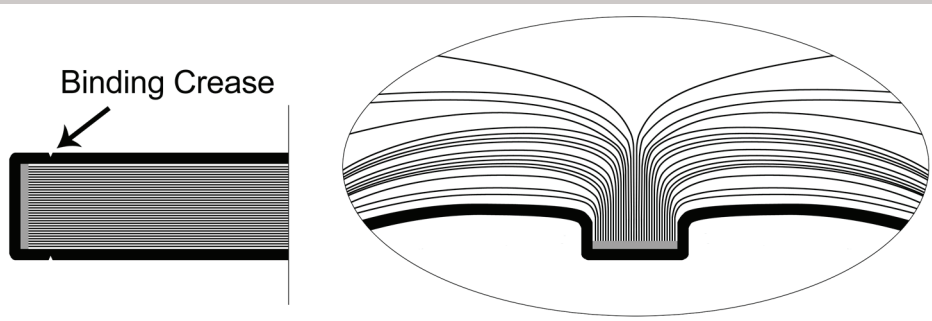
- **High Quality**, "Creates PDFs for quality printing on desktop printers and proofing devices. This preset uses PDF 1.4 (Windows) or PDF 1.6 (Mac OS), downsamples color and grayscale images to 300 ppi and monochrome images to 1200 ppi, embeds subsets of all fonts, leaves color unchanged, and does not flatten transparency (for file types capable of transparency)," Adobe Acrobat Help.
- **Press Quality**, "Creates PDF files for high-quality print production . . . but does not create files that are PDF/X-compliant. . . . the quality of the content is the highest consideration. The objective is to maintain all the information in a PDF file that a commercial printer or print service provider needs in order to print the document correctly. This set of options uses PDF 1.4, converts colors to CMYK, downsamples color and grayscale images to 300 ppi and monochrome images to 1200 ppi, embeds subsets of all fonts, and preserves transparency," Adobe Acrobat Help.

Although Adobe Acrobat is the standard, many free conversion programs like primoPDF, do PDF, cutePDF, do an adequate job.

PE: printer's errors are mistakes created by the printer or typsetter.

Perfect bound: is the binding most commonly associated with paperbacks. The pages (signatures) are gathered and the spine edge is sheared off. Glue is applied to it or to the cover, which is wrapped or folded over the text block. The three remaining sides are then trimmed.

CS uses a tight binding that is visually about 0.25″ less than what appear in the PDF. There is also a binding crease that runs parallel to the spine about 0.25″ in.



PDFs for Commercial Digital Printing

PDF stands for Portable Document Format. The goal of using a PDF is to produce a facsimile of your document that is device independent: that is, it can be opened without having Word for a Word file, or a specific printer if you print out the document. PDF is the file extension (myfile.pdf). Originally this was an Adobe creation, and the program was Acrobat—Acrobat Reader is the free Adobe PDF reader, Acrobat Pro or Standard are the Acrobat stand-alone programs used to create PDFs. However, in 2008 Adobe issued a public patent licences—royalty free—for Acrobat patents, to encourage reliance on PDF technology and standards.

There are now many companies that provide free and low cost PDF conversion programs. Most of these programs do not adhere strictly to Acrobat's standards, several of which are now ISO standards, for example PDF/X (used for graphics exchange, developed for commercial printing), and PDF/ A (developed for archival purposes).

Most commercial digital printers print from PDFs.; and most of them specify PDF/X-1a.

PDF conversion programs (including Acrobat, which can be accessed as a printer) install as virtual printers. To create a PDF, *File > Print > Select the printer* then select the PDF conversion program from your available printers. Do not click <Print>. Depending on your system or applications, you may have to click <Set up> or <Options>, you are looking for a button that says <Preferences> or <Options>. Sometimes the settings are immediately available, sometimes you have to find <Advanced>* (not all conversion programs have all these options):

- Paper/trim/output size—most of these programs default to 8.5 x 11. If your document is different from that you must check that the PDF size is set correctly.
    - In Reader: mouse over lower left corner or *File > Properties > Description* to see the actual size of the PDF pages.
    - Downsizing—also called downsampling. Most programs permit downsizing (e.g. 300 ppi > 200 ppi†). Do not downsize unless you know you need it. Most programs default to either 300 ppi or downsizing is deselected/grayed out.
    - Without Acrobat or some other premium conversion program, you cannot tell the image resolution of images inside a PDF.
- Compression—Most programs permit adjusting compression.‡ For printing, 85% to 100% image quality, Adobe uses a 1-12 scale, with Maximum quality being 10-12.

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* See notes at end for more detailed information.

† PPI/DPI: many graphics programs use ppi (pixels per inch); however commonly people say dpi (dots per inch) for the units of measure for image resolution, although it is incorrect. If you printed one pixel (the smallest single element of a rasterized image) at 300 ppi on the Canon Pixma desktop inkjet printer, it would require 1,024 tiny drops of ink, because the Pixma prints at printing resolutionof 9,600 dpi. I continue to make the distinction not because it technically correct, but because understanding the difference between actual dots of ink and pixels is important.

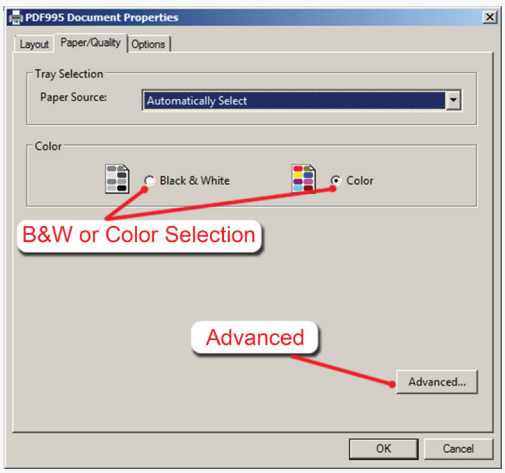
‡ Compression: quality and file size (compression) are inversely related. If you want maximum quality, the amount of compression will be relatively small. If you want the smallest possible file size, the quality will be very poor.

    - There is no way to know if an image has been overly compressed by any number or test. Viewing it or printing it may show compression problems.
- Font embedding—you want to embed (fully or subset) the fonts you use in your document. The alternative is that system fonts are substituted. Some programs call embedded fonts softfonts, and will let you select "Download as softfonts." Do not use, "Substitute with device fonts."
    - In Reader, go to *File > Properties > Fonts* to see if the fonts are embedded or not. If the fonts are listed but do not say "Embedded" (complete or subset), they have not been embedded.
    - If you create a PDF with a font that is not embedded, the PDF will look okay on your computer because Reader will use the font on your computer. But on a different computer that does not have those fonts, substitute fonts will be used and the formatting will change.
- Transparency—ideally you want to remove transparency before commercial printing because you will see any color shifts, and there is less likelihood of problems. This may not be an available option (e.g. PDF/A, PDF/X-1a, and PDF/X-3, remove transparency; PDF 1.3 compatibility does too).
    - Transparency (drop shadows, vignettes, blending modes, objects on a transparent background, translucent objects, etc.) must be removed (flattened) by the printer prior to printing. This often results in shifts in color. JPGs do not support transparency, but PNGs, TIFFs, GIFs, etc., do. Multilayered files have transparency.
    - PNG files with transparency (clear backgrounds, drop shadows, vignetting, etc.) do not always work—especially in Word. Tiff files with transparency or JPGs (with the transparency flattened/removed) generally are not a problem.
    - Without a program like Acrobat Pro, you cannot determine if the PDF has transparency.
- Output resolution—this sets the resolution of the ouput (printer, etc.) device.* Most commercial digital presses use 2400 dpi, often referred to as addressable resolution; laserjets are typically 300 to 600 dpi, a new inkjet printer could be 4800 x 1200. The higher the number the sharper and clearer the image. Check with your printer. Note: this does not convert your images to that resolution.

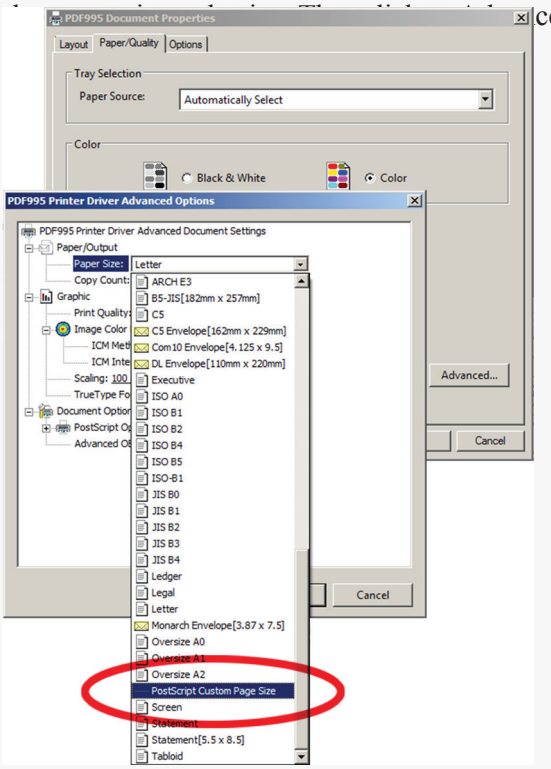
For Acrobat Distiller or non-Adobe products, select the PDF virtual printer, and click on Preferences or Printer Properties. This will bring up a properties screen:†

* It is here we see the need for just using dpi for resolution. Digital image resolution is given in pixels per inch (ppi). A printer's addressable resolution, is given in dots per inch (dpi); and those dots can be made up of droplets of ink also given in dots per inch (dpi). And if the work is to be commercially printed, continuous tone images (JPGs for example) will be screened, that is, converted into halftone dots, measured as lines per inch, lpi (although they are dots).

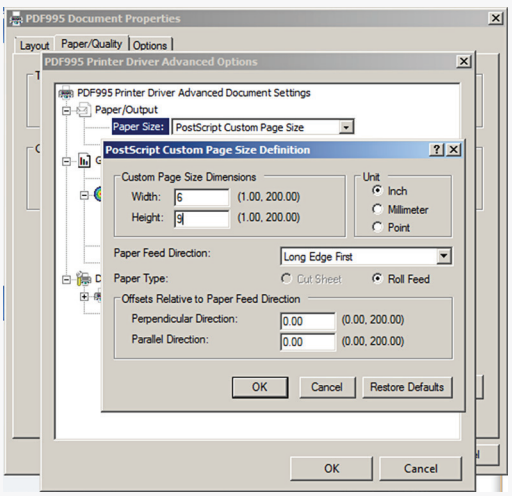
† Not all of the screens will look exactly like this or have all the same settings, but these representative enough to make things clear for most PDF conversion programs.



