


# The Exercises

## Intermediate Digital Imaging



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**F**or this course, part of your grade is based on completion of four tutorial exercises. You may complete them at your own pace, but you need to have them completed by the date your last project is turned in.

The exercises are designed to help you learn a wide variety of useful and important things about Photoshop. This information will be covered in class, and the exercises will give you some hands-on experience with the concepts and tools your instructor has talked about.

While you are working on these projects, please feel free to ask your instructor questions; he or she is happy to help you out if you get stuck. Note that two of the exercises require that you have some images to work with. These are available on the classes' server volume.

Note that this document assumes the use of Photoshop version 6.0 or later. If other versions of Photoshop are used, some of the exercise sections may not work as expected.

As you complete the exercises, fill in the Completion Record that is at the end of this packet. Once you are done with all four exercises, turn in this sheet to your instructor. You do not need to turn anything in aside from this sheet; no images or other materials are necessary to turn in for credit for this assignment.

Goofy Fun: With Photoshop 6.0 Open, hold down the Option and Command keys and choose "About Photoshop" from the Apple Menu. "Venus in Furs" was the code name for this version of Photoshop when it was in Beta testing and this was the splash screen that graced the program just prior to final release.

These exercises are intended to be used by students at the College of DuPage who are enrolled in Photography 142, Intermediate Digital Imaging

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# CHANGING CHANNELS

## Photo 142

### Exercise #1

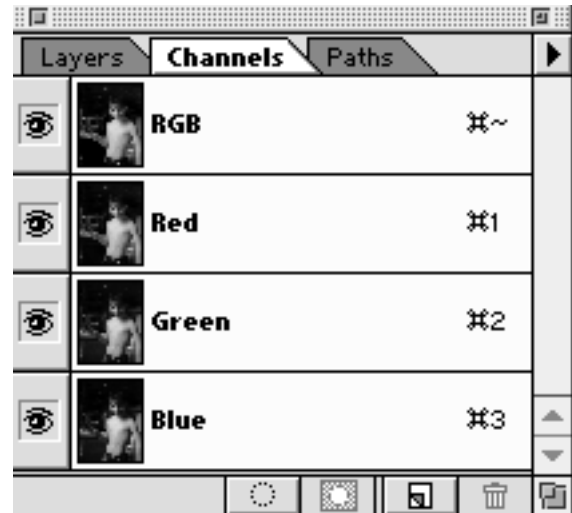
This exercise is comprised of a couple of short tutorials. Individually, they are designed to show you how to do some nifty things in Photoshop using Selections and Channels.

Taken as a group, they are intended to show you that Channels are simply 256 levels of gray that can be used as a “Marching Ant” selection, manipulated like an image using painting tools or filters, or both. Perhaps the most important concept that this exercise seeks to drive home is that a Marching Ant Selection, a saved Selection, an “Alpha” Channel and Photoshop’s Quick Mask mode are all the same thing, but in different forms.

Read through and do the following activities.

Depending on how well you understand the concepts, you may want or need to redo one or two of them. You may also want to redo some of them using different parameters, so you can see how you can use them for your own creative images.

Channels are important because they appear all over Photoshop in various ways. Understanding them will go a long way towards helping you understand how Photoshop deals with selections and masks.



## Embossing With Channels

This tutorial will show you how to create the look of something that’s embossed onto a textured background or a photographic image. Yes, you can use Photoshop’s Layer Styles (Layer> Effects> Layer Style...) to achieve an effect similar to what is described below, but this technique allows you a much greater degree of control. It will also show you some things about the way channels can be used within Photoshop, and how varying shades of gray affect the way a channel “appears” to Photoshop.

### Step 1

#### Open the background you want to emboss.

Scanned sections of fabric, marble or textured papers are useful to collect for this type of technique. You could also make a texture by starting with a blank image window and using various Photoshop Filter tools on it (try noise and emboss). You could also use a photograph for this technique. In any case, it should be an RGB image that is about 4x5 inches at 72 PPI.

## Step 2

### Create a New Channel

This channel will hold the artwork you want emboss into your background. A simple black and white artwork, like type or a logo, works best.

- A: Choose New Channel from the Channels fly-out menu (on the right side of the Channels palette), Note: If the Channels palette is not visible, choose Show Channels from the Window menu.
- B: Name the new channel "Texture Channel."
- C: Choose the Selected Areas option. Click OK to close the Channel Options dialog box.
- D: Using black as your foreground color, create the graphic you wish to emboss. For practice, just type a word or two with the Type Tool. You could also use paint tools to make a design of some sort; a logo for example. Note: you are again creating this graphic *in the new channel you've just created, not in the background image itself.*
- E: If you have an active, "marching ant" selection, Select> Deselect it. You should now have a black design on a white background.

## Step 3

### Blur the New Channel

- A: Make sure your new channel is the only "active" channel by clicking on it in the channels palette.
- B: Choose Blur> Gaussian Blur... from the Filter menu. Try using a radius setting between 4 and 7. This blurring step is necessary to give the Lighting Effects filter some grayscale information to work with.

