Image Annotation with Adobe Photoshop

Ronald D. Caruso, MD and Gregory C. Postel, MD

The authors relate the basic steps used to annotate grayscale cross sectional images with keyboard characters, arrowheads, and arrows using Adobe Photoshop 6.0 and 7.0.

KEY WORDS: Soft copy, image, annotation, photoshop

ADobe Photoshop 6.0 (Adobe Systems Inc., San Jose, CA) is a useful tool for editing and annotating cross-sectional radiographic images intended for publication or computerized presentation.¹ Earlier reports reviewed the recent history of grayscale image editing and software annotation and detailed the basic steps used to edit grayscale images with Photoshop 6.0.^{1,2} Windows XP (Microsoft Corp, Redmond, WA) and Adobe Photoshop 7.0 have just become available. The appearance of the XP/7.0 desktop is slightly different than the Windows 98/6.0 desktop, and there are several useful improvements in the new version. The main change related to annotation is the inclusion of many more stock arrows, making it unnecessary for most users to make custom arrows. This communication will cover image annotation using keyboard characters, arrows, and arrowheads. It presumes familiarity with the skills outlined in the previous report on editing.² The same conventions are followed as in that report, except that italicized type is used, as well as capitalization, for menu and similar items. All figures are from 98/6.0, with one exception, but have a similar appearance in XP/7.0.

BASIC DESKTOP FOR ANNOTATION

Figure 1 depicts the basic 6.0 desktop for grayscale annotation. An image is open on the

desktop, ready for annotation. The *Tools* palette (Fig 2) and the *Actions* palette are open. The *Custom Shape* tool (**U**) has been selected (Fig 2). It is used for applying arrows, arrowheads, and other shapes. Its appearance and name will vary (but not its shortcut key, **U**), depending on its last use. (In 7.0 its icon has been changed, but its location and shortcut key are the same.) Here it takes the form of an arrowhead, the last applied annotation, and is named *Custom Shape*. For the remainder of this article, please refer to Fig 2 when the *Tools* palette is mentioned or reference is made to any of the items on it (as usually symbolized by a bold, capital letter in parentheses). The *Actions* palette displays some of the authors' custom macros. *Free Transform Path* and *Merge Down* are particularly useful for annotation. The *Type* tool (**T**), used for application of keyboard characters, is just above the *Custom Shape* tool. The *Foreground Color* is black; it controls the color of any applied annotation. The *Background Color* is white. If your colors are different, select the *Default* icon (**D**) below the *Foreground Color*. An options strip corresponding to the selected tool is displayed at the top of the desktop. The option strip for the currently selected *Custom Shape* tool is shown in Fig 3. The options strip for the *Type* tool is

From the Neuroradiology Section, Department of Radiology, University of Louisville School of Medicine, Louisville, KY.

Correspondence to: Ronald D. Caruso, MD, Department of Radiology CCB-C07, University of Louisville Hospital, 530 S. Jackson Street, Louisville, KY 40202; tel: 502-852-1662; fax: 502-852-1754; e-mail: rcaruso@louisville.edu.

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Fig 1. Basic 6.0 desktop for annotation. An image is open of a patient with hemorrhage from multiple cavernous angiomas. The *Tools* and *Actions* palettes are displayed. All figures, except Fig 8, are from 98/6.0; their appearance is similar in XP/7.0.

displayed in Fig 4. Settings on these strips will control annotation. Some advanced users may prefer to use the *Layers*, *Paths*, and other palettes; this is not necessary for basic grayscale annotation.

First we describe how to produce, apply, and edit custom arrows using the *Custom Shape* tool. Then we cover annotation with keyboard characters using the *Type* tool.

Figure 5 is an image with representative annotations. The annotations overlying the black periphery, plus the V and asterisk in the head, are keyboard annotations. They are all in Times New Roman bold font; numerous fonts and other options are available. The arrows and arrowheads are custom shapes. The arrowhead, a single custom shape, appears in 2 sizes and colors. Likewise, the arrows on the patient's left are derived from a single custom shape.