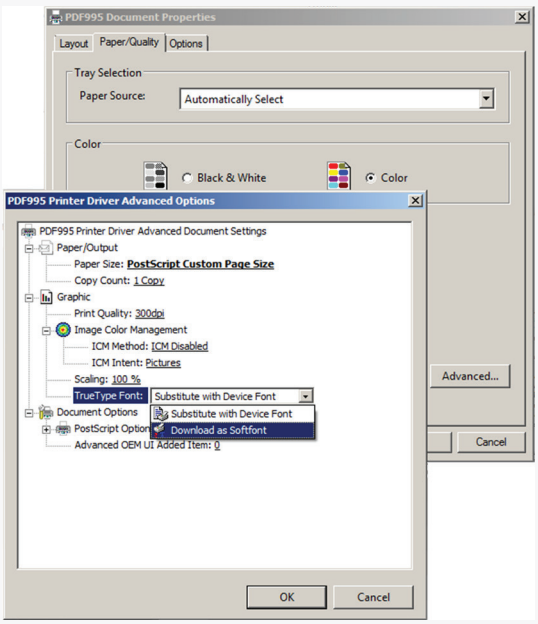
If you use a conversion program that permits selecting for black and white or color printing, make [illegible] ced to make the rest of the necessary changes.



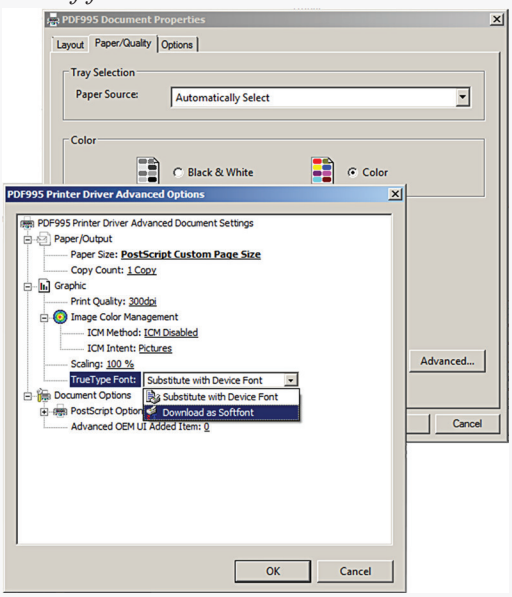
Most conversion programs default to 8.5 x 11 paper. To select the correct paper/output/trim size, open the drop down sizes and if the size of your work is not listed, select *PostScript Custom Page Size*—left. This will immediately open the PostScript Custom Page Size Definition dialogue.



Right: enter the correct page or trim size.



Left: click on True Type Font for the font embedding setting. Select *Download as Softfont* to embed the fonts.



Right: to set the output resolution click on Print Quality and in the drop down menu select the appropriate resolution.

PDF Presets

Adobe Acrobat offers a number of presets that are unavailable in most other PDF conversion programs. If you don't have Acrobat, it is still worth understanding what these presets are because: they are often referenced when specifying what type of PDF is required for certain uses; they provide a sense of what features to look for in non-Acrobat programs. In Acrobat most of these features, and many more, are editable, the table indicates the default settings:

Preset	Embeds fonts	Transparency	Color mode	Downsamples Color	Downsamples Mono	Compression Quality	Output Resolution	PDF
PDF/X-1a	Yes	Flattens	Converts to CMYK	300/ 450	1200/ 1800	Maximum	2400 dpi	PDF 1.3
PDF/X-3	Yes	Flattens	Does not change & embeds profiles	300/ 450	1200/ 1800	Maximum	2400 dpi	PDF 1.3
PDF/A-1a	Yes	Flattens	Converts to either CMYK or RGB	300/ 450	1200/ 1800	Maximum	2400 dpi	PDF 1.3
Press Quality	Yes	Preserves	Converts to CMYK	300/ 450	1200/ 1800	Maximum	2400 dpi	PDF 1.4
High Quality	Yes	Preserves	Does not change	300/ 450	1200/ 1800	Maximum	2400 dpi	PDF 1.4
Standard	Yes[5]	Preserves	Converts to sRGB	150/ 225	1200/1800	Medium	600 dpi	PDF 1.5
Smallest	No	Preserves	Converts to sRGB	100/ 150	300/ 450	Low	600 dpi	PDF 1.5

* By default Standard will not embed "Windows font" (*Acrobat Help*, page 80) subsets. These are also called Base 14 fonts, the fonts that are part of Acrobat: Times (v3) or Times New Roman PS MT (v4.x), Helvetica (v3) or Arial MT (v4.x), and Courier, Symbol, and Zapf Dingbats.

Most commercial printers prefer PDF/X-1a-; however, many will accept other presets. Check with your printer. A quick overview of some popular print-on-demand, p-o-d, printers:

	Preferred Preset	Embed fonts	Transparency	Color Mode/Management	Image dpi	PDF compatibility
48hrbooks	High Quality or DoPdf	Yes	Accepts	N/A		PDF 1.4 or ?
Blurb	PDF/X-3	Yes	Flatten	sRGB; other RGBs convert to CMYK	300	PDF 1.3
CreateSpace	N/A*	Yes	Accepts with warning	RGB and/or CMYK	≥300	PDF 1.4
Espresso	PDF/X-1a	Yes	Flatten	RGB or CMYK	300	PDF 1.3
Fidlar	High Quality	Yes	Accepts	CMYK	300	PDF 1.4
Lightning Source	PDF/X-1a or High quality	Yes	Flatten	CMYK; TAC 240%	300	PDF 1.3
Lulu	PDF/A	Yes	Flatten	RGB or CMYK; TAC max. 270%, min. 20%	300	PDF 1.3

* Accepts other formats (doc, docx, rtf, pdf)

Here are comments on several PDF conversion programs (these are Windows programs). The test was run with a small file, consisting of some text in black and three images. The Word docx file (not used, was 8.554MB, and the Word doc file (used), was 4.326MB:

	Files Size	Color B&W Setting	Special Setting	Transparancy	Image	Text;	PDF Compt-ability
Acrobat HQ	1.911MB	No	—	Yes	RGB	K-only	PDF 1.4
Acrobat PDF/X	2.455MB	No	—	No	CMYK	K only	PDF 1.3
doPDF (free)	5.747MB	No	High Quality	No	RGB	PhotoShop K*	PDF 1.5
NitroPDF	2.51MB	No	Print Ready	No	RGB	RGB Black	PDF 1.4
OpenOffice (free)	2.137MB	No	PDF/A	No	RGB	RGB Black	PDF 1.4
PDF995 (free)	1.289MB	Yes	—	No	RGB	PhotoShop K*	PDF 1.3
PrimoPDF (free)	1.291	Yes	Prepress	No	RGB	PhotoShop K*	PDF 1.4
Word2010	0.466MB	No	PDF/A	No	RGB	RGB Black	PDF 1.4

* Photoshop Black text is screened. However, many people have used these programs, and where I have been able to check, OpenOffice and LibreOffice, their text was not screened.

- Where there is Black C0 M0 Y0 K100) text other black objects over color (overprint), PDFs made in InDesign default to convert K-only to overset black—the default can be deactivated.
- K-only is black ink only (C0 M0 Y0 K100).
- Word's Save as PDF feature downsized the images to 200 ppi (dpi) from 300: do not use.
- Based on the file size (not any actual print test), I would lean towards Acrobat, doPDF, NitroPDF, and OpenOffice.

If you do not have Acrobat or other Adobe products that enable saving as PDFs, text is generally saved as Photoshop Black (rich black) or R255 G255 B255 (black). Text printed from these:

	PhotoShop Black	**R255 G255 B255 (K-only)**
Color Books	Halftone screen, darker text, 4 color, possible misregistration problems	100% black, no halftone screen
B & W Books	Screened, lighter text (95±%)	100% black, no halftone screen

This may or may not be a problem; I tend to think that from CS forum complaints, it is rare, despite my tests: and when it occurs it is seldom a problem. But funny things can happen, and having some sense of where they might come from would be helpful.

Conclusion

Acrobat is the best program (most consistently reliable with the most options) to use for creating PDFs—but many of the free conversion programs work well for many people.

While all the conversion programs listed above worked, in tests run a few years ago, one of the free programs did not work for me, but it worked well for other CS members. My conclusion then was that some of the conversion programs might not work for everyone—probably due to software conflicts—but another free program can be downloaded: which makes more sense than struggling for days to create a PDF.

If images are involved, given Word's downsizing, do not use Word 2007-2010 Save as PDF feature. Only NitroPDF ($119) and OpenOffice/LibreOffice, offer the security of PDF/A and full black text.

Resizing PDFs

Sometimes the trim/paper size of a PDF must be changed, but the original (source) file no longer exists.

- Open the file in Reader
- File > Print > Select printer
- Select your PDF conversion printer
- Set the output size to whatever size is desired.
    - if the size is smaller, image resolution will increase
    - if the size is bigger, image resolution will decrease
    - Image proportions may change to fit the ne new size, i.e. there might be some distortion compared to the original.
- Embed fonts—select Download as softfonts.
- Make sure the graphic or print quality is set to the printer's recommend resolution, the default for PDF/X is 2400.

Pica: A typographic unit of measure, equal to 12 points, or 1/6 of an inch, 0.166 inch.

Pixel: From *pic*ture *el*ement, is a single display point in a raster (bitmap) image. It is the smallest element in an image that can be represented or controlled. The resolution of an image is ppi, pixels per inch; although commonly most people refer to it as dpi, dots per inch.

Pixelated: An image quality where individual pixels are visible. See **Resolution**.

P-o-d: see print-on-demand.

Point: A unit of measure for type, 1/72" of an inch, or approximately 0.0139". Type for a book is normally described by is its size and leading: 12/14 (read "12 on 14"), which means twelve point type with 2 additional points of space between lines. Type set solid, that is no additional spacing is, for example, 12/12, or 10/10.

Portrait: An aspect ratio where the height it greater than the width.

PPI: pixels per inch—the resolution of an image. However dpi is used commonly over the more more correctly ppi.

Preflight: is the process of confirming that everything required for printing is in the print-ready file (embedded fonts, no transparency . . . .) and that everything is valid. Various standards can be used to check against (PDF/X, PDF/A, etc.) as well as individual aspects that might cause trouble (image resolution, for example).