## Step 4

### Use the Lighting Effects filter

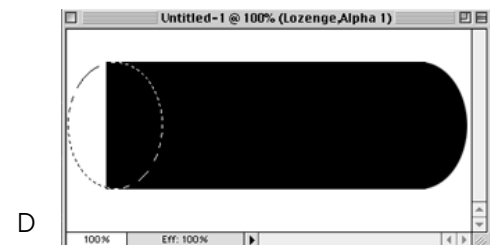
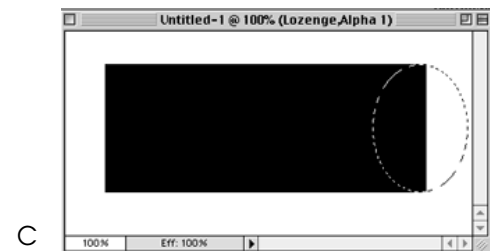
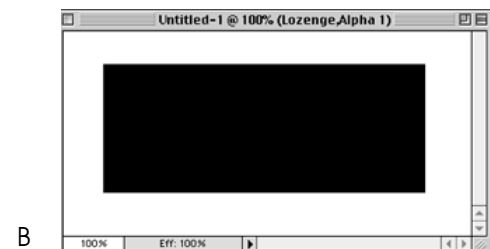
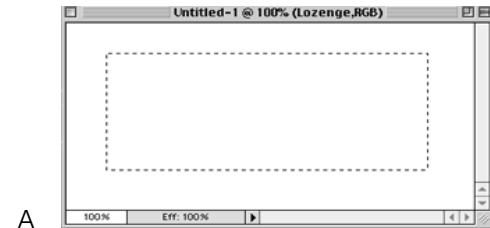
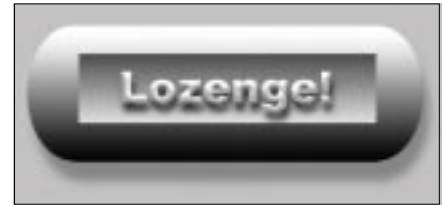
- A: Make the RGB composite Channel active by clicking on it in the Channels Palette.
- B: Go to the Filter menu and choose Render> Lighting Effects...
- C: In the "Texture Channel" pop-up menu at the bottom of the Lighting Effects Dialog box, choose your Channel named "Texture Channel."
- D: Experiment with the "White is High" and "Flat/Mountainous" options.
- E: Note also that the position, width and distance of the light can be adjusted in by dragging the light's handles, and that various parameters of the light can be adjusted in the rest of the dialog box.
- F: Try some of the preset Lighting Styles (top pop-up menu), or create your own lighting style by dragging new "lights" from the light bulb icon below the preview window.
- G: When you are satisfied with the way your image looks, click the OK button, and your lighting effect will be rendered.

## What has happened here?

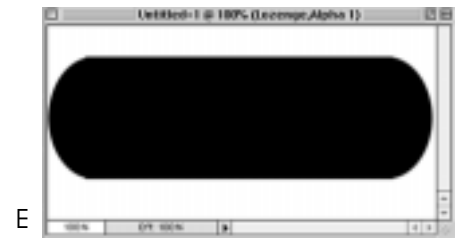
By blurring your texture channel (the type, paint or other information you created in Step 2-D above), you introduced some gray into the channel. The Lighting Effects filter then used that combination of gray, black and white in that channel to "wrap" the lighting effect around, creating a smooth, rounded shape. In other words, you created a selection that had variable opacity; where it was white, nothing happened, where it was black, lots of "Lighting Effect" happened, where it was gray, something in between occurred.

# Making a Lozenge-Shaped Button

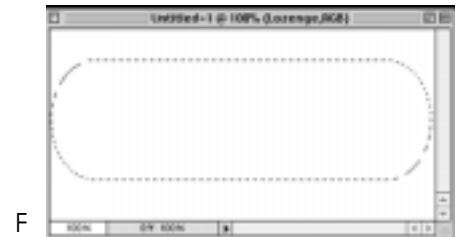
- 1) Make a new horizontal RGB window, 400x200 pixels. Create a new Layer. A keyboard shortcut here: Shift-Command-N creates a new layer and allows you to name it; call it "Lozenge". If you add the Option key to the above (Shift-Command-Option-N), you bypass the naming dialog box.  
  
2) With your new layer active, make a wide rectangular selection (A) that covers about 60 to 70% of the window, left to right, and about 70 to 80% top to bottom. Save that selection as a channel by using Select> Save Selection...  
  
3) Make the new saved selection channel active by clicking on it in the Channels palette. You should see a black box on a white background (B). If you see the opposite of that, double-click on the channel's name and select the button that says "Color Indicates: Selected Areas."  
  
4) Now, switch to the Elliptical Marquee tool by option-clicking in the Marquee tool in the toolbar (or by clicking and dragging in the Marquee tool to select the Elliptical Marquee). Draw an ellipse that just touches the top and bottom and overlaps the right side of the rectangle in your saved channel (C). Use the arrow keys on your keyboard if you need to nudge the oval you've drawn into position.  
  
5) Fill this circle with black by first hitting the "D" key (sets foreground/background colors to default) then hitting Option-Delete (fills with foreground color). This will give your rectangle a rounded end on the right side (D). Keep the selection active, hold down the shift key, and use the left arrow key to move your ellipse to the left side of the image. The shift key moves the selection by 10 pixels at a time; releasing it moves it one pixel at a time.



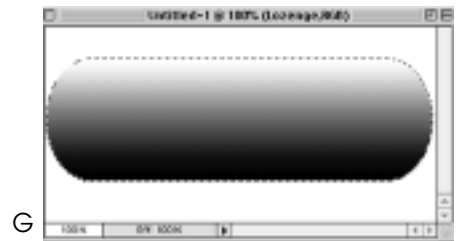
- 6) Once your ellipse is in place on the left side, Option-Delete to fill it with black. Your lozenge-shaped selection is now ready for use (E).



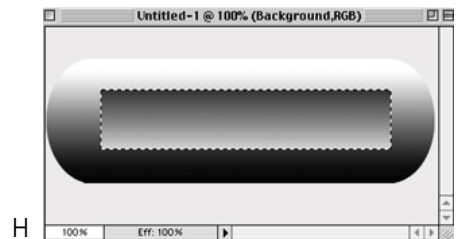
- 7) Return to your Lozenge layer and load the Channel you've just created as a selection (F). The easiest way to do this is to Command-click on the Channel in the Channels palette.



- 8) Use the gradient tool (Linear gradient, Normal, 100% opacity, foreground to background) and, dragging from bottom to top, place a vertical gradient in your lozenge-shaped selection, using the shift key to constrain your gradient to vertical. Black should be on the bottom, white on the top (G).



- 9) Next, use the rectangular Marquee tool to drag out a rectangle that is centered in the lozenge. Use Edit> Transform> Rotate 180 to flop the gradient within this selection (H). You may want to use a soft-edged paintbrush to accent the "shadow" on the top edge of the "box" you've just made.



Now, you can place some text or other graphics on your lozenge. Throw in a drop-shadow and you've got a spiffy-looking button. You could make this a "two-state" button by varying the color, the text density or creating a glow behind the text or icon you use.