CUSTOM SHAPES ANNOTATIONS

Photoshop 6.0 and 7.0 use vector-based shapes for annotation, which are described mathematically and retain their clarity whatever their size.³ For arrows, once a basic shape is developed, simply changing its numerical parameters can alter both its length and width. If done proportionately, its size is changed; if done differentially, its shape is altered. Because color also can be changed readily, only a few basic shapes are necessary for a complete black and white annotation set, similar to conventional rub on symbols.¹ Once basic annotations have been developed and organized, and a few key *Actions* (macros) recorded, images can be annotated very rapidly.

Making custom shapes is not difficult, but requires some trial and error in the beginning. Some may prefer to utilize some of the *Custom*

Fig 2. Tools palette. Asterisk, *Foreground Color*; D, *Default* icon; V, *Move* tool; T, *Type* tool; U, *Custom Shape* tool; X, *Switch* icon; Arrow, *Background Color*.

Shape annotations supplied by Adobe, which include several arrows. The selection is much greater in 7.0. For most users, we recommend making and saving at least one arrow, because it so easy and shows the tools necessary for making basic custom shapes. You then can evaluate the arrows provided by Adobe and decide whether they will suffice.

DEVELOPING CUSTOM SHAPE ANNOTATIONS

To make a custom arrow, open an image file (or a *New* file from the *File* menu) with a 5 × 7-inch *Canvas Size*; a blank white canvas also can be used. Black should be set as the *Foreground Color*. Select the *Custom Shape* tool (U). As noted above, its appearance and name may vary, depending on its last use and the version of Photoshop. (In 7.0 it has the appearance of a stylized star.) From the buttons that appear in the options strip at the top of the desktop (Fig 3), select, if necessary, the *Create a New Shape Layer* button (highlighted in white near the far left of the options strip in Fig 3; in 7.0 it is located near the center of the strip.). Then select the *Line* tool, a diagonal line, which is designated by an arrowhead beneath it in Fig 3. The icon in the *Tools* menu now should change to a similar shape. Now select the *Geometry Options* button (above the arrow in Fig 3). Configure the now-displayed *Arrowheads* dropdown menu as shown in Fig 6 (*Start* checked; *Width* 300%, *Length* 400%; *Concavity* 20%). The other settings on the options strip, which now has changed slightly in appearance from Fig 3, should include 20 px *Weight* (in 7.0, 0.2 in), *Normal Mode*, and 100% *Opacity* (may not be visible in 7.0); *Layer Style* (*Style* in 7.0) should be set as shown in Fig 3 if not already in that format. The cursor, when over the image, will now be a plus sign. Holding down the *Shift* key, which defaults to drawing a straight vertical or horizontal line, drag (holding down the left

Fig 3. Custom Shape option strip. Arrowhead, *Line* tool; Arrow, *Geometry Options* button; Asterisk, *Custom Shape Picker*.

Fig 4. Type tool options strip.

mouse button) the cursor across the image vertically or horizontally until the desired arrow is achieved. If desired, the parameters can be changed and new shapes drawn. For instance, to eliminate the curve at the base of the arrow or arrowhead, simply set the *Concavity* to 0%. The length is controlled by how long the line is dragged, so an arrowhead, short arrow, or long arrow can be created. Once the basic shape is achieved and saved, it also may be adjusted later by changing its size and proportions numerically. Until satisfied with the first arrow or arrowhead, use the *History* palette to erase each unsatisfactory shape and then start over, so only one annotation is visible. To save an arrow, select *Define Custom Shape* from the *Edit* menu. The *Shape Name* box (Fig 7) will open showing the shape just developed. Provide a name and indicate *OK*. Additional custom shapes can be developed now or later. Once done, select the *Custom Shape* tool on the op-

tions strip, the button to the right of the Line tool in Fig 3, which probably will have a different appearance on your desktop. Then select the adjacent *Custom Shape Picker* (above the asterisk in Fig 3). Figure 8 (from 7.0; 6.0 has a similar appearance) is the resulting drop down box on the authors' desktop, showing saved shapes. Your list will have a different appearance, likely featuring some default Adobe custom shapes and the shape(s) you have just developed, displayed in a different fashion. To view as shown, if desired, select the small arrowhead icon at the upper right of the drop-down list and select *Large List*. To display the arrows supplied by Adobe, select the same icon and then *Load Shapes* followed by *Custom Shapes* (in 7.0, *Arrows*). To rename or delete a shape, right click it in the list. The numbers after each shape name in the authors' *Custom Shape Picker* list are those used to size annotations for 5 × 7-inch prints as covered below. They are a point of departure; often alterations are made; proportionately smaller dimensions are used to annotate smaller images. Parameters and adjustments used at the time of application, as described in the sections below, will deter-

Fig 5. Image with representative custom shape and text annotations.

