

Annual Reviews Graphics Guide

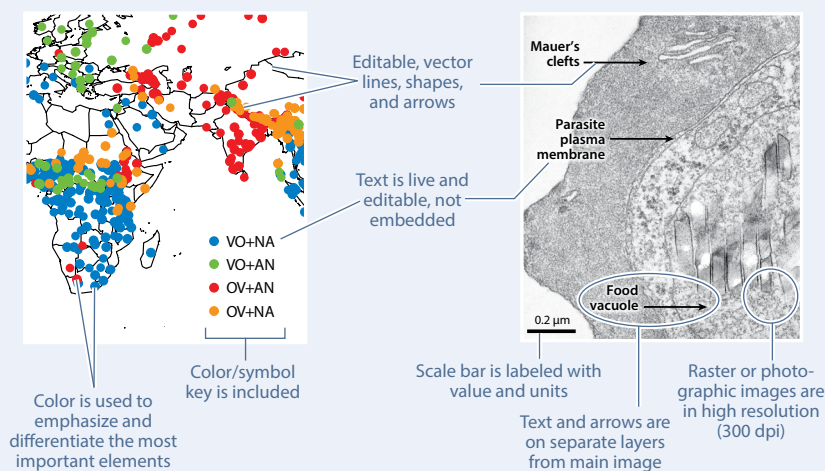
1. Keep figures editable

Annual Reviews has a team of Illustration Editors who work with your figures using Adobe Illustrator to ensure accuracy and consistency, provide graphical enhancements, and apply our house style. During this process, we may change font, type size, colors, layout, figure size, and information hierarchy, and we may redraw certain elements.

Therefore, while we prefer that figures be as close to final as possible when you send them, please make sure the files are not flattened* or uneditable.

NOTE: many other journals require print-ready, flattened files; our requirement for editable files is quite different, due to the figure enhancement and editing we provide.

Examples of desired figure attributes:



If you are creating your figures from scratch:

- Send the original, editable/vector format wherever possible (for graphs, diagrams, etc.). Avoid creating line- or text-heavy diagrams in raster programs such as Photoshop.
- Keep text/lines on separate layers from any photo, or send one version of the image with labels and one without. Suggested: place the photo in Illustrator or PowerPoint, then add text/lines; send us the original .AI or .PPT file.
- Make sure all photos you start with are high resolution (300 dpi at desired final size).

If you are using previously published figures:

- Consult our [Figure Permission Guide](#) for details.
- Request permission from the copyright holders to adapt figures; include citation/license/permission info in the captions. (Authors are responsible for obtaining all permissions, ideally BEFORE submitting the figures.)
- The low-resolution figures found in online journals are usually not adequate for our press-quality publication. Contact the author or publisher for high-resolution, editable files.
- Redrawing a figure does not change copyright; if the original author would recognize the figure as theirs, permission to adapt/modify the figure must be obtained.

2. Submit PDF files

- Always send us a high-quality PDF of every figure.
Look for "save as PDF" or "export PDF" options; otherwise, choose "Print" and select "PDF file" as the destination instead of your printer.
- Please ensure the file name includes the correct figure number.
- If you used the following programs to create the image, please also send the figure in the original file format listed:
Adobe Illustrator: .AI
Adobe Photoshop: layered .PSD or .TIF
Microsoft PowerPoint: .PPT/.PPTX
Microsoft Excel: .XLS/.XLSX
CorelDraw: .CDR
ChemDraw: .CDX, .CDXML
- AR encourages authors to submit video clips. Please see our supplemental material guidelines for information on format and compression:
<http://www.annualreviews.org/page/authors/author-instructions/preparing/supmat>

Further notes on file format:

- **Why PDF?** Almost all programs can output PDF files, which maintain the exact look of the image while preserving vector data, editable text, and high-resolution raster images, all at once.
- Unacceptable file formats include:

ArcGIS (various)	Kaleidagraph (.QPC)
Canvas (.CNV, .CVX)	Painter (.RIF)
Cricket Graph (.CGG)	SigmaPlot (various)
Freehand (.FH)	Visio (.VSD)
- For files created in these and other programs not listed in the blue box at left, please save as, export, or print to .PDF, .EPS, or .SVG format.
- High-resolution .JPG or .PNG files are acceptable only for photos without text, lines, or labels.
- BioRender-created figures are not ideal because all images are rasterized upon export. (Export as PDF to retain editable text.) BioRender figures will be either retouched or treated as sketches/drafts and redrawn entirely.