Read on for a variation on this idea that will show you even more about using channels

# A Lozenge Button Variation

- 1) Go through steps 1 to 9 in the previous tutorial, but stop short of rotating the rectangular selection in step #9; just leave the selection in the center of your button.
- 2) Once you get your button made and have a horizontal rectangular selection inside it, save that selection by clicking on the “Save Selection as Channel” button at the bottom of the Channels palette (looks like a gray square with a dotted-line circle inside of it).
- 3) Deselect your “marching ants” selection and click on your newly-saved channel in the Channels palette to make it the only active channel.
- 4) Go to Filter> Blur> Gaussian Blur... enter a value of 3 to 5 in the dialog box, and click “OK”. Note that you now have gray values inside your saved selection; it’s no longer just black or white. Those gray areas represent parts of the image that will be neither fully selected nor fully masked.
- 5) Make your RGB composite channel active, then load your saved channel (now blurred) as a selection, either by holding down the Command key and clicking on the channel, or by dragging the channel to the little dotted circle in the Channels palette.
- 6) Use Edit> Transform> Rotate 180 to flop the gradient within this selection.

The gray areas of your blurred channel give only partial selection, so not all the values get 100% reversed. This gives your inner “cut out” a rounded-edged look. The lesson here is twofold:

- Wherever Photoshop sees gray areas in a channel (a.k.a. “Mask” or “Selection”), it only allows part of the actions that are applied to happen. The amount of the action is dependant upon the amount of gray value in the mask.
- The blurring step above could be done in several other ways. Try each one and see what happens:
  - Make the selection and choose Select> Feather... and enter a radius value. Then flop the gradient inside the selection (Edit> Transform> Rotate 180).
  - Make the selection and enter Quick Mask mode (click on the button near the bottom of the toolbar or tap the letter “Q” on your keyboard). Once you are in Quick Mask mode, use Filter> Blur> Gaussian Blur... to blur your Quick Mask, then switch back to “marching ant” mode (another tap of the “Q” key is the fastest way back). Then flop the gradient inside the selection (Edit> Transform> Rotate 180).
  - How could you have just one part of the selection blurred and the other part a sharp, black and white edge? See if you can find a solution to this problem. If you can’t, seek some help from your instructor.

Note that in each of the above cases, what you’ve done is blurred (feathered) the selection by adjusting the channel, and that each method gives the same results. This is because Marching Ants, saved Channels and Quick Mask are just different ways of viewing the same thing.

Astute observers will have noticed that when entering Quick Mask mode, a temporary “Channel” will appear in the Channels palette, reminding us that Quick Mask is nothing more than a transient channel that can be adjusted manipulated using paint.

As a final experiment, try using other filters on your saved Channel, drawing on it with painting tools or using one of the Image> Adjust controls (like levels or curves) on it. What happens with each of these ideas?

# LEARNING LAYERS

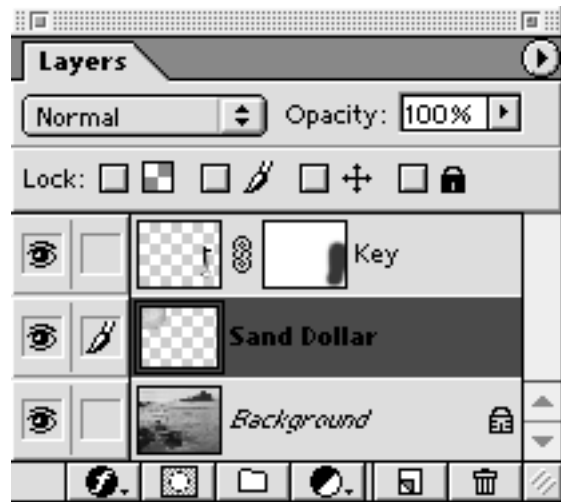
## Photo 142

### Exercise #2

Layers enable you to experiment with lots of effects without having to commit to them. In many ways, Layers are the heart and soul of Photoshop; a thorough understanding of them is essential to mastering the program.

Many people find it helpful to think of Layers as if they were sheets of clear acetate that are stacked up on top of one another. Each sheet of acetate can hold image information that blocks or reveals what is on the sheet or sheets underneath it.

Before you start this exercise, here is a guide to some of the highlights and basic functions of the Layers Palette:

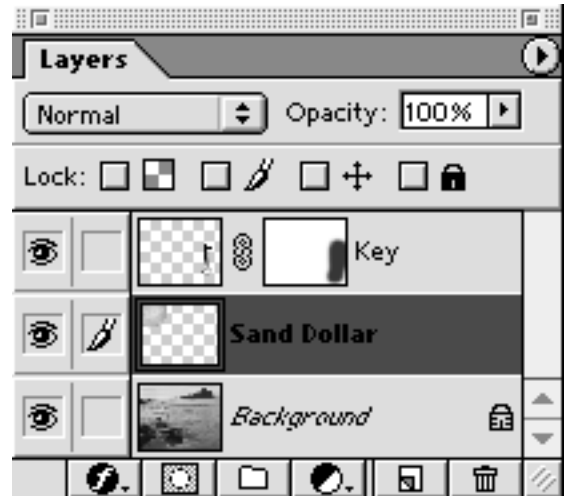


## General

- Most options for a Layer can be accessed by double-clicking on the Layer in the Layers palette. Here you can set opacity, blend mode, drop shadows and many other options. You can even save favorite settings as a “Layer Style” so that you can re-apply that setting at any time.
- Holding down the option key and double-clicking on a Layer brings up the Layer Properties dialog, which allows Layers to be named and renamed, as well as adding a color-coding to a Layer. The color-coding merely allows you to identify layers by color and does not affect the way a layer looks in your image. The Layer Properties dialog can also be accessed via the Layer menu in Photoshop or through the Layers palette fly-out menu.
- The Layer palette’s thumbnails show what image information is on each Layer.
  - Command-clicking on the a Layer thumbnail loads the non-transparent pixels in the Layer as a marching ant selection.
- Separate thumbnails appear for Layer Masks, which are 256-level (8-bit) mask channels that allow parts of a Layer to be made opaque, transparent or translucent. These are similar to Alpha channel masks, but only apply to their own individual Layer.
  - Shift-clicking on the Layer Mask thumbnail temporarily hides and deactivates the Layer Mask.
  - Command-clicking on the Layer Mask thumbnail loads the grayscale information in the Layer Mask as a selection.
  - Option-clicking on the Layer Mask thumbnail hides all other layer information and shows only the 256-level Layer Mask.
- A highlight indicates which Layer is currently active.
- The Opacity slider sets the opacity/transparency of each Layer.
  - The number keys on the keyboard move the opacity slider by units of 10; the number 0 equals 100%
- The pop-up menu (set for “Normal” above) selects among various blend modes.
- The eye icons allow selection of which Layer or Layers are being viewed at a given time; a Layer can be hidden (no eye in the column) but active (Layer highlighted).
  - Option-clicking the eye icon turns visibility for all other Layers on or off.
- The Link/Unlink area (the second column from the left, between the eye icon and the thumbnail image of each Layer) links Layers together to affect multiple Layers at the same time. For example, if one layer is moved, all layers linked to it will be moved as well. Additionally, this column will show a paintbrush or a Layer mask icon for the section of the Layer that can currently be modified.

## Palette Icons

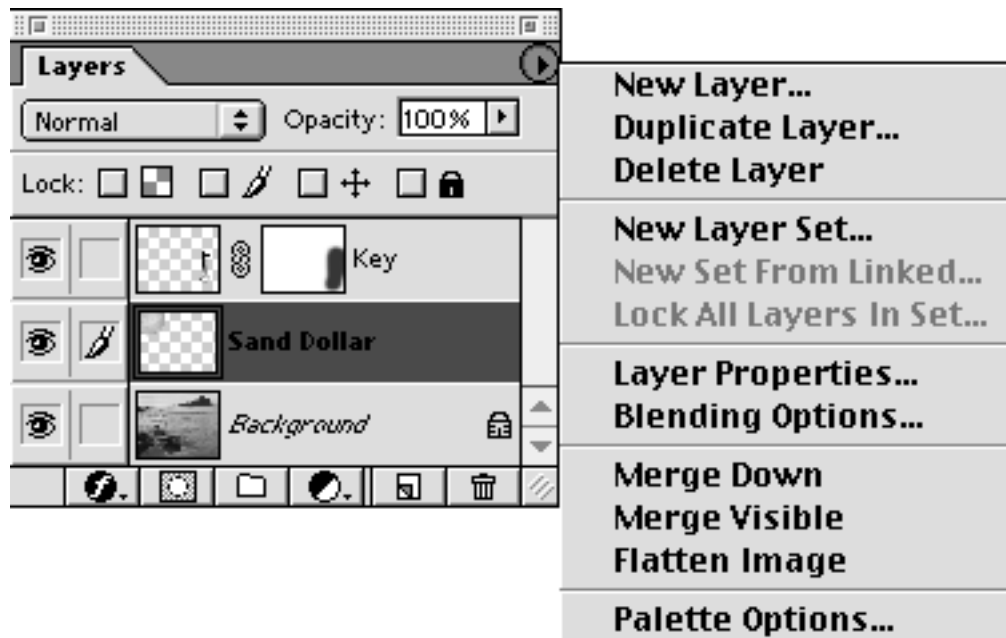
- The blend mode pop-up and the opacity setting adjust how the pixels on a layer interact with pixels in layers below them.
- The “Lock” checkboxes at the top of the Layer palette allow you to avoid affecting various aspects of the layer as you edit your image. The checkboxes, from left to right allow you to lock:
  - Transparent pixels (only image pixels will be affected; transparency is protected)
  - Image pixels (only transparent pixels will be affected; image pixels are protected)
  - Layer position (image pixels on the Layer cannot be moved)
  - All (locks all the above parameters)
- When any one or two of the above options are locked, a small gray “lock” appears on the right side of the palette; when the “Lock All” option is selected, the lock is black.



Along the bottom of the palette are menus for various functions:

- **Add a Layer Style:** Quick access to the options in the Layer Styles dialog box.
- **Layer Mask:** Inserts a new Layer Mask on the active Layer.
  - Option-clicking on the new Layer Mask icon fills the Layer Mask with black.
  - Shift-clicking on the Layer Mask thumbnail temporarily hides and deactivates the Layer Mask.
  - Command-clicking on the Layer Mask thumbnail loads the grayscale information in the Layer Mask as a selection.
- **Add a Layer Set:** Inserts a new Layer Set in the Layer stack. Layer Sets can be used to group Layers together for easier Layer management.
  - Option-clicking on the new Layer Set icon allows you to name the set, assign a color-code to it and assign it a blend mode and opacity.
- **New Fill or Adjustment Layer:** A pop-up menu of available fill and adjustment Layers.
  - Holding down the Option key while choosing a Fill or Adjustment Layer allows you to name the Layer, color-code it and assign it a blend mode and opacity. It also allows you to decide whether the Layer you create will be grouped with the previous Layer, affecting only it, or whether it will affect all the Layers below it.
- **New Layer icon:** A new, empty Layer can be created *above* the current Layer by clicking this icon. Additionally, dragging a Layer onto the “New Layer” icon copies that Layer.
  - Option-clicking the New Layer Icon allows naming and setting of parameters for the Layer.
  - Command-clicking the New Layer Icon creates the new Layer *below* the current Layer.
- **Trash Can icon:** Deletes Layers that are dragged onto it, or will delete the active layer when clicked. Option-clicking the Trash Can bypasses the “are you sure you want to do this?” dialog.