Prepress: is a general term used in printing to indicate the processes and procedures that occur between layout and printing: these can include typesetting, editing, proofreading, proofing and outside CS, would also include screening, imposition, separations plate, etc.

Press run: the total number of copies to be run of a specific job.

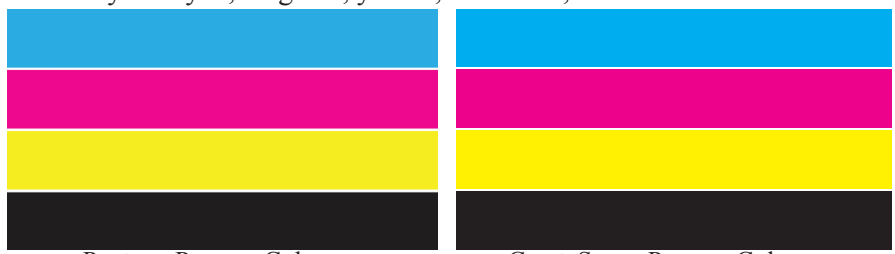
Press sheet: a single printed sheet. It usually refers to a sheet pulled at random during or after a press run.

Primary color: although almost any set of colors could be designated primary colors in some color system, in practice we are concerned with red, green, and blue in RGB, and cyan, magenta, yellow, in CMYK. See Secondary color.

Print-on-demand: (also p-o-d) printing work when needed, as opposed to printing several thousand or more copies at one time then fulfilling orders from an inventory. This work must be done on a digital press, where printing one copy is as easy as printing a hundred. Although work printed on an Indigo press can be proofed and adjusted page by page, this is not practical for print-on-demand.

Print ready: Before digital images and prepress, work that was ready to go to the printer was said to be camera ready, that is, ready to be shot by a process camera to generate film from which printing plates would be made. With digital images and prepress, digital work that is ready to be printed is print-ready. CS requires PDF files.

Process color: Colors that are used for four-color offset printing to reproduce the full range of colors. They are cyan, magenta, yellow, and black, referred to as CMYK:



Pantone Process Colors CreateSpace Process Colors

Profile: see **Color Profile**

Quartertone: The tonal range of an image that falls between the highlights and the midtones. Also one-quarter tone.

Raster: From the name of the parallel grid of scanning lines in a TV or monitor. Raster graphics are bitmapped images, where each pixel is mapped (each bit or byte is mapped), pixel location by pixel location. Jpg, tiff, png, psd, bmp, and gif are examples of raster image file types. Because every pixel is mapped, the larger the image the more pixels and the bigger the file. See **Sampling**

Raster art: Bitmapped images (jpg, tiff, etc.)

Rasterization: To convert vector art (type for example) into bitmapped art.

Reader's spread: The pages of a document that are organized as they will be read and numbered.

When Word displays pages as spreads, it shows them 1-2, 3-4, 5-6 . . . odd on the left, even on the right. However, in a book the reader's spreads are 1 (first, odd page on the right), 2-3, 4-5, 6-7. . . that is, the spreads are even (left side), odd (right side). OpenOffice/LibreOffice has a correct book view. Also, in Acrobat Reader, open a document, then select *View > Page Display > Two Page View* with *View > Page Display > Show Cover in Two Page View*: this will display the pages in reader's spreads.

Ream: 500 sheets of a given size of paper.

Reflective art: Art that can only be seen by light reflected off it. Photographs, painting, most printed matter are examples of reflective art. For printed pieces this generally uses CMYK. See **Transmitted art**

Registration: Placing two or more images (color separations) over one another in such a way that they are exactly align. See **misregistration**.

Registration black: A black made from the C100 M100 Y100 K100, that is, 100% of each ink. In most printing this is too much ink and other than for registration marks, it is rarely used for printing. See **TIC**.

Registration mark: A graphic device to assist in aligning two or more images (color separations).

CS does not want registration marks on print-ready files.

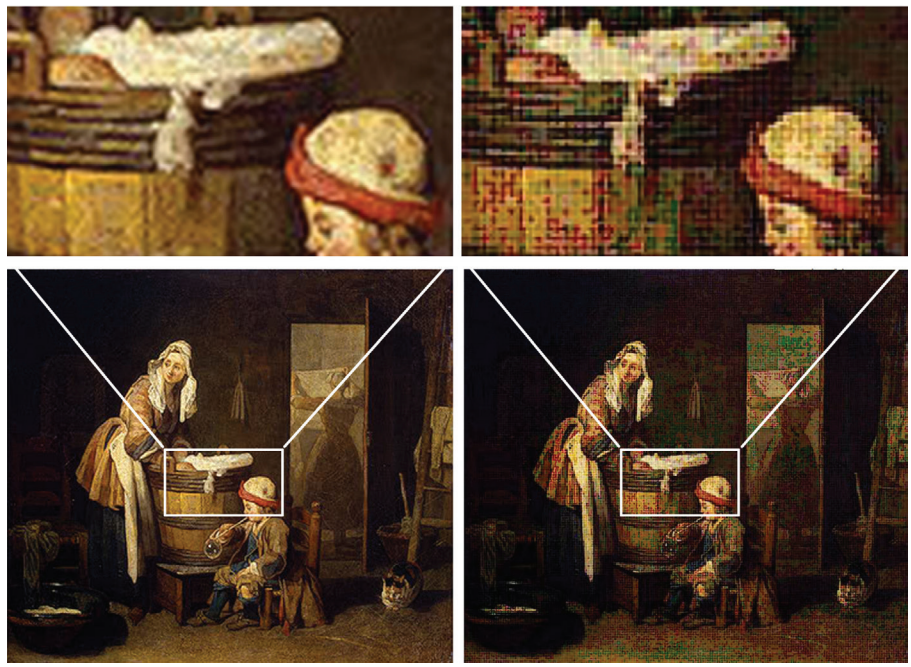
Rendering intent: Because the RGB gamut is bigger than CMYK's, those colors that are out-of-gamut must be dealt with when converting from RGB to CMYK. There are four ICC-specified approaches: 1) Absolute Colorimetric Rendering—all in-gamut colors are exactly converted, while the out-of-gamut are clipped to the nearest reproducible hue. Lightness and saturation are lost. This is the standard default. 2) Perceptual Rendering—compresses all the RGB colors into the CMYK destination, preserving the overall, perceptual image appearance. All the colors, in-gamut and out-of-gamut will change a little. This is usually the best intent. 3) Relative Colorimetric Rendering—scales the white of the source file to that of the target file (the output media). Then all the colors are mapped to the CMYK file, lightness and hue are maintained, but the out-of-gamut colors are clipped to the nearest reproducible colors at the expense of saturation. 4) Saturation Rendering—maps the fully saturated colors to fully saturated colors in the CMYK, at the expense of hue and lightness. This is best suited to charts and logos, where certain colors are intended to pop, but specific hues are less important.

Resolution: The degree to which an image or device can record or reproduce detail. Bitmapped images, where the image is made up of pixels, will have a certain number of pixels per inch (ppi). This is the image's resolution. Commonly, but incorrectly, it is stated as dpi, dots per inch.* A low resolution image would be 72 dpi. A high resolution image would be 300dpi, which is what most printers want to work with.

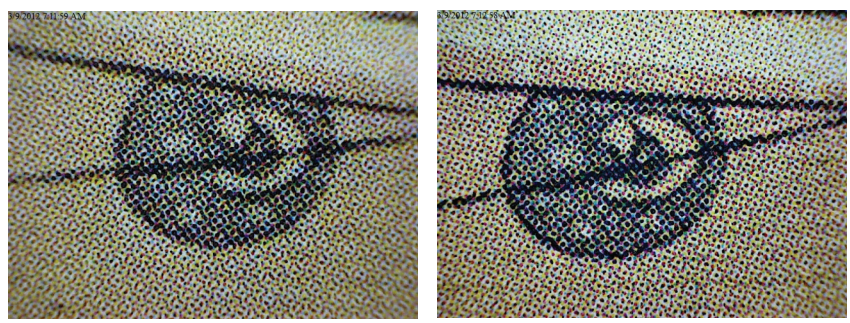
Notice that with the higher resolutions the jaggies are much less apparent.

There are articles saying 300 dpi is unnecessary for printing and that even 72 dpi or 96 dpi images can work. As general advice, that is baloney. The image on the left is a screen print of Chardin's *Laundress,* from the Hermitage; and right the same image as it printed.

* Throughout this book, I tend to use dpi, sometimes with a reference to ppi, but it is a losing battle. An example of when when this misuse becomes important, is when there is some confusion over the addressible dots in a printer versus the "dpi" of an image.



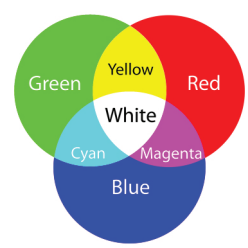
While images around 200 dpi (see page xx) resolution can work well or sometimes better than 300 dpi:



200 dpi 300 dpi

Here details from two identical printed pieces, except that the one on the right, the original, was printed at its original 300dpi. On the left, the image was saved as a PDF in Word and was automatically downsized to 200dpi. In this detail, the 200 dpi image feels sharper. Although the overall image may have lost a little, arguably, in this example, at least, 200 dpi printed as well as its 300 dpi original. Despite this example, 300 dpi images remain the standard in the printing industry, and should.

RGB: A color system made up of red, green, and blue light. Typically this is the **color space** your monitor, camera, or scanner. See CMYK.



Right Reading: An image or page of text that reads left to right, top to bottom, that is, correctly. Often used to describe the orientation of a printed sheet.