Fig 6. Arrowheads dropdown box.

Fig 7. Shape Name box.

mine an annotation’s final shape, size, color, orientation, and position.

ANNOTATION WITH CUSTOM SHAPES

Now that at least one arrow or arrowhead has been saved, or the decision has been made to use a supplied arrow, open a new 5 × 7-inch image or white canvas and reselect the *Custom Shape* tool (U), first from the *Tools* menu and then from the options strip that opens at the top

of the desktop. Open the *Custom Shape Picker* by selecting it on the options strip. From the list (Fig 8) select an annotation. Its image now should appear on that button and several other buttons on the desktop. Now move to the left and select the *Geometry Options* button (above the arrow in Fig. 3). In the *Custom Shape Options* dropdown box that appears (Fig 9), arbitrarily enter the settings shown for an arrow that is oriented vertically in the *Custom Shape Picker* list; reverse the dimensions for a horizontal arrow. (These numbers are given only as a point of departure. Your ultimate dimensions probably will vary from this, depending on the shape of the arrow chosen, the size of the image and structure to be annotated, and personal preference. Some trial and error will be necessary.) Now place the annotation on the image by clicking on the image in any location. To rotate the annotation, if it is not at the angle desired, select *Free Transform Path* from the *Edit* Menu; then click anywhere on the image and drag the cursor clockwise or counter-clockwise to rotate the arrow. Select *Enter* when done. (For a 90° or 180° rotation select *Transform Path* instead.) If the annotation needs to be relocated, select the *Move* tool (V) and drag the annotation anywhere in the image. Finally, select *Merge Down* from the *Layer* menu. Additional annotations then can be applied, each

Fig 8. XP/7.0 Custom Shape Picker dropdown list displayed as a Large List. The curved arrows are Adobe arrows from 7.0, which has a larger supply of stock arrows. The vertical arrows are custom made.

Fig 9. Custom Shape Options box.

time performing the *Merge Down* operation. (Adobe treats all annotations as being in a single layer on top of the image until incorporated into it by merging. The *Layers* and *Paths* palettes can be used for applying multiple annotations if desired, keeping each as a separate layer. This increases file complexity and is not necessary if a copy of the image before annotation is saved.) For white annotations, the *Foreground Color* can be set to white, by using the *Switch* icon (X) above it. (The *Color Picker* dialog box, accessed by selecting the *Foreground Color* box, can be used to set any color.)

ANNOTATION WITH KEYBOARD CHARACTERS

With a new 5 × 7-inch image open and the *Foreground Color* set to black, select the *Type* tool (T; *Horizontal Type* tool in 7.0). The *Type* tool options strip will appear at the top of the desktop (Fig 4). Now enter the settings shown in Fig 4 using the various dropdown boxes including *Times New Roman* for *Font*, *Bold*, *30 point* for *size*, and *Crisp* for the final box. Note the many other options available, including regular, italics, and numerous fonts; 7.0 has a few more choices, and its defaults are slightly different. Place the cursor in a light portion of the image, and click the left mouse button. Note

the flashing vertical line, which will be proportional to the font size selected. Now select the asterisk (or any other upper or lower case character). The annotation will appear. Then select the *Move* tool (V), even if it is activated automatically, and reposition the annotation if necessary. When done, apply the *Merge Down* command from the *Layer* menu. This should be done after each annotation. White annotations are applied in a similar fashion. (In 6.0, automating the *Merge Down* command with an *Action* permits one to skip selecting the *Move* tool. In 7.0 it is not necessary to physically select the *Move* tool; the *Layer Down* command will be available and can be used.)

We hope you will find that the above methods enable you to annotate images conveniently and rapidly.

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