## Pop-Out Menu



The Pop-Up Menu for the Layers Palette contains a number of other options, including:

- Commands for making New or Duplicate Layers and for Deleting Layers. Note that these commands accomplish many of the same functions as the icons in the Layers Palette.
- Commands for creating new Layer Sets. Note the one for creating a Layer Set for Layers that are “Linked”.
- A command for calling up the Layer Properties dialog, allowing you to rename and color-code a Layer. Remember that you can also access this command by Option-double-clicking on the Layer in the Layers palette, or by Control-clicking on the Layer and choosing Layer Properties from the resultant menu.
- A command for calling up the Blending Options dialog. Remember that double-clicking a Layer does the same thing.
- Commands for Merging Layers. These commands allow Layers to be merged together. The commands are contextual; they change depending on whether Layers are linked or visible.
  - Link Visible will only merge Layers that are visible (have the eye icon next to them).
  - Merge Linked will merge any linked Layers that exist.
  - If the active Layer is above any Layer other than “Background” in the Layer stack, an additional command for “Merge Down” will appear, allowing merging of the active Layer with the Layer directly underneath it in the Layer stack.
- A command for flattening the image. This removes all Layers; returning the image to a one-Layer file.
- Most of these commands are duplicated in the Layers menu in Photoshop’s menu items
- Remember that if you want to preserve the Layers in a file, it should be saved in Photoshop’s native file format. Saving in most other file formats requires that the image be flattened first.

## Layer Types

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There are several different kinds of Layers in Photoshop:

### **Image Background Layers**

Whenever you create a new image (via scanning or other image input option), you create an image with a single Layer that is called “*background*” (in italics). You cannot change the position of the background layer in the stacking order (it is always at the bottom of the stack); nor can you apply a blending mode or opacity to a background layer (unless you first convert it to a normal layer by renaming it anything other than “*background*”).

### **Image Layers (non-background)**

These Layers are like separate clear sheets of acetate on which you can store selected artwork and to which you can add full-color information. Where there is no image on a layer (that is, in places where the layer is transparent), you can see through to the layers below. All layers in a file have the same resolution, start with the same number of channels, and have the same image mode (RGB, CMYK, or Grayscale).

Image Layers are created in a variety of ways. Pasting image information from the clipboard, dragging an image or a selection from another image or adding a new, blank layer and drawing on it in some way are some of the ways that new layers can get added to your Photoshop document.

Layers can be transformed, filtered, moved and deleted from a document. They can also be duplicated; the additional copies used to build up a picture. Each Layer has a distinct character, depending on its opacity, blending mode, etc.

### **Fill Layers**

Fill Layers allow you to add solid colors, gradients or patterns to images as an independent Layer. The nice part about adding Fill Layers in this way is that the information in the Layer can be changed dynamically (by using Layer> Change Layer Content...) which means you don't have to commit to changing the pixels underneath the fill.

Fill Layers can also contain vector information. The importance of this is that when printed to a postscript-capable printer, vectors can retain a high degree of sharpness, even when scaled up or down drastically.

### **Adjustment Layers**

These Layers allow most of the commands from the Image> Adjust menu in Photoshop to exist on a separate Layer, so you don't have to commit to a change in those settings as long as you keep your image layered. For example, you can create a Layer that holds a Levels adjustment, and those levels settings can be edited at any later time, as long as the image remains Layered. An Adjustment Layer can affect either all layers under it in a Layered file, or just the Layer immediately under it.

### **Type Layers**

Anytime you create text with the Type tool, you create a new Type Layer. Type can be edited, colored, textured, warped, twisted, rotated and otherwise adjusted in a variety of ways.

Like Fill Layers, Type Layers can be made to retain their vector shapes, making it possible to print them as sharp, postscript-aware objects within your composites.

## Layers vs. Channels

Layers differ from Channels in that Channels affect all layers in a document. Each Channel in an RGB image contains 8 bits of information; taken together, they define the colors for the 24-bit composite information. Alternately, Channels can be used to store selections. In this case, they are usually referred to as “Alpha Channels.” All Layers share any Alpha Channels.

Each layer (with the exception of the Background Layer) can have a Layer Mask. Layer Masks are separate channels (256 levels, or 8 bits) that allow parts of a Layer to be made opaque, translucent or transparent. A Layer mask works with both Image Layers and Adjustment Layers and allows a tremendous amount of control over how Layers appear.

While Layer Masks and Channels are not the same things, it is possible to share information between them, so that information in a saved selection (a.k.a. Alpha Channel) can be used in a Layer Mask and vice-versa.

## The Exercise

The following exercise is designed to show you some of the power of using Image Layers, Layer Masks and Adjustment Layers to composite and adjust images in ways that can't be done with any other method. You'll also work a bit with a Text Layer and explore some other Layer options.

Another thing this exercise is designed to do is to show you that there are several ways to accomplish something in Photoshop. For several common actions, you'll be shown at least two ways to accomplish the action; sometimes more. Note that the “right” way to do a particular thing in Photoshop changes as the images change.

As you are working through this exercise, remember to save often to avoid having a computer catastrophe destroy your work. As you save, remember that an image that contains Layers should be saved in the Photoshop file format.

Find the folder in the Server's Photo 142 folder that is labeled Exercises and find the subfolder named “Exercise #2, Layers,” and open all of the images inside. Note that these images are also available on the web at: <<http://www.cod.edu/dept/curto/curto/142/142hand.htm>>.

The images are:

- A full photograph named “BigSur.psd”
- A scan of a fish fossil named “fish.tif”
- An scan of a key named “key.psd”. Note that key is the only thing in the frame and the image has a transparent background as witnessed by the gray checkerboard pattern.
- An image of a keyhole, “keyhole.tif”
- A scan of a sand dollar, “dollar.psd” (note the transparent background).
- “OceanFinal.psd” which is approximately how your final image will look when you're done.
- There is also a folder named “Extra Goodies” which contains extra images that you may choose to use at the end of this exercise.

All the images have been “locked” to prevent you from saving any unwanted changes to the originals. If you want to save what you've done, use File> Save As... to save a copy with a different name.

Instructions begin on the next page. Don't forget to save frequently!

- 1) Position the images on your screen so you can see parts of all of the images that will be combined in the composite.
- 2) Use menu Window> Show Layers (or hit F7) to display the Layers Palette.
- 3) Make the “key.psd” window active, and use Select> Select All (Command-A) to select the whole image. Copy the image to the clipboard (Edit> Copy or Command-C).
- 4) Make the “BigSur” window active, and choose Edit> Paste. Note that a new layer is created in the Layer stack; by default, it is called “Layer 1,” and it is above the “Background” Layer, so it obscures all parts of the Background that are behind it.
- 5) Hold down the option key and double-click on the key Layer, and in the resultant dialog box, rename the Layer “key” and click OK.
- 6) Note that the Key Layer is highlighted and that a paintbrush icon appears next to the thumbnail image, indicating it can be painted, filtered, etc.
- 7) Select the Move Tool (four-headed arrow; top right corner of the toolbar) and click and drag in the image itself, moving the Key toward the lower right corner.