3. Contact us with questions

If you have questions or need help creating figures, please ask your Production Editor to put you in touch with the Illustration Editor for your volume.

Our general specs

- We prepare all figures to fit our layout; you do not need to size your figures exactly. Ideally, make figures larger and higher resolution than they need to be; it is easier for us to scale down as needed than to scale up. The largest image dimensions we can publish per page are 6.33 × 7.9 inches (160 × 200 mm).
- Photos must be at least 300-dpi resolution at final layout size. For an image to be 3 × 3 in. (76 × 76 mm), it must be 900 × 900 pixels.
- We change all type to house style, which uses Myriad Pro, with most type at 7–8 pt size; minimum size is normally 6 pt.

- Do not include so many panels (figure parts) that the majority of the type must be smaller than 7 pt when the figure fits our page size. A maximum of six panels per figure is usually reasonable.
- Include only the most important images as figures. Additional images can be posted online as Supplemental Material. See your specific AR journal's submission guidelines for recommended figure numbers.

What is the difference between vector and raster?

Vector (object-oriented image)

Vector* images are based on mathematically described points, lines, and areas; they can therefore be easily resized and edited.

Graphs, diagrams, schematics, and cladograms are usually created in a vector format and should be submitted as such.

Raster (bitmap or scanned image)

Raster images are made up of pixels, and thus cannot be easily edited or enlarged without losing resolution or image quality.

Photos, scans, and continuous-tone data plots are examples of intrinsically raster images, and are fine to submit as such.

File formats that are usually vector:

Adobe Illustrator (.AI)
PowerPoint (.PPT)
.SVG, .WMF, .CDR

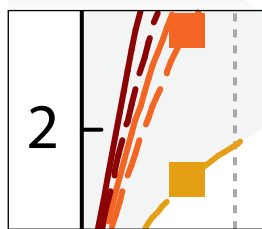
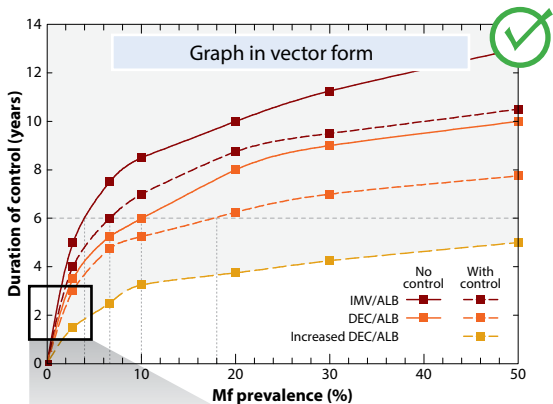
File formats that can be either vector or raster:

Adobe Acrobat (.PDF)
Encapsulated PostScript (.EPS)

File formats that are always raster:

Adobe Photoshop (.PSD)
.TIF, .JPG, .PNG, .GIF

Why graphs and similar imagery should NOT be submitted in raster format:



Detail

Resolution independent

Crisp at all magnifications

Imagery consists of a set of mathematically described objects, each separate, independent, and scalable without distortion

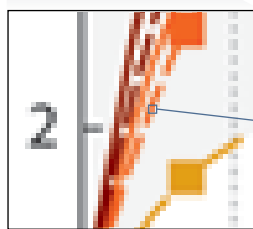
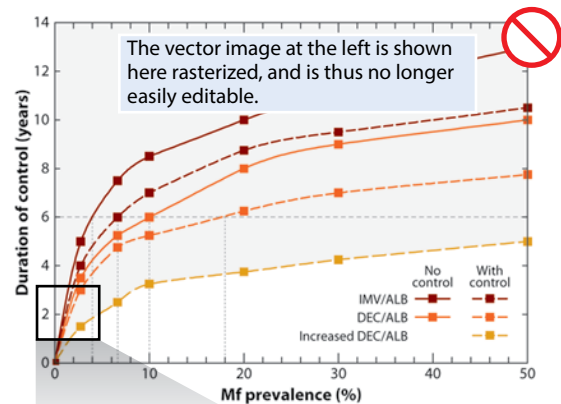
Editable