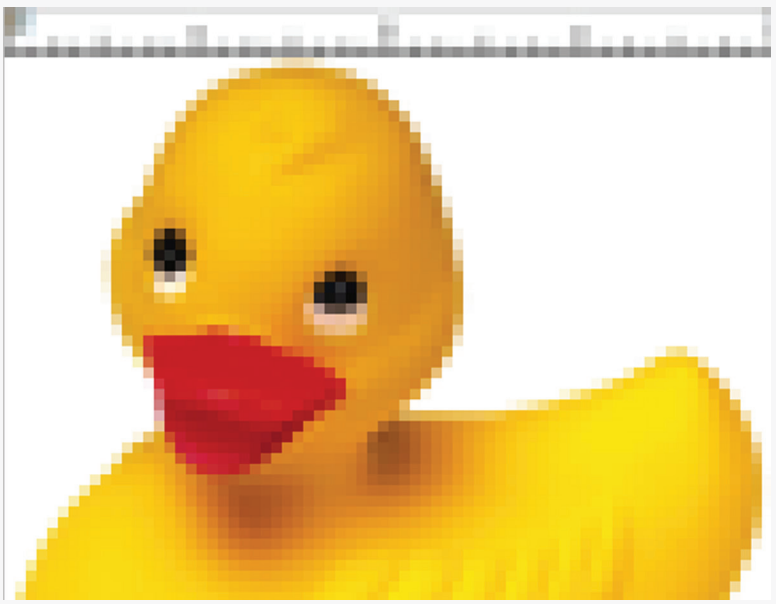
Image Resolution

Resolution is the degree to which an image or device can record or reproduce detail. This is commonly stated as dots per inch , dpi, or, more correctly, pixels per inch, ppi. The image dimensions are inversely related to the resolution: if one goes up the other goes down:

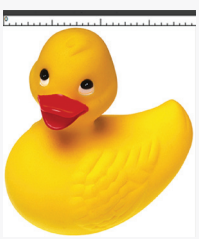
All three images have the same file size, 37.9 KB. At 0.24" wide the image is 300 ppi, at 1" wide, it is 72 ppi, and at 4" wide, it is 18 ppi.

Except in graphics editing programs, when an image is resized, this is what happens. The image is pixilated.

Resized without sampling



Resized with sampling

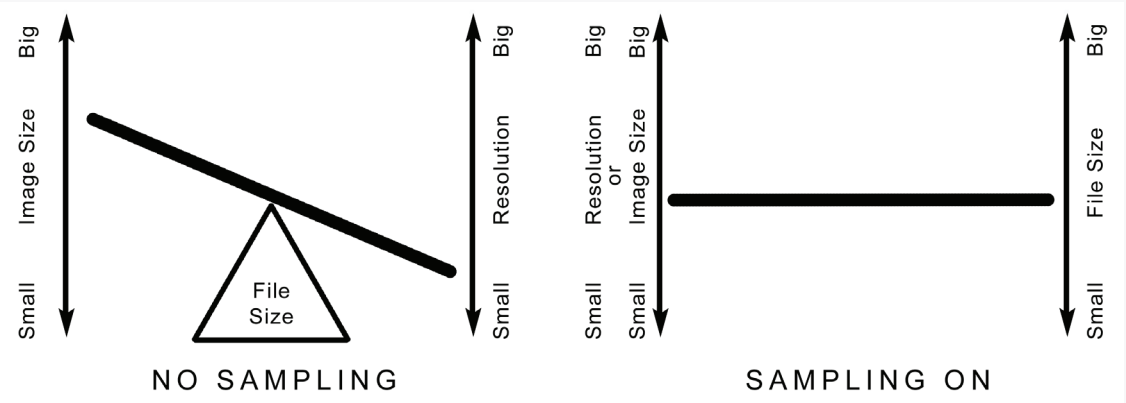


Here, all three images are 300 ppi at the same dimensions as above. However, the file sizes are 37.9 KB, 309.4 KB, and 4.62 MB, left to right.

For most printing, 300ppi (most people will say 300 dpi)* is the norm. This is true for ink jet and laser jet printers, as well as large, commercial presses, digital or non-digital. Although some images might print well at lower resolutions, and some better at higher resolutions, 300 is a safe number.

Regardless of whether you work in InDesign, Word, or OpenOffice, resizing the image inside the program will usually keep the file size the same and the resolution will change. In some programs, such as Word, some people have experienced catastrophic downsizing (for example, 300ppi > 96ppi). †

Roughly, a digital pocket camera produces a good quality image that is 12" x 9" at 300 ppi, but it often opens up in software as 50" x 37.5" at 72 ppi. Reduced to standard print sizes, the image quality is perfectly adequate.



This is the basic relationship between image size and resolution with and without sampling on. Without sampling, nothing new is invented; and if one increases the other decreases. Whereas, with sampling you can control both size and resolution.

As noted above, changing the dimensions and the resolution requires sampling. Graphics programs have sophisticated algorithms that sample (also called resampling or interpolation) the original file, calculating either new, additional pixels when enlarging, or what to remove and how to alter the remaining pixels when reducing, so that the enlarged or reduced images appears otherwise unchanged.

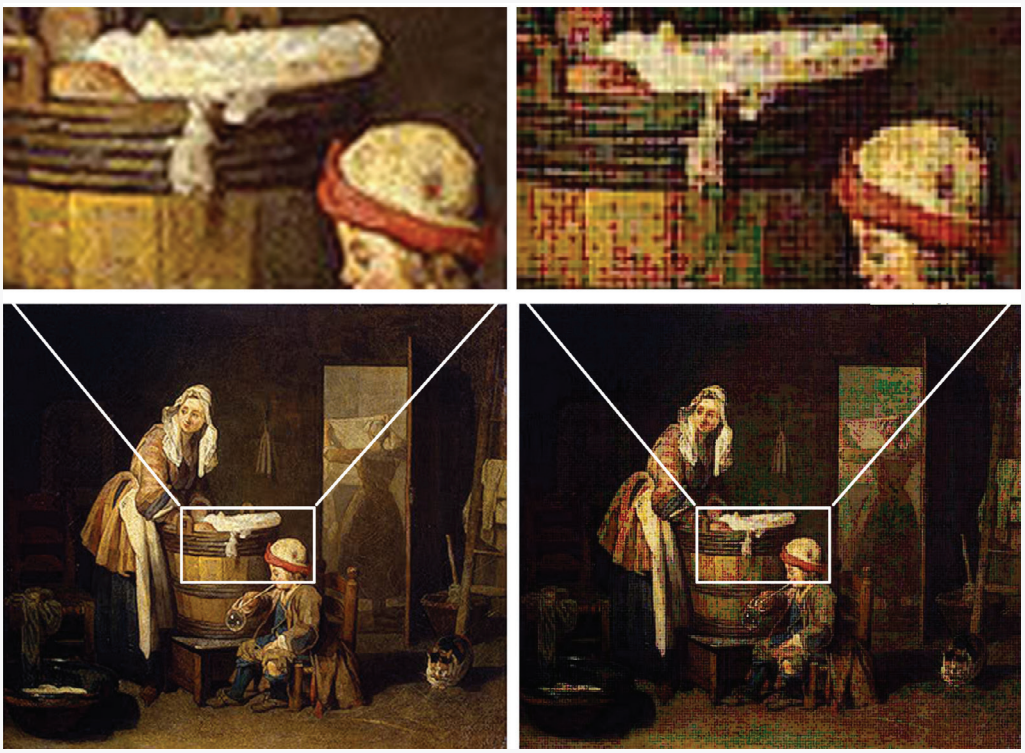
Although sampling can produce enlargements as much as 800% from good images, or even 2,000% from a very high quality image, if the original image does not have enough visual information, the interpolation process has nothing to work with. What often confuses people is images we see on our monitors.

Personal computers (PC and Mac) are designed to give the best possible online experience, which means the monitor, video card, and operating system produce unbelievably good monitor

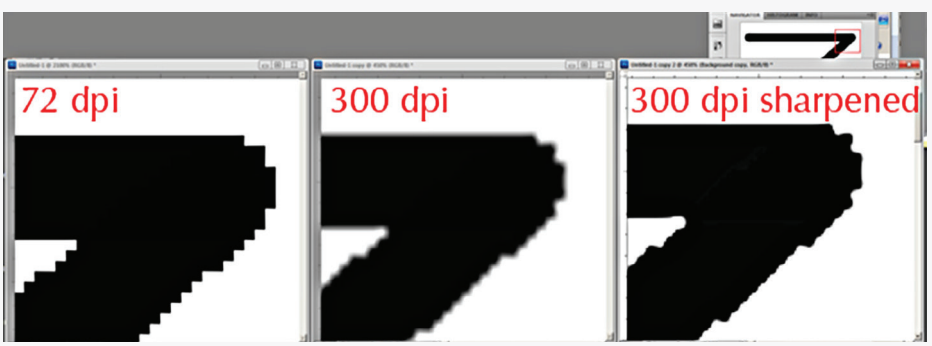
* A pixel at 300 ppi printed by a Canon Pixma printer requires 32 x 32 tiny dots of ink (1024 tiny droplets): the Pixma prints at 9600 dpi. In trying to promote "ppi" over "dpi" when talking about resolution, I know this is probably a losing battle, but for this little information piece, I will persist, but understand that most people will say "dpi."

† Word 2007+ will also "compress" images (downsize) unless the feature is turned off, see page 18.

images from truly awful web image files. Here, left, is a screen shot of Chardin's *The Laundress*. The online images was about 3 x 4 inches, and as can be seen, isn't bad even with enlarged. The same images printed shows an entirely different story.



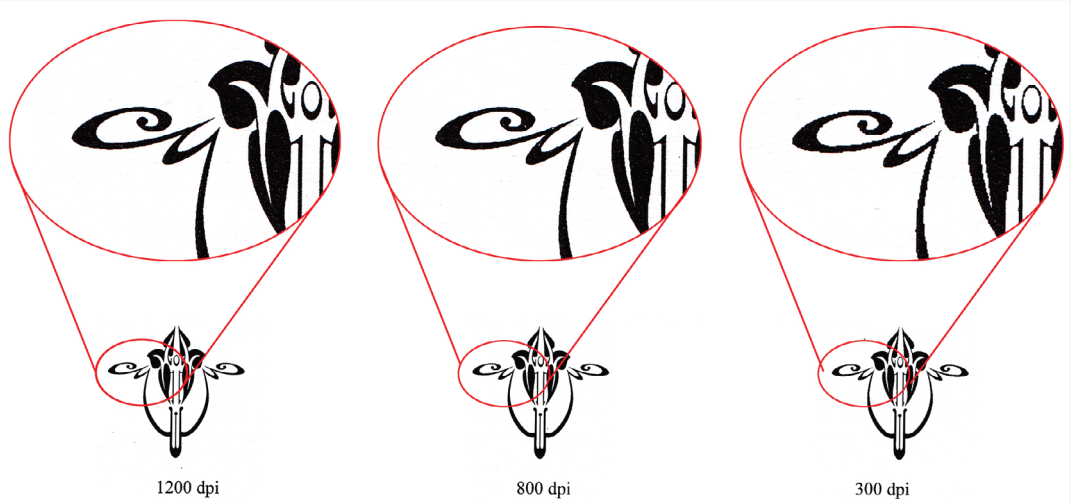
Free programs like Irfanview and GIMP, have sampling. Generally, look under *Image* > *Image Size* or *Image* > *Scale*. (Canvas size—found under Image—refers to the overall dimension of the the image file. A 4 x 5 inch will open as a 4 x 5 image, but the overall size, the canvas could be changed, for example to 6 x 7—the image size would not change, but the background would be bigger by 1 inch all the way around.)



