# Understanding Resolution

by

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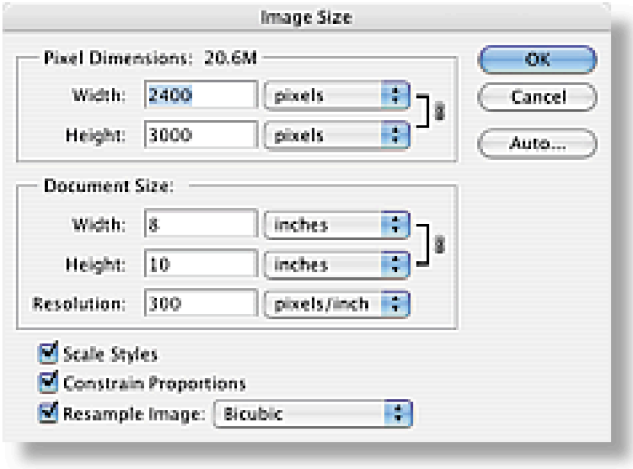
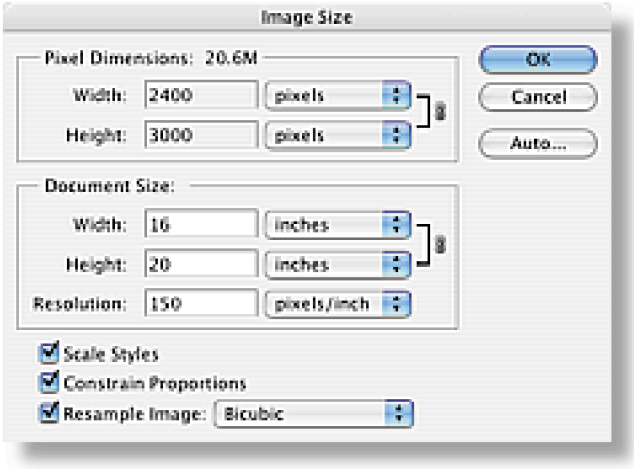
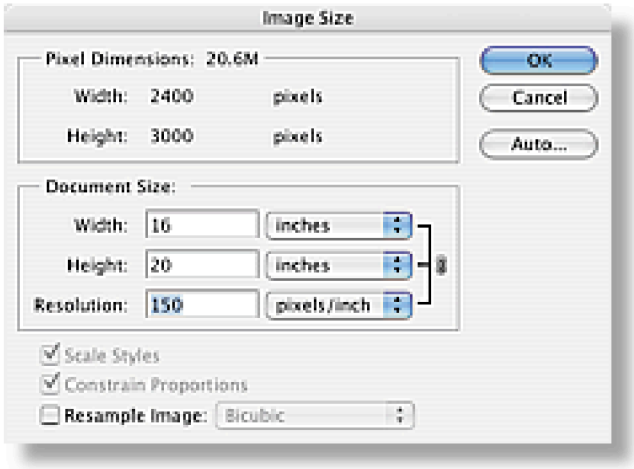
Resolution is one of the most difficult concepts to understand in the Digital World, but it is a vital one. Without a good understanding of this key issue, mistakes will surely be made in the processing of files.

Perhaps the first concept to deal with, on the road to understanding resolution, is that file size — and file size alone — determines the resolution of an image. Not ppi (pixels per inch), not dpi (dots per inch - which has no correlation to digital images anyway), and not the document size. Simply put, a 15MB file is a higher resolution file than a 5MB file. The confusion arises mostly out of misuse of terminology and the placement of certain words in key dialog boxes with Photoshop. To illustrate this fact, look at the two Image Size dialogs below. One has a resolution listed of 300 ppi and the other only 150 ppi, yet they both have the same file size and, therefore, the same "effective resolution".