Control points are connected by lines called paths

Lines, colors, gradients, and type are instantly changeable

Paths can be manipulated (where appropriate) with handles

Underlying wire-frame view



Detail

Resolution dependent

Jagged pixelation occurs when image is enlarged

Imagery consists of a grid of tiny adjacent square pixels, each one color

Resolution depends on size of pixels (i.e., dots per inch or dpi)

Not easily editable

No control points or paths

Can only be changed using photo retouching tools in Photoshop

Type is not live or editable

No wire-frame view exists

Definitions

Bitmap: (a) A spatially mapped array of bits; that is, an image made up of a fixed number of pixels, also known as a raster image. (b) A raster image made up of one-bit data (black and white pixels only). This is the meaning used by Adobe Photoshop's bitmap mode. (c) Bitmap (BMP) image format, one of many raster file formats.

CMYK: A color space using the primary colors cyan, magenta, yellow, and black. K stands for key; black is the key plate on a traditional printing press.

Color space: A description or model of the range of all possible colors that can be displayed on screen or in print. Display devices such as computer monitors typically define colors using RGB, the primary colors of light. Printing processes typically use CMYK, the primary colors of ink. Annual Reviews converts all images to the CMYK color space to ensure our journals print properly. The RGB color space is slightly larger than the CMYK color space due to the properties of transmitted versus reflected light. Therefore certain colors that can be shown in RGB (especially bright blues and greens) will look less bright when converted to CMYK.

dpi: A measurement of image resolution, described as dots per (linear) inch or pixels per (linear) inch (ppi). See resolution for more details.

Editable: An image containing text, lines, and other graphical elements that are live and can be separately selected, moved, edited, or deleted. Entirely vector files are the most easily editable. Flattened raster files are considered uneditable by Annual Reviews, as they can only be changed to a limited extent, using time-consuming photo-retouching tools. Typically, the format in which the file was originally created will be most editable, because the figure's creator would want to preserve the ability to easily move and change elements. For example, a Photoshop (PSD) file with a background photo and live text on top, on a separate layer, is considered editable. A JPG version of the same file would not be editable, because the layers would be flattened and the text would be embedded into the pixels making up the image.

Embedded text: Text that has been rasterized and flattened into the pixels that make up a raster image. Embedded text becomes part of the image, permanently obscuring whatever was beneath it, and it cannot be moved or edited without altering the image. As a result of rasterization, embedded text often appears blurry or pixelated in print. Annual Reviews prefers that images be submitted with editable text, or text on a separate layer, or in two files, one with the text and the other without.

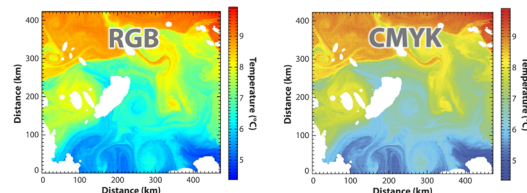
EPS: Encapsulated PostScript. A graphics file format used for both vector and raster images. EPS files can be read by a wide variety of software. Raster data saved in an EPS file cannot be read as vector data.

Flattened: A flattened image is one that was originally created with layers and/or vector components, then rasterized into a single-layer, non-editable "snapshot" image. Please avoid sending flattened images. Annual Reviews prefers graphics in a vector or layered format.

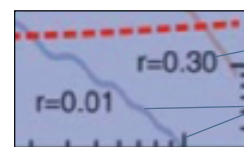
JPG or JPEG: A common file format for compressed raster images. Does not support layers (therefore not appropriate for images with text/lines/labels). JPG compression is "lossy": it causes the image to permanently lose quality as the file is compressed; quality deteriorates further each time it is resaved. While this makes the file size much smaller, it may cause blurriness and smudgy compression artifacts around the edges of color regions. JPG images are commonly used on the Web, in PowerPoint files, and anywhere else small file size is more important than image quality. Unless they come straight from your digital camera in high resolution and have not been resaved repeatedly, JPG files are typically not acceptable for submission to Annual Reviews; use TIF instead.