*Note: The Move Tool can always be accessed by holding down the Command key no matter what tool is currently active.*

- 8) Next, make the “Keyhole” window active. This image has a “pre-baked” selection that has been saved for you. Load the selection by going to the Select menu and choosing “Load Selection...”. The selection is called (aptly) “Keyhole Selection”; choose it and click OK.

Use the Move Tool to drag the selected portion of the “Keyhole” image over to the “BigSur” image; just drag and drop. You will see another Layer appear on your Layers Palette. Use the Move Tool to drag the Keyhole Layer on top of the Key Layer so that it partly covers it. With the Move Tool selected, you can also use the keyboard’s arrow keys to “nudge” a layer around. Adding the Shift key nudges in 10-pixel increments.

*Note: You could have made this new layer the same way you did the “Key” Layer, by copying and pasting. Additionally, if you had held down the “Shift” key while dragging (or pasting) a new Layer, the new Layer would have been centered exactly in the target image. If you want to try this, delete the current “Keyhole” Layer by dragging it to the Layers palette trash can and starting over.*

- 9) Rename the new Layer “Keyhole” by holding down the Control key and clicking and holding on the Layer (in the Layers palette) that you want to rename. Choose “Layer Properties” and type in “Keyhole”. Click “OK” to save your change.
- 10) Click on the eye icon next to each Layer in the Layers palette, displaying only one Layer at a time, to see what information you now have in this image.
- 11) In the Layers Palette, drag the “Keyhole” Layer below the “Key” Layer. A dark line indicates that you are rearranging the order of the Layers. Note that the key now hides some of the keyhole.

*Note: you can't move any layer below the "Background" Layer, as it is always opaque, and can contain no transparency. However, if you rename the "Background" Layer by Option-double-clicking it and typing in any name other than "Background" other layers can be dragged below it, and then the "Background" layer **can** have transparency.*

- 12) Experiment with moving the Layers around by making one active and then dragging with the Move Tool. Note that with the Move Tool selected, the Options Bar (along the top of Photoshop's screen; just below the Menus) there are two checkboxes. Right now, we'll only concern ourselves with the one marked "Auto Select Layer". When this box is checked, the Move Tool will automatically select a Layer when you click on a pixel that belongs to that Layer. This works really well with Layers that are widely separated, but not as well when Layers are very near one another. Experiment with it on and off to see how this feature works.

When you've arrived at a placement for each element, make sure the Key Layer is active, then click in the "Link" column (the one next to the eyeball) on the Layers palette next to the Keyhole Layer. A "chain" icon appears, indicating that these two Layers are now linked together so that moving one causes the other one to move and vice-versa.

- 13) Now, in the Layers palette, try adjusting the opacity setting and the Blend Mode for each Layer and note what happens. When the Move Tool is selected, a Layer's opacity can be changed numerically by tapping the number keys on the keyboard. You can cycle through the various blend modes by using Shift-+ (plus key) or Shift- - (minus key).

In the "example" image, the opacity of both layers has been set to "60%" and their blend modes have been set to "Multiply", but you can choose whatever you think looks best.

- 14) Now you will add a drop shadow to the Key and Keyhole layers.

Make the Key Layer active. Then, go to the bottom of the Layers palette and click and hold on the Layer Styles button; it's the one on the left, marked with an italic **f**.

Choose Drop Shadow, and in the dialog box that comes up, set, from top to bottom,

Blend Mode: "Multiply"

Opacity: "75%"

Angle: "120°"

Distance: "14"

Spread: "7%"

Size: "10"

Ignore the settings marked "Quality" for now, but make sure there is a checkbox in "Layer Knocks Out Drop Shadow". Click "OK".

Note that there are now some separate Layers in the Layers Palette that define the drop shadow you've created. You can turn their visibility on or off just like any other Layer and delete or change them as you choose.

You can edit the settings you've just made at any time by double-clicking on the **f** in the Layers Palette which will bring up the Layer Styles dialog

- 15) Now you will copy the settings for the drop shadow on the Key Layer to make a drop shadow on the Keyhole Layer. With the Key Layer still active, go to the Layer Menu and choose Layer> Layer Style> Copy Layer Style. Then, make the Keyhole Layer active and choose Layer> Layer Style> Paste Layer Style. The same drop shadow that was on the Key Layer is now on the Keyhole Layer.

Note that there was a choice for “Paste Layer Style to Linked”. This was an option that would have worked, too, and would work with any number of linked Layers.

- 16) You are now done with the Key and Keyhole layers. Since you’re not going to change them anymore, you might want to “clean up” your Layers palette using some of the tools that Photoshop provides for you. At the bottom of the Layers palette, click the “New Layer Set” icon (looks like a little folder). This will put a little folder icon in your Layer stack. Double-click it to name it “Key&Keyhole” and click OK.

Then, drag your Key Layer and your Keyhole Layer to the folder. They are now “contained” within that Layer Set. Clicking the little triangle next to the little folder shows/hides the contents of the Layer Set. With your Layer Set active, you now can click the little “Lock” button at the top right of the Layer palette. This will keep the Key and Keyhole Layers from being moved or changed in any way.

Another way to have accomplished this is to choose “New Set From Linked” from the Layers fly-out menu.

- 17) Now you need to get the fish image into your composite. Since a new layer always appears “above” the currently selected layer, click on the “background” layer in your composite to make it active, then switch over to the window of the “fish.tif” file and use the Move Tool to drag and drop it into your composite.
- 18) The fish is facing the wrong direction, so you need to turn its layer around so it is “swimming” to the right. Since you only want to change this layer and not the entire composite, you will use the Edit> Transform> Flip Horizontal menu command to flip the fish.

Once the fish is flipped, use the move tool to position the bottom of the fish just above the bottom of the frame and the right edge of the fish image so that it goes all the way to the right edge of your composite. Rename the Fish Layer “Fish”.