Note: Starting with a low resolution image, left below, and simply increasing the resolution produces a softening of lines and edges, middle. Some images may need to be sharpened, right, to bring back crisp edges. (The duck on the first page was not sharpened.)

The biggest exception to the 300 dpi standard is for 1-bit art—that is, line art that is either

black or white, with no grays. On the right, the 300 dpi art shows jaggies, because of the aliasing caused by relatively low resolution. At 800 or 1200 dpi, the aliasing is gone. Whether 1200 dpi is truly better than 800 dpi is hard to tell—although I think not—the variations could be due to how the dots of ink react to the paper fibers in printing. Some people suggest that 600 dpi is generally sufficient for 1-bit art.



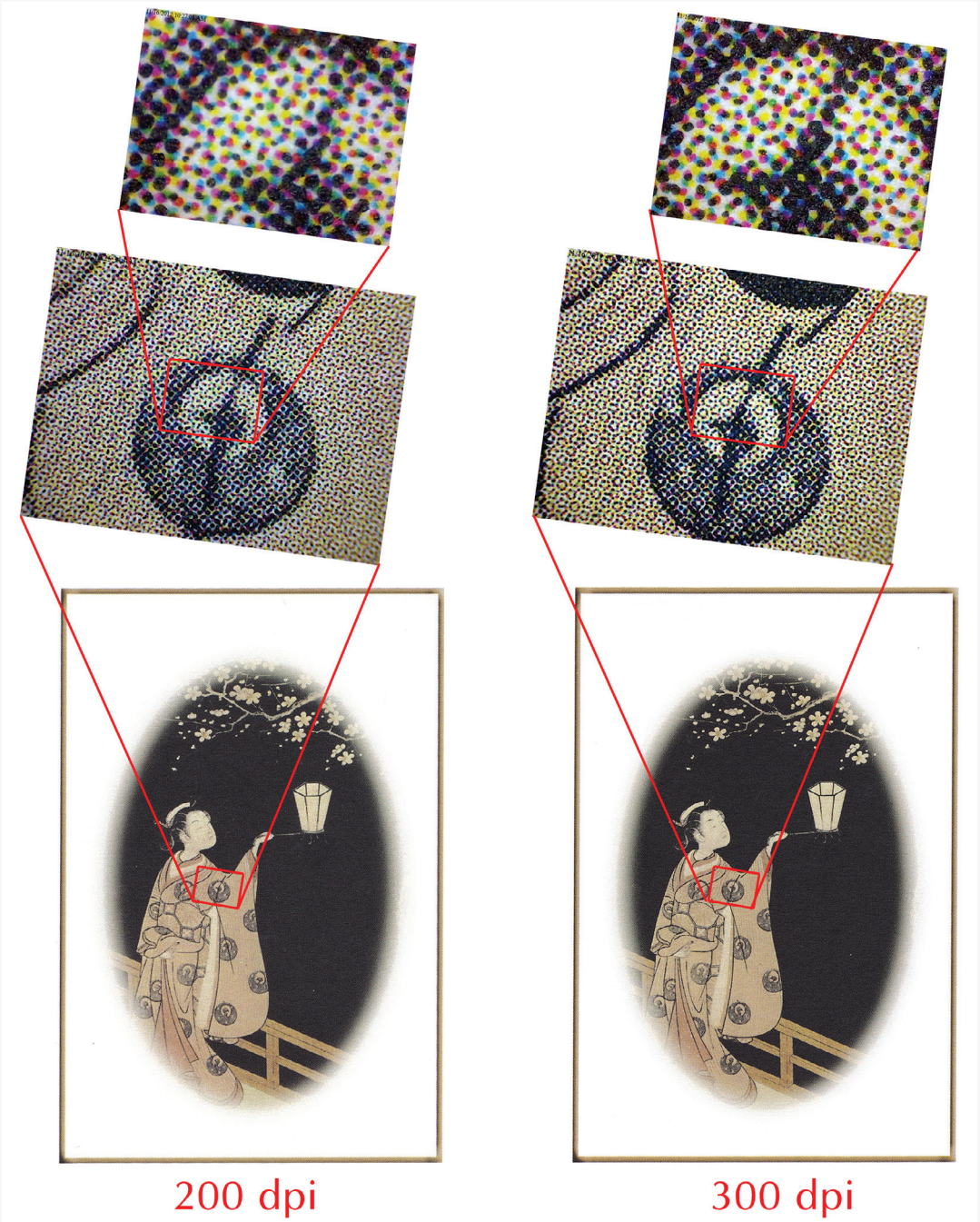
A second exception to the 300 dpi standard is difficult to define. Some images do not need that much resolution. On the next page, there are two identical images printed from 200 dpi on the left and 300 dpi on the right. While I prefer the 300 dpi image, the 200 dpi image is adequate. See image on next page.

General guidelines for printing images

- If images are to be used in print jobs, they should be 300 ppi.
- Most monitors are too bright. Images that look good on a bright screen will tend to look darker and muddier when printed.
- Print images to proof them.*
- Size images in graphics programs to the exact size required: do not resize inside any program that does not have sampling. Specifications requiring images at 100% mean:
  - at the size intended to printed
  - at 300 ppi (dpi)
- Insert or place images into files, do not drag and drop or copy and paste.
- Cameras, scanners, and monitors are sRGB devices (full color is created by varying amounts of Red, Green, and Blue). Most desktop printers are set up to work best from RGB color (although their ink-sets are CMYK, Cyan, Magenta, Yellow, Black). Some commercial printers (printing in CMYK) prefer images converted to CMYK, some do not. Check with your printer.
- All digital images are soft. Most cameras sharpen the images, and make other adjustments. (Images that have not been manipulated in the camera are called camera raw.) Check your images for sharpness.

* Soft proofing, that is, looking at them on the monitor, requires a calibrated monitor and a good color management regime, including ICC profiles for print output devices.

- It is rare for an image to get better when commercially printed. Shadow detail tends to plug up and highlight detail tends to blow out. Compensate when adjusting your images for print.



Reverse/reversed out: To print text or an image in the opposite color (often just paper) to the background: this is reversed out.

Rich black: a black made up of all four CMYK colors. Photoshop Black is C75 M68 Y67 K90. Rich black has traditionally been a problem especially with type because it requires perfect registration

(C0 M0 Y0 K100) (C75 M68 Y67 K90) (C100 M100 Y100 K100)

In black and white printing, K-only should print without screening (unless it's part of a rasterized image); however, any rich black, will be screened and will appear less black.

Right reading: a piece is right reading when it can be viewed correctly, and text goes from top to bottom and left to right—that is, when it isn't upside down or sideways.

RIP: Raster Image Processor. The RIP is the process and means of converting vector information in your file (type, for example) and all other image information into a raster, bitmap, file composed of dots that can be printed. The process consists of interpretation, rendering, and screening. The page is defined and all of the elements that make it up are defined and mapped into a raster image. This is where profiles are applied, and adjustments are made for GCR, sharpening, dot gain, etc. The page image is then screened, and converted into dots to be printed.

Rule: A continuous line used for alignment, separation of page elements, or underlining; short for rule line. The smallest rule is a hairline. A down rule is a vertical rule.

Sampling: This feature of most graphics programs permits enlarging or reducing the size of an image while setting the resolution at what you want (also called *interpolation* or *resampling*). Without sampling, if the dimensions are changed, the resolution changes inversely. With sampling, the program invents new pixels, or removes pixels, adjusting the remaining ones, so that the new size is identical in appearance to the original at the same or any preset resolution.

No Sampling				Sampling		
Dimension	Resolution	Size		Dimension	Resolution	Size
4 ″x 5″	300 dpi	5.15 MB		4 ″x 5″	300 dpi	5.15 MB
8″ x 10″	150 dpi	5.15 MB		8″ x 10″	300 dpi	20.6 MB
12″ x 15″	100 dpi	5.15 MB		12″ x 15″	300 dpi	46.3 MB

Most graphics programs have sampling, but most word processors and desktop publishing program do not. If you adjust the size of an image in Word or even InDesign, it will not be sampled and the resolution will change.

Safe Zone: is generally an area inside the trim that is safe for text. However, text and images can bleed, but parts get trimmed.

For CS, text and images in the interior must be at least .25″ inside the trim lines, 0.125″ for covers.

Sans serif: Type that does not have a serif: This is sans serif. See **serif**

Saturation: is the colorfulness of a color compared to its brightness. In this example, the top is fully saturated, and the bottom is fully desaturated (grayscale equivalent of red). See **desaturate**.

Screen: The image is separated into four process colors. Each process color is converted into halftone dots of varying sizes and angles. See **halftone**.

Scale: to increase or decrease the size of an image while maintaining the original proportions.

Scanner: is a device that takes accurate pictures of documents. Scanning is one of three ways to create digital images: digital photographs, scans, and digital painting and drawing.

Screen angles: the angles screens are placed to avoid Moiré patterns, see example under **halftone**. .

Screen font: is a font that is intended to look and work best on a monitor. Postscript fonts have two components, one is best for printing and the other is best for display.

Screen frequency: is usually given as lines per inch, lpi, although this is usually the same as the dots per inch.

Secondary Color: is a color made by mixing two primary colors within a specific color space. In RGB, the secondary colors are cyan, magenta and yellow; in CMY, the secondary colors are red, green and blue.

Selection: is the isolation of a part of an image. Graphics programs have many selection tools—magic wand (selects by color), polygonal tool, pen tool, etc. And selection can be saved, depending on the program, as selections, paths or in channels,

In the example below, the flower has been selected, which appears as a moving dashed line, called marching ant. What is outside the selection cannot be altered. However the selection can be inverted: the top right selection was inverted and the background darkened.

In these examples, the flower selection was moved to its own layer with black behind it, left, and right, on white, it was rotated and enlarged.

Separations: these are the separate color carries that, when combined, create a full color image. For most printing, these are cyan, magenta, yellow, and black. These can be made in film and plates, or digitally. See examples on pages 31 and 49.

Serif type: is type that has serifs, i.e. little extensions from the main strokes of a character: This type is serif type. See **sans serif.**

Set-off: the unintentional transfer of printing to the sheet it is in contact with.