Layers: A way of arranging image files to allow for easy editing. In programs such as Adobe Photoshop and Illustrator, layers allow different components of an image to be kept in separate virtual spaces that are stacked like sheets of transparent acetate. Text can be kept on a separate layer from the rest of an image, (Continued on next page)

Example of the same image in RGB versus CMYK color space.



Example of uneditable image—please make sure submitted files are editable.

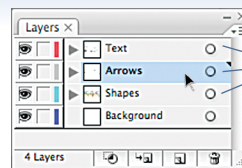


Embedded text: all text has been converted to uneditable pixels

Rasterized image: lines that used to be crisp, editable vector are now converted to blurry pixels.



JPG compression artifacts show in areas that were pure white before compression



Layers allow different parts of an image, such as text, arrows, or shapes, to be separated and restacked.

Definitions, continued

so that it can be moved without affecting the underlying layer. In Photoshop and similar programs, if multiple layers are merged into a single layer, the image has been flattened and is no longer editable. Annual Reviews prefers to receive layered files whenever possible.

PDF: Portable Document Format. A file format created to enable image and file transfers between software programs. Image, text, and layout information is stored in a manner that is independent of the operating system or software program in which the file was created. Because of its ability to protect the exact look of an image, while also preserving vector information, fonts, and image resolution, PDF is the preferred file format for figures submitted to Annual Reviews. Be sure to select high resolution and no image compression if given the option when saving as PDF.

Pixel: Also called a picture element or dot, a pixel is the smallest element of a raster digital image. Each pixel is a small square of a single color that is arrayed in a grid adjacent to other pixels; viewed together, many tiny pixels form a larger visible image. The more pixels an image contains per unit area, the higher its resolution is, and the clearer and more detailed it will look.

Pixelated: Visibly showing pixels, for example as jagged edges on text or color transitions. If an image is at adequate resolution, no pixels should be visible to the naked eye at 100% size.

Raster: A term for an image made up of a fixed number of pixels, for example, a digital photo or scanned image. Raster images cannot be made larger in size without losing resolution, or image quality. Raster images are also sometimes referred to as bitmap. (See “What is the difference between vector and raster?” on page 2.)

Rasterize: To convert an image from vector format into raster format, rendering it largely uneditable. Wherever possible, do not rasterize images before submitting them to Annual Reviews. For example, a graph exported from a graphing program as a TIF or JPG has been rasterized; exporting it as a PDF or EPS instead may preserve the vector data.

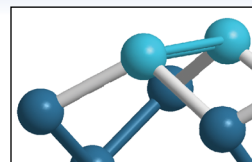
RGB: A color space using the primary colors red, green, and blue.

Resolution: The density of pixels (dots) in a raster image, usually measured in dots per (linear) inch (dpi). The higher the resolution of an image, the more pixels it contains, and the clearer and higher quality it appears when viewed or printed. Annual Reviews requests all raster images be at least 300 dpi, the standard resolution for printed images. For example, a 3 x 4-inch image at 300 dpi will measure 900 pixels wide by 1200 pixels high. Internet images are usually saved at low resolution (often 72 dpi) to minimize file size. While they may appear clear on screen, they will appear blurry or pixelated in print, and are not acceptable.

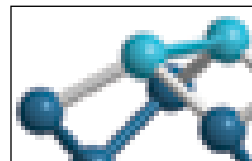
SVG: Scalable Vector Graphics. An XML-based graphics file format used for vector files (and sometimes animations). If a program does not have PDF as an export option, SVG is a good choice for preserving editability of the image for Annual Reviews.

TIF or TIFF: Tagged Image File Format. A graphics file format used for raster files. TIF files tend to be large, stable, and readable by a wide variety of software. Annual Reviews prefers all raster images be submitted as TIF. Lossless compression such as LZW can be used to make TIF files smaller without losing image quality.

Vector: A type of image that is based on mathematical points connected by paths. Unlike raster images made of pixels, vector images are resolution-independent and can be resized without losing quality or sharpness. They are much smaller in file size, and they are easier to edit because the elements of an image are recognized as individual, overlapping shapes. Vector images can be converted into raster images (rasterized), but rasterized images cannot be converted back the other way. (See “What is the difference between vector and raster?” on page 2.)



High-resolution image. Acceptable for publication at AR.



Low-resolution Web image, with evident pixelation. Not acceptable for publication at AR.