- 19) Now you’ll add a Layer Mask to the Fish Layer. The Layer Mask will make it possible to have the Fish image fade gradually into the BigSur image.

Make sure the Fish Layer is active and then, in the bottom of the Layers palette, click the Layer Mask icon (a gray square with a white circle in it.) A small, white rectangle appears next to the “Fish” Layer. Either the “Fish” image Layer or the “Fish” Layer Mask can be made active simply by clicking on each small window; a black border indicates which one is active.

*Note: by default, a “Link” (looks like a chain) icon appears in between the thumbnails for the Image Layer and the Layer Mask. This indicates that the two items will move together if dragged. To move them independently, click on the “Link” to turn it off.*

- 20) Set the foreground/background colors to black and white (the default setting can be obtained either by clicking the little B/W squares or by tapping the “D” key on the keyboard)
- 21) Choose the Gradient Tool (the “G” key selects it, or choose it from the toolbar). Check the Options Bar and make sure that the options are set to Linear Gradient (the left-hand option), Normal, 100% apply mode, checkbox for “dither” On.

Now, draw a gradient from the top of the Fish image to the bottom of your composite. What you are doing is making a black to white Mask (or “Alpha Channel”) for the “Fish” Layer only, blocking out some of the information in the “Fish” Layer, and allowing other information to get through.

*Note: in a Layer Mask, white areas allow information on that layer to be opaque, black areas allow information on that layer to be transparent. Since you’ve created a gradient, with a subtle transition from black to white, the “Fish” layer gradually fades from totally opaque to totally transparent.*

- 22) Hold down the Option key while clicking on the Layer Mask in the Layers palette. This will show you only the Layer Mask, independent from the Image Layer. Shift-clicking on the Layer Mask temporarily disables the Mask, allowing you to see your composite without the Mask. Clicking any Layer in the Layer palette will take you back to the full composited image.
- 23) As long as the Layer Mask is active (black border around it) it can be adjusted with any paint or fill method. Black “paint” will block the image, white “paint” will let it be seen. Any shade of gray “paint” will fall somewhere in between. The “paint” can be made to be gray by adjusting either the color of the foreground color or by adjusting the brush’s opacity.
- 24) Experiment with editing the Layer Mask and see what happens when you change it. Remember that what you are doing here is adjusting a “Mask” that consists of 256 levels of gray; where there is black, the layer’s contents are transparent, where there is white, the layer’s contents are opaque.

All the Layer Mask does is allow you to use “paint” to hide or show parts of your image, leaving the actual image pixels untouched. The mask can be edited back and forth at will at any time.

- 25) Now, you will add one more image to this stack.
- 26) Make the “Dollar.psd” image the active window and drag it to the composite image that you’ve been working on. It’s already been saved with a transparent background, so you don’t need to remove the background.
- 27) Rename the layer “Dollar” and move it to the top of the Layer stack, if it’s not already there.
- 28) Use the Move Tool to drag the sand dollar to the top left corner of the image; the sand dollar will become a stylized “sun” for this composite.
- 29) The Sand Dollar is a bit too big for the composite; you need to scale it down.
- 30) Go to Window> Show Info (or hit the F8 key) to bring up the Info Palette. Position the Info palette so you can see all of it.
- 31) With the “Dollar” Layer active, go to Edit> Transform> Scale. This will put a bounding box around the Dollar.

- 32) Hold down the Shift key (this constrains proportions so you don't get an oval, but retain the spheroid shape) and drag on one of the corner handles to scale the image down to about 80% of its size. Watch the Info Palette to see your scale percentage.
- 33) To finalize the scaling, tap the Enter or Return key, or double-click inside the bounding box.
- 34) You need to use a Layer Mask to remove the part of the sand dollar that shows up below the horizon line. First, create a Layer Mask using the icon in the Layers palette.
- 35) Next, drag out a rectangular selection from the horizon line down to below the bottom edge of the sand dollar.
- 36) Lastly, make sure the Layer Mask is the active part of the Layer and use Edit> Fill... to fill the selection you've made with black. This will knock out the part of the sand dollar below the horizon line. You may want to use a brush on the Layer Mask to soften the transition that you've made at the horizon line.
- 37) The last step for the sand dollar is to set the Layer's blend mode to "Multiply" and its opacity to somewhere between 60 and 70%. You can do this by using the pop-up and slider on the Layers palette, or, with the Move tool selected, you can use Shift - + to change the blend mode and tap the number keys on the keyboard to adjust the opacity.
- 38) The next task is to add the "Ocean" text. To start, choose the Text tool from the toolbar and click in your image just above the Fish's tail.
- 39) Using the pop-up menus in the Options Bar, pick a font, a size, an aliasing method and a style of justification. The example uses (from left to right)

"Georgia" — "Regular" — "36pt" — "Smooth"
- 40) You will have noticed that your type appeared with whatever your foreground color was when you clicked the Type tool. To change the color, click on the little color box in the Options Bar, which will open the color picker. You can either choose a color that you want from the color picker, or you can pick a color from within the image by moving your cursor over the image and clicking in the water or the sky.
- 41) To warp the text, click the "Create Warped Text" button (on the Options Bar; to the right of the Color picker). You will be presented with a dialog box that allows you to pick a Style and then some options within that style. The example uses the following settings:
  - √ Style: "Wave"
  - √ Radio button: "Horizontal"
  - √ Bend: "+83%"
  - √ Horizontal Distortion: "+26%"
  - √ Vertical Distortion: "+12%"
- 42) When you've adjusted the settings "to taste", click OK.

- 43) Now, double-click your Ocean text Layer to bring up the Layer Style dialog box. Note that you can do a lot of things in this dialog box that you've done in different ways already, as well as a whole lot of things that you can't do anywhere else in Photoshop.
- 44) First, in the General Blending options, set "Overlay" as the blend mode and change the opacity of the Layer to 80%.
- 45) At the bottom of the General Blending options, find the "Blend If:" options. Leave the pop-up menu set for "Gray" and slide the lefthand (black) slider for the "Underlying Layer" so that the numeric readout is "87".

What this is doing is telling Photoshop: "please make every pixel of the image under this Layer that is between Level '0' and Level '87' show through this Layer". These sliders are "variable opacity" sliders; they allow you to adjust opacity of a Layer relative to the densities of underlying Layers.