Shade—is a mixture of the color plus some amount of black. See **Hue.**

Shadow: the darkest neutral areas of an image.

Shadow values: the darkest values that still show detail.

Sharpening: a technique for bringing out detail in an image. It does it by increasing the contrast of transition areas: the edges of the lighter areas get lighter while the edges of the darker areas get darker. Because all digital images are soft when they are first created, most images are sharpened either in the camera or scanner or manually in a graphics program. Excessive sharpening produces halos.

Graphics programs usually offer many ways to sharpen images.

Normal E xcessively Sharpened

Blurred The Blurred Image Sharpened

Just to show the relationship between blurring and sharpening, the Normal image was blurred (softened) then it was sharpened, note that most of the detail was recreated although both blur and sharpen are destructive processes: that is, they destroy or permanently alter pixels.

Sheet-fed press: a printing press that uses pre-cut paper, instead of a single sheet in a roll. See **web press**

Show-through: is the amount of printing on the reverse side that visible under normal viewing conditions.

Signature: is a folded sheet that forms the pages of a book. Folded once, a signature contains four pages, folded twice, it has 8 pages, etc. In preparation of binding, the signatures are gathered in order. [Printing with CS, we really need only think of working with two-page "signatures."]

Simultaneous Contrast: any change in the appearance of a color relative to either a background color or to adjacent colors. This is the Munker illusion:

There are three colors: blue C88 M77 Y0 K0, yellow C6 M0 Y96 K0, and green C83 M6 Y 95 K1. There are no other colors. (The illusion works in grayscale as well.)

Related to this, are temporal and spacial considerations. Colors can appear to change because we've stared at them for a while, or change distances.

The point is that while a spectrophotometer will see only three colors, the human eye sees four. So the context of a color is important, after all, we are printing for other people to see, not for measuring equipment.

Soft proof: a digital proof seen on screen instead of on paper. It is intended to simulate color space, inks, paper, profiles, etc. To be accurate it requires correct calibration, the correct ambient light, and the correct profiles. [With CS, we do not know what profiles to use.]

Specular light: highlights that reflect light directly, it generally has no dot or tonality.

Spine: the back of a book that connect the two covers, which to say, also, where the pages are hinged.

Spine—text: See **spine titling**. [Every book will vary slightly when bound. "Allow for 0.0625" variance on either side of the fold lines for your cover. For example, if your spine width is 1", your text should be no wider than 0.875". Because of this variance, avoid hard edges or lines that end on the fold line. For books with a page count of less than 130 pages, we strongly recommend a blank spine. Blank spines are required for books with a page count of fewer than 100 pages," CS guidelines.]

Spine titling: in the US and UK the correct orientation is so that when the book is placed flat on a table with the front cover up, text on the spine reads correctly left to right.

Spine width: The spine width is based on the number of pages in your books multiplied by a factor. For CS, multiply the page count by 0.002252" for white paper (B&W books only); 0.0025" for cream paper (B&W books only); 0.002347" for color books only.

Spot color: or control color, is a premixed ink so that it can be printed solid or screened, but it is not made up of process colors.

Spread: two facing pages in a publication.

sRGB: is the standard RGB color space. It was created for monitors, printers, and the Internet. Therefore most cameras and scanners use sRGB as the default or only color space.

Step wedge: A gradient broken into steps, used for reference. Here is a common step wedge in 5% increments from black to white. Related to the step wedge is the color spectrum ramp (or wedge:

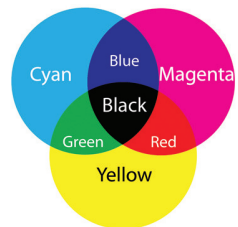
Stitching Line: is a very thin black or white line that appears in a PDF that are associated with transparency and flattening—specifically with atomic and complexity regions. See **transparency**.

Stochastic screening: this is one of several non-conventional screening (halftone) methods. Stochastic screening separates the image using a very fine, seemingly random, dot.

Stock: the type of paper or other substrate that a particular job is being printed on.

Subpixel rendering: is a way to increase the apparent resolution of LED or LCD displays. Because each pixel is made up of three and sometimes four pixel components, or subpixels (red, green, and blue, and sometimes yellow), these can be used, just as gray tones are used in anti-aliasing.

Subtractive: is the color model for reflective art, as opposed to transmitted (like monitors). The color you see is caused by the the material absorbing the colors it is not (subtracting from the light) and reflecting what color it is. Using CMYK halftone dots and the yellow rose on the opposite page, the yellow dots are absorbing the cyan and magenta light components and reflecting yellow. See **additive**, **RGB**.



Substrate: the material being printed on.

Surprint: to print over something that has already been printed. Same as overprint.

SWOP: Standard for Web Offset Printing.

Tablet: is an input device, used for drawing and writing. It has two parts, the tablet for drawing on, and pen-like device or stylus to draw with. Graphics tablets permit control over light/dark, thick/thin when painting lines, as well as mouse-like controls.

Tack: is how sticky ink is. Generally, in offset printing, the ink must be sticky enough to adhere to the paper, but not so sticky as to lift the paper or tear it.

Tagged: is another way of saying a file has an embedded color profile. A tagged image means the same as an image with an embedded profile, ICC profile, color space, etc. Embedding or tagging enables an output device such as a monitor or printer to display the color correctly.

Targeted correction: in digital image enhancement, a targeted correction is one made to specific areas of an image, not made globally. This is done either by creating selections or by using painting tools, which include the eraser, clone tool, paint brush, dodging, burning, smudge and sharpen tools.

Text figures: see **non-lining**

Text paper: is a paper suited to good printing, more opaque than bond paper, finished two sides with good folding and durability qualities. Also called book or offset paper.

Three quarter tone: tonalities of an image that lie between the midtones and the shadows.

TIC/TAC: Total Ink Coverage (Total Area Coverage) refers to the total amount of ink or toner that can be put on paper. Each ink can be applied between 0-100%. (If each ink were printed at 100%, that would be 400% TIC. The upper limit varies according to the printing process, the speed of printing/drying times, the inks, and the paper. Over inking is also referred to as paper wetness, it can result in offset, ink not sticking, etc.

Web offset 240-260%
SWOP:300% (e.g. Photoshop black, C75 M68 C67 K 90 = 300%)
Sheetfed offset on coated paper 320-340%

Note: Since I was apparently able to print Registration Black (C100 M100, Y100, K100), which is 400%, TIC is not a significant problem with CS; however, Lightning Source recommends a maximum of 240%, well below PhotoShop default black (300%).

TIFF: is an image format, Tagged Image File Format, or tif. Although TIFF files are usually large, they can be compressed. TIFF uses lossless compression (except when JPG compression is chosen).

Tint: is a mixture of the color plus some amount of white. See **Hue.**

Title and Author: Your book's title and the author's name must appear on the cover exactly as it was entered during the title setup process.

Tonal range: is the difference between the darkest and lightest tones in an image.

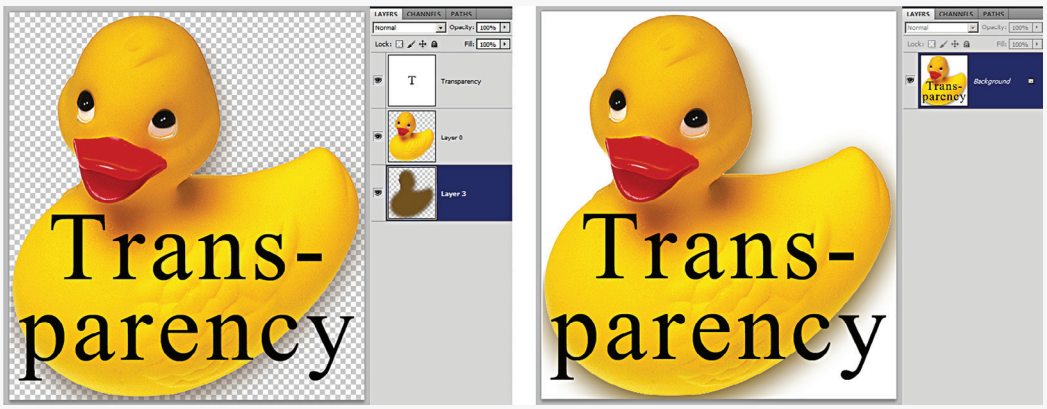
Top Bind: applying the binding to the top edge of the book rather than the side. This can be done with prior notification of CS Customer Support. See Landscape

Transparency: transparency refers to objects or text that appear transparent, that is, they let objects that are underneath them show through. Generally this means having **layers**. Converting all images to JPGs removes transparency. PDF/X and PDF/A remove transparency, see **Flattening**. The problem with transparency is that objects beneath transparent objects, or even very close, can be adversely effected (stitching lines, color shifts,etc.). The PDF output (monitor/printer) is independent of the software or hardware used to create the original page or images, and must deal with layers, stacking order and transparency. Because PDFs are what most digital presses print from, and Adobe is at the forefront of these things, most of the following involves Adobe products and adobe solutions.

See **Layers** for the most common cause of having issues with transparency.

Transparency

Transparency refers to objects or text that appear transparent, that is, they let objects that are underneath them show through. Generally this means having **layers**. Converting all images to JPGs removes transparency. PDF/X and PDF/A remove transparency, see **Flattening**. The problem with transparency is that objects beneath transparent objects, or even very close, can be adversely effected (stitching lines, color shifts,etc.). The PDF output (monitor/printer) is independent of the software or hardware used to create the original page or images, and must deal with layers, stacking order and transparency. Because PDFs are what most digital presses print from, and Adobe is at the forefront of these things, most of the following involves Adobe products and adobe solutions.



Left: this image contains several examples of transparency. Each element is on it's own layer. The checkerboard background indicates transparency. Each layer has transparency. The text, vector art, requires transparency. The drop shadow requires transparency. Right: combining all the visible layers into one layer, *flattening*, removes the transparency; although there still could be an alpha channel if that's supported in the file format.

To simplify handling transparency, pages are divided into atomic regions and the transparency effects are resolved for each separate atomic region, then stitched together. PDF's can contain transparent objects with different color spaces, for example: a spot color with a drop shadow over a CMYK background, or a translucent RGB image over a CMYK background. These an result in color shifts, sometimes only in part of an image. The interaction of text or other vector based objects and a bitmapped (raster) oject can result in some part of the vector object being converted to bitmap (with text, some part may look thicker). Sometimes, multiple layers that contain transparency can create problem when determining which parts combine with which.