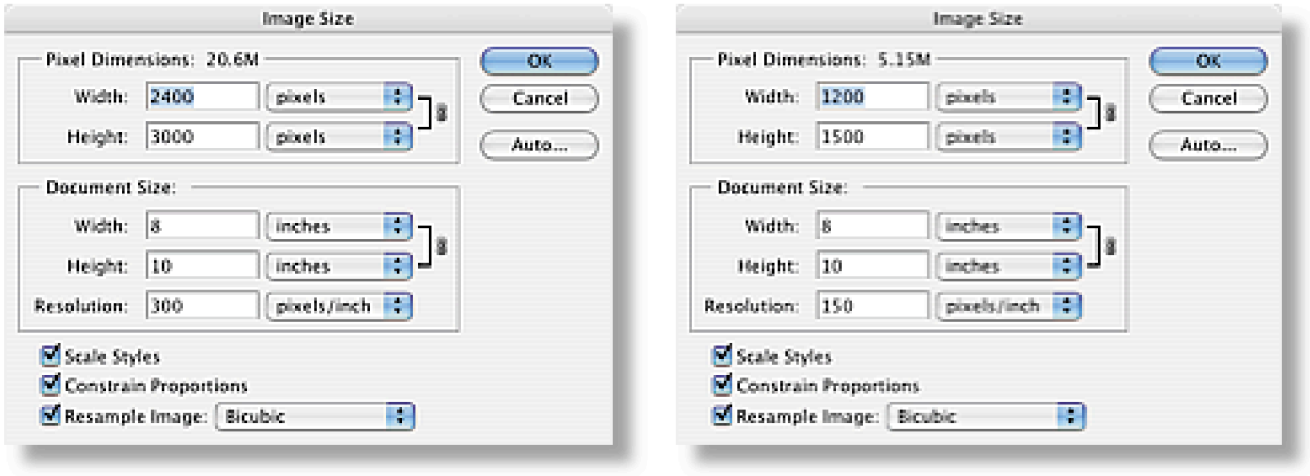




By "effective resolution" I mean that either file is capable of producing the same sized document at a given number of pixels per inch. If the "Resample Image" checkbox is turned off as it is below, notice that the upper part of the dialog box is greyed out. This means that neither the number of pixels in the image (height and width measured in pixels) and the file size, which are directly related, can be changed regardless of what we do to the numbers in the lower portion of the dialog box. Also notice that, unlike the upper two dialog boxes, all three fields under "Document Size" in the lower box are now linked. This means that any changes made to one field will have a proportionate effect on the other two (assuming that the "Constrain Proportions" box is checked).

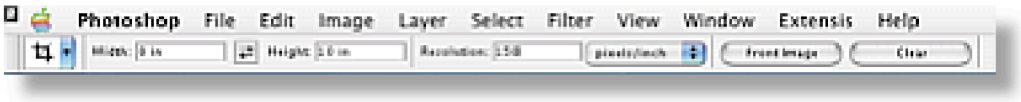



Since pixels ***are not always the same size***, the document's size can change, but the overall file size and the number of pixels in the image, cannot! An 8x10 @ 300 ppi is exactly the same file as an 16x20 @ 150 ppi! All we've done is made the pixels larger, thus having fewer per inch.

By contrast, look at the dialog boxes below. With Resample Image turned on, if we make a change to the resolution field from the first dialog box, we are changing not only the total number of pixels in the image, but also the file's size from 20.6 MB to 5.15 MB. To over simplify, with Resample Image turned on, you are interpolating the image's size either up or down, depending on the changes you make.




In a similar fashion, the same adjustments are available via the crop tool. If you start with the image on the left, and set the fields in the options bar up as illustrated below, you will end up with the file on the right.




This is why it can be dangerous to simply plug in numbers to the resolution field when using the crop tool, without understanding the file's size & resolution beforehand. You could be unwittingly throwing away a large portion of your file, or you could be interpolating the file's size upward beyond its quality limits. Leaving the resolution field ***blank*** when using the cropping tool is exactly the same as changing the height and width in the Document Size area of the Image Size dialog with "Resample Image" turned ***off***.

To better understand this concept, spend some time in the Image Size dialog box experimenting. Turn checkboxes on and off in conjunction with changes made in the fields and you will eventually start to see the relationships there. This will make it easy to figure out what size prints you can comfortably make just by knowing the file's size. Don't worry about "messing things up" in the Image Size dialog as you experiment. To get back to where you started when the window first opened just hold down the option key (Mac) or the Alt key (PC) and the "Cancel" button changes to "Reset".