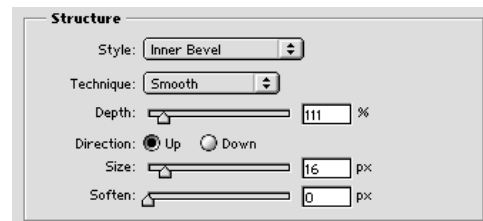
- 46) You will note that this produces a harsh transition in your image. We can change that by *splitting* the "Blend If:" slider. Hold down the Option key and drag the **right** side of the slider you moved previously. This will split the slider in half, creating two smaller triangles. Drag the right half of this slider to the right so its readout is 230.

What this move is doing is telling Photoshop: "Please make every pixel of the image under this Layer that is between Level '0' and Level '87' show through this Layer", but make a transition between Level '87' and Level '230' so that there is a gradual falloff of transparency up through Level '230', where the image on the top Layer will become totally opaque."

These blending sliders are *very* powerful; experiment with them to achieve an effect you like.

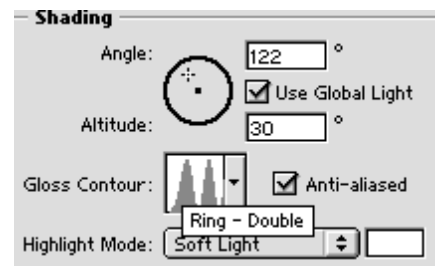
- 47) Next, in the lefthand panel of the Layer Styles dialog, click the text marked "Bevel and Emboss". Note that if you check *just* the checkbox, the dialog box doesn't change; you must click on the text to allow you to set the parameters for the Bevel and Emboss section of the dialog box.
- 48) In the top part of the Bevel and Emboss section, labeled "Structure", set the following options:

- √ Style: Inner Bevel
- √ Technique: Smooth
- √ Depth: 111%
- √ Direction: Up
- √ Size: 16 px (pixels)
- √ Soften: 2 px



- 49) In the lower section of the Bevel and Emboss section, labeled "Shading", set the following options:
- √ Angle: 122°
  - √ Altitude: 30°

Click on the "Gloss Contour" pop-up and choose a contour to apply to the bevel. The example image uses "Ring Double", which looks like two tall mountains. Note that these contours can be edited and that new contours can be created and saved.



- 50) Ignore the settings in the bottom of the Bevel and Emboss section and click OK to set your changes into your image.
- 51) In the example image, a Layer Mask has been created for the Ocean text Layer and a 50% opacity brush has been used to make the text look as though it fades into the water a bit. For more practice using Layer Masks, you may choose to duplicate that effect. If not, move on to the next steps.
- 52) Now, your composite is really taking shape, though there is a bit of tweaking to do. Notice how the color of the Fish Layer doesn't quite match the color of the BigSur background image? We'll fix that by using something called an "Adjustment Layer".
- 53) Make the Fish Layer active by clicking on it in the Layers palette.
- 54) At the bottom of the Layers palette, find the "Create a New Adjustment or Fill Layer" control. It looks like a circle that is half black and half white.
- 55) Clicking on that control will display a pop-up menu of most of the commands from the Image> Adjust menu as well as several other choices.
- 56) Select Hue/Saturation from the pop-up. This will bring up the Hue/Saturation dialog box. Leaving the radio button set at Master, set these settings:
 

√ Hue: -23	√ Saturation: -18	√ Lightness: -12
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Once you click OK, you'll see that this changes the whole image, and you want to change only the "Fish" layer. To have this Adjustment Layer affect only the layer directly under it, go to the Layers menu and choose "Group with Previous" (or tap Command- G). This will "clip" the Adjustment Layer to the layer immediately below it (Fish) and leave the background Layer alone.

*Note: if you had used the Layer menu (Layer> New Adjustment Layer> Hue/Saturation) you would have been presented with another dialog box that would have allowed you to choose the "Group with Previous Layer" option beforehand. Also, note that multiple Adjustment Layers can be stacked on top of one another.*

You can re-edit the Hue/Saturation Adjustment Layer by double-clicking on the **Thumbnail Icon** of the Adjustment Layer and resetting the sliders. This can be done as often as you want; the changes are not permanently applied to the pixels under an Adjustment Layer until the two Layers are Merged or until the image is flattened.

*Note: When it's created, an Adjustment Layer gets a Layer Mask that is associated with it; you'll see it in the Layer stack. That Layer Mask can be painted on and the paint affects opacity. Black paint hides, white paint reveals and gray paint is in between. You might want to experiment with using painting tools (brush, airbrush, etc) on your Adjustment Layer to see what happens.*

- 57) When you're ready to save, remember that a Layered image should normally be saved in the Photoshop file format. Most other file formats require you to flatten the image first. As an alternative to flattening, individual layers can be merged together to save disk space, but if the image still has more than a single *background* layer, it should be saved in Photoshop file format.

One other choice for saving Layered files is to use the "As a Copy" checkbox option in Photoshop's Save... and Save As... dialog boxes. When you choose this option, you can save a flattened *copy* of the image, thus keeping the Layered document in its Layered state.

You may want to go back over this exercise again, using different options and experimenting with different image placements, etc. A folder with a few "extra" images (In the "Extra Goodies" folder) is available in the Layers Exercise folder on the server for you to experiment with other image combinations. Play around and see what you come up with.

## Other Layers Tips

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- If you want to make a layer active in a layered document without having to use the Layers palette, select the move tool, hold down the Control key and click the mouse; a pop-up menu of all layers under the cursor will appear. Remember that to get to the move tool when *any* tool is selected, you can hold down the Command key. This means that the handy trick above works even if the move tool isn't selected by using Command-Control-click.
- Holding down the Shift key while dragging from one image to another will “pin register” the center of the dragged image to the center of the target image. If you make a selection in the target document before dragging a new layer to it from a source document, the source layer will be centered in the selection if you hold down the shift key while dragging.
- Linking layers together in the “link” column not only allows those layers to drag together inside a document, but they will remain linked if dragged to another document as well.
- If you make a selection in the target