Transparency comes from:

- Making an object transparent: for example, removing the background, or placing an object on a transparent layer (the file format/application must support transparency)
- Adding a drop shadow or feathering, blending modes or opacity
- Layers

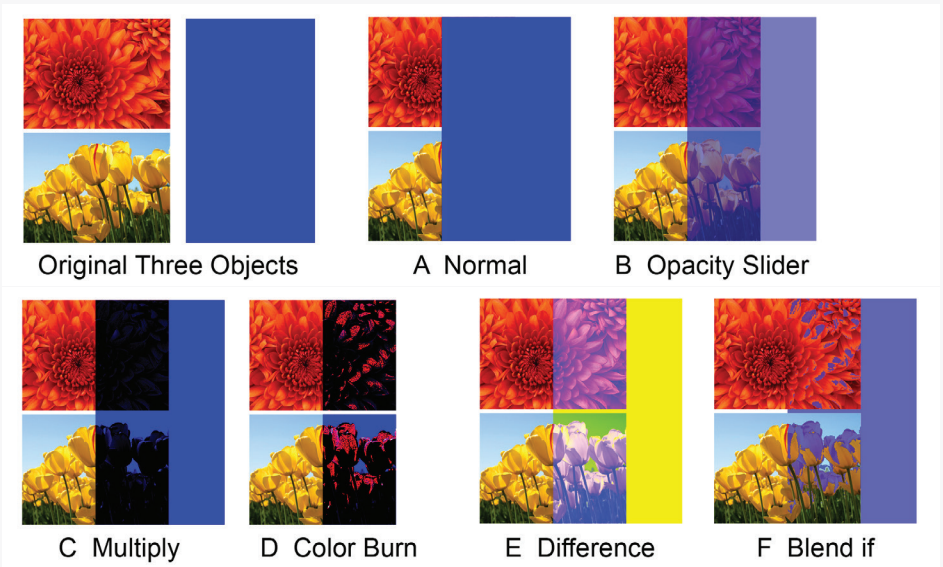
- Editable text requires its own layer
- Placing files with transparency into the document
- To remove or prevent transparency:
- PDF 1.3 do not support transparency (PDF 1.4+ can, which enables keeping text in an editable form.)
- PDF/X, PDF/A, and Print Quality (in Acrobat) do not support transparency
- JPGs, for example, do not support transparency

There is a vocabulary related to transparency (note: many of these definitions relate to Adobe programs; non-Adobe PDF conversion programs might have different names):

Alpha channel: a channel that contains transparency information.

Atomic regions: 1) the smallest intersections of objects related to transparency; 2) zones a page is divided into when it is flattened. Objects (text, vector, image) may be divided among atomic regions.

Blending mode: a specification for various ways in which the colors of object above or beneath each other can blend:



The blue panel was placed over the flower pictures, then blending modes were applied to the blue layer. A: normal, that is, no blending. B: the opacity of the blue was reduced to 50%. C: blue was set to multiply, which multiplies the pixel values underneath it. D: color burn divides the inverted bottom layer by the top layer then inverts the result. E: difference subtracts the bottom for the top or the top from the bottom —whichever produces a positive value. F: blend if (red, normal mode at 60%)permits a particular blending mode if the values of one layer, above or below, is darker or lighter, red, green, blue, or luminance. Including Normal, InDesign has 16 blending modes and Photoshop has 27, each can be effected by the opacity slider, which itself is creating transparency.

Clip: is to cut. Specifically here, it means to use a vector object as a mask or window for other objects, see **mask**. While raster objects can be used this way, they leave rougher edges than vector shapes that work at the resolution of the output device.

Clip Complex Regions: is a Transparency Flattener option. It places the boundaries between vector and rasterized art fall along object paths, which reduces stitching artifacts (where part of an object is rasterized while another part remains vector).

Color stitching: is a visible difference in color between objects whose color should be identical—most commonly caused when only a portion of a vector object is rasterized.

Complexity region: is an area that because of a complex transparency interaction, is rasterized.

Convert All Strokes to Outlines: is a Transparency Flattener option. It converts all strokes to filled paths, ensuring that the width of strokes is consistent during flattening. Thin strokes may appear slightly thicker.

Convert All Text to Outlines: is a Transparency Flattener option. It converts all text objects to outlines and discard glyph information. It ensures that text width is consistent during flattening. Small text might appear slightly thicker.

CT/LW: (continuous tone/line work) are two file formats—dual resolution—used by Scitex.

Drop shadow: is a live effect that can be applied to objects or type in Illustrator, InDesign, and Photoshop. Generally it is a shadow that appears under an object from a specific direction. The drop shadow is a source of transparency and in Adobe products requires the Transparency Flattener to process it (in the example, the images were converted to JPGs, which removed the transparency).

Dual resolution RIP: is a RIP where each pages is created in a unscreened, intermediate, rasterized format in two files: a high resolution file for line work and text and a lower resolution file for continuous tone images.

Fatten: is the process of creating high resolution image data from low resolution image data or place holders. See OpenPress Interface.

Feather: is a live effect that vignettes the edges of an object. It requires Transparency Flattener to process it. See **vignette**. (In this example—prior to feathering, it was basically the same as the drop shadow, less the drop shadow—the images were converted to JPG, which removed the transparency.) Example on next page.

Flattener presets: are Low Resolution, Medium Resolution, and High Resolution in Transparency Flattener. Custom presets can be created.

Gradient and Mesh Resolution: is a Transparency Flattener setting that sets the resolution applied to any **gradient meshes** and **gradients** that are involved in transparency.

Gradient mesh: is a single, multicolored Illustrator object on which color flows smoothing with seamless transition.

Gradient: is a fill or stroke containing a smooth blend of color(s).

Ink Manager: is an Indesign feature that lets the user control the output of each color in a document.

Interacts with transparency: is describes objects that may not be transparent but which could be affected by the Transparency Flattener during flattening.

Line Art and Text Resolution: is a Transparency Flattener setting that sets the resolution for complex areas that need to be rasterized. Typically, this should match the resolution of the output device.

Live effects: are Illustrator operations (also in InDesign effects, and in Photoshop as effects and styles) which can be edited. These include drop shadow, feather, inner and outer glows, etc., which make an object a source of transparency.

Live transparency: is any transparency effect that is live—that is, it can be edited. Once the effect has been flattened or rasterized it is no longer live.

Opaque: is the color attribute of being impenetrable to light, non-transparent, non-translucent. An opaque object totally obscures anything beneath.

Open Press Interface (OPI): is an standard whereby you can use low-resolution images in your page layout, but they are replaced by high-resolution ones by a RIP or OPI server. The proxy images must not interact with transparency or they could be processed into the output by the Transparency Flattener.

Overprint Preview: is a display option in Illustrator, InDesign and Acrobat 8+ Professional that shows the effects of object overprinting. It lets you view flattened output more accurately.

Pages panel: is the InDesign panel that shows pages and spreads in small icons. If the page

contains transparency, the background in the pages panel page icon will show a checkerboard background.

Proxy image: is a low-resolution placeholder image. See Open Press Interface.

Raster/Vector Balance: is a Transparency Flattener setting. It lets the user set the amount of rasterization. The lower the setting the more will be rasterized; the higher the setting the less rasterization is done to the document.

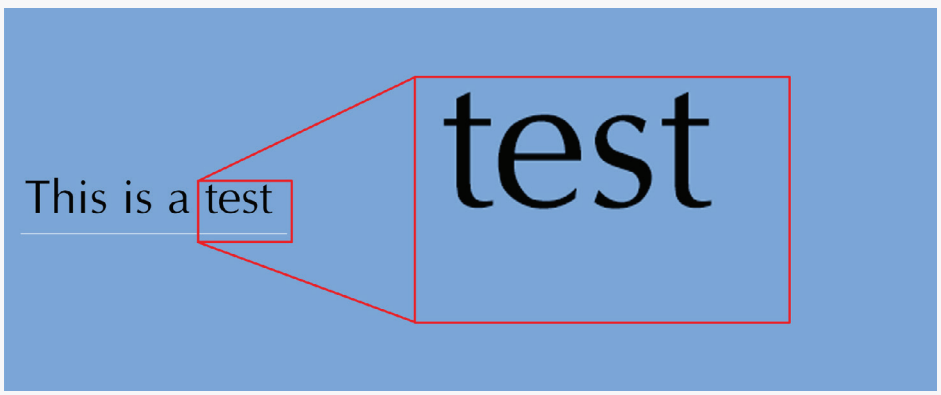
Seam stitching: is the appearance of white or black lines in a flattened images or difference along the borders of atomic or complexity regions. Although Adobe says the white lines are non-printing—enlarge the image, if the white line disappears it is non-printing; black lines print—there have been reports (anecdotal) of white stitching lines printing.

Separations Preview panel (*Window* > *Output* > *Separations Preview*) shows the color separations individually or in combination. It includes a dynamic densitometer that displays separation values where the cursor is positioned.

Source of transparency: is any object with less than 100% opacity, blending mode other than normal, drop shadow, or feather.

Stacking order: is the back-to-front or front-to-back order of objects on a page, within and between layers. Objects beneath transparent objects may be affected during transparency flattening.

Stitching lines: are black or white lines along the boundaries of atomic regions. Adobe says that white lines are most often non-printing (by enlarging an image, those lines should disappear or remain exactly the same size), and black lines will probably print. Several website say that white stitching lines may print. See **clip complex regions**.



Adobe has a page on how to deal with these lines (http://helpx.adobe.com/indesign/kb/thin-white-dark-lines-stitching.html). Depending on the cause, some people recommend using a PDF setting that preserves live transparency, and when that is the solution, PDF/X-1a will not work. However, I've encountered lines where using PDF/X-1a does eliminate them.

Sometimes these lines are not stitching lines, but are lines that come from the art itself, not the PDF conversion.: working in layers and having an edge of a selection print, as if it were stroked. The solution is to go back to the art and erase the offending line(s), or, if the image has been flattened, paint it out.

Transparency Blend Space: sets either RGB or CMYK as the color space in which Transparency Flattener works. It tells the Flattener what profile to use for various transparent objects of different color spaces.

Transparency Flattener: is a component of Illustrator, Indesign and Acrobat 8+ Pro that processes live transparency along with the objects it interacts. It creates a an opaque object that has the appearance of the original, but which can be rendered as PostScript. It is available for the PDF/X preset.

Transparency interaction: is the relationship and affect between a source of transparency and any other object that is a source of transparency or is very close, generally a point, to a source of transparency.

White: as a color in images is opaque. It hides what is beneath it. Generally, if a white object hides text or part of another image, that is how it will print, as if it were opaque, and what you will see is paper color. However, if you print an image on a white background, the white will be non-printing—as if it were transparent; if the paper has pre-existing text the white areas of the image would not hide it.

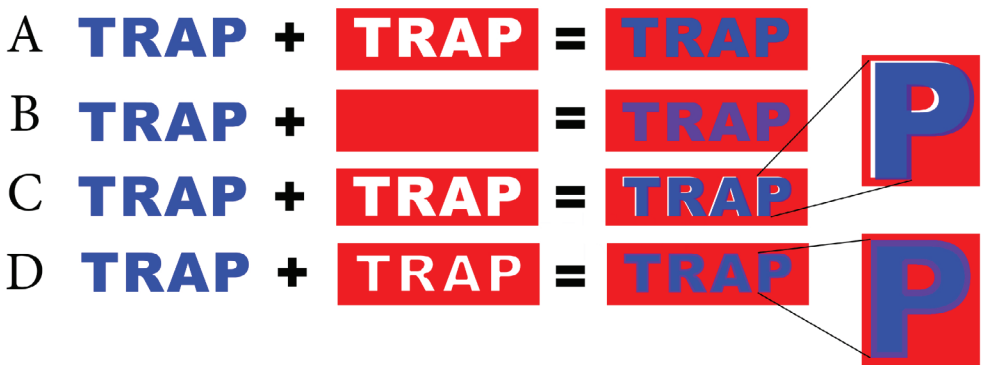
Working with CS

CS will accept images with transparency, but they will give a warning in their review letters, saying that this could cause a shift in color. When images are flattened there is often a slight shift in color—this occurs in Photoshop, for example, all the time, although most people never notice it. If there is transparency, you could do one of two things: ignore the warning and proceed, knowing that you could end up with a color shift that is unpleasant (I have never seen this); or, fix the transparency.

As a matter of workflow, it is often best to eliminate transparency whenever possible, just to avoid problems.

This is a related problem: how the RIP handles transparency and screening. This is part of a test printing text in Photoshop Black (four-color), and K-only. Because of registration problems, you can see a strange manifestation: the rainbow "t" which should have been K-only, but printed in what is registration black with no screening. Eliminating transparency would not have prevented this, but strange things happen with transparency as this shows.

Trapping: overlapping adjacent colors slightly to hide possible registration problems. Here, TRAP is to be printed in the color on the left. **A** is the ideal. **B**, however, shows what happens if the word is simply printed over the red, the blue changes. So, as in **A**, the word TRAP is knocked out of the red and then printed over the white. **C** shows what happens if the registration is off: while the slightly redder fringe is barely noticeable, the exposed white is unacceptable. To prevent the effects of misregistration, the word can be trapped, either by reducing the size of the white knockout, as in **D**, or the blue could be enlarged (not shown). These examples have been exaggerated. No trapping was used in this book.



Sometimes the cure is worse than the problem. For CS, trapping appears to be unnecessary.

Trim: is to cut excess paper away after it has been printed, folded, gathered, and bound.

Trim mark: is a mark on the printed piece to indicate where the trim should occur. It is not used with CS: that is, PDFs are not to have them.

Trim Size: is the size of the piece after trimming. For example, this is the final size of your book in width by height, for example 6 x 9. (Note, customarily the width comes first.) On a template it is shown as the trim line. It is synonymous with paper size when working in word processing, publishing, and PDF conversion program.

Trim zone: a margin, no less than 0.125" on one or more sides of a image that will be trimmed off in binding. It starts at the trim line and goes out away from the edge.

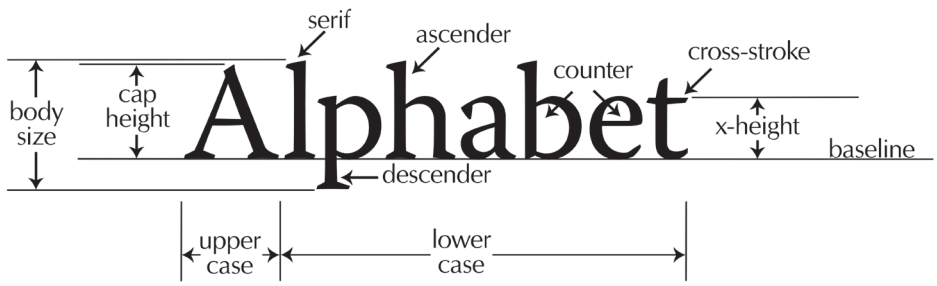
True type: see **type**

Two up: to impose two items (generally pages) on a press sheet.

Type: is the small block of wood or metal, or the digital equivalent, of a letter or character used in printing. With the advent of desktop computers, the terminology is now imprecise. *Font* is a complete set of characters (uppercase, lowercase, numerals, punctuation, etc.) for style or type effect (regular, italic, bold italic, etc.) in one family: for example, Times New Roman regular; whereas Times New Roman italic is a separate font. *Typeface* is correctly synonymous with type family: a set of related fonts, designated by names:

Times New Roman, Arial, Garamond, etc. Each font on a computer is represented by a font icon, or in a font folder; however, word processors are able to create imitation fonts, see **Faux Fonts**, which do not print reliable if at all in the context of print-on-demand printing.

In considering a typeface or font, we look at the various parts of each letter:



Fonts come in three basic formats: TrueType, OpenType, and PostScript fonts. Several questions persist: which formats are cross-platform (Mac vs. PC), which formats display well, and which formats print well. Macs since OSX (some sources say 7.x*), and WIndows since Window 2000, that is roughly any computer built since 2000-2002 can use True Type, Open Type, and Postscript fonts.

Before Windows 2000, PostScript fonts would only work in PC's with Adobe Type Manager. PostScript was the preferred font for Apple computers and the font of choice for graphic designers for years, and the bias persists. TrueType was developed jointly by Windows and Apple. However, it is associated more with Windows.

TrueType and Postscript fonts can contain 256 characters, OpenType, based on TrueType, can have 65,000+ characters.

TrueType, OpenType, and PostScript fonts are scalable, vector fonts. There is a bitmapped font format where each font, like metal fonts, is one style from one family in one size.

UCR: under color removal is the process of removing CMY that added to dark neutral blacks to avoid exceeding a specific TIC.

Uncoated: paper that has no coating. These are not as good for halftone printing as coated papers. See **coated.**

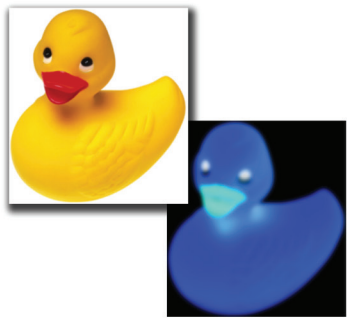
Unique Hue: there are four unique hues in the **opponent process** theory, red, yellow, green, and blue.

Unsharp masking: is a sharpening technique that combines a blurred inverted (as in: postive/negative, negative/positive) with the original in registration, increasing the accutance (edge contrast). With film, it is literally an unsharp mask: the mask is a second piece of film that is slightly out of focus (this is usually done by exposing a second piece of film base side to base side, like a contact print, except that because of the gap caused by the film base, it is soft.). In the example below, done digitally, and inversion of the original

* http://www.microsoft.com/typography/WhatIsTrueType.mspx

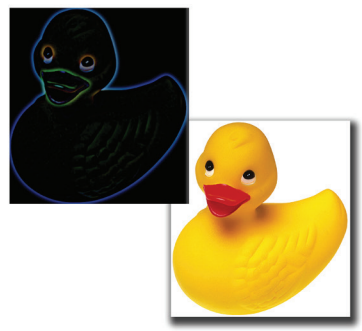
was made and it was softened. To show how this works, both the original and the soft inverted images were aligned and a blending mode (Linear Burn) was applied, which shows the edge effect:

Orignal: slightly soft



Unsharp mask: very soft inverted image

Effect of the unsharp mask: to accentuate edges.



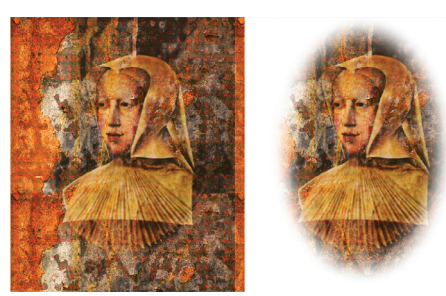
The sharpened copy

Unwanted color: the weak ink when two other colors are dominant. The unwanted color can be used to improve contrast. In the example below, the original is on the right, the improved image on the left. It was not sharpened, rather the yellow and black channels were adjusted.

Improved Original

Vector: this is a type of computer graphic that uses points, lines, and curves to describe an image mathematically. Unlike raster graphics where the file size is proportional to the images size (bigger image—bigger file size; smaller image—smaller file size); vector art is "infinitely" scalable. The file size does not change if you want a bigger or smaller image. Type is vector.

Vignette or vignetting: often called feathering, is basically a gradient applied to the edge of an image or shape. The image on the right has been vignetted. When applied to a shape or selection, it is called feathering.



Watermark: 1) a mark impressed in the paper when it is made; 2) a lightly printed mark often used to indicate proof copies or prevent copying. **Web press:** a high speed offset press that prints paper from a continuous roll.

Weight: the density (weight) of specific paper in a specific size, measured in pounds.

White point: is the place in an image that is or should be white, that is with no color cast. I tis used in image capture, enhancement, and reproduction.

Widow: is the last line of paragraph that begins a page; an orphan is 1) a very short last line of a paragraph, generally a word or part of a word, or 2) the opening line of a paragraph that appears as the last line of a page.

In books I examined, written and designed by Hermann Zapf, Bruce Rogers, Frederic Goudy, Adrian Wilson, and books designed for limited edition publishers like The Folio Society or The Heritage Press, none contain widows, and all contain orphans—with either meaning.

Widow/Orphan control produces long and short pages—vertically unjustified—which is never done by good book designers except as the only remedy to a difficult formatting problem and then only when both pages of a spread are either long or short (almost all spreads made up of the last page of a chapter and the opening page of the next will each have a different number of lines).

Wrong reading: An image or text that is flipped so that it does not read top to bottom, left to right—for example, holding a book sideways, or printing a page upside down.

WYSISWG: what you see is what you get. This is the promise of most word processors, graphics programs, and PDFs. Usually it works, sometimes it does not.

X-height: see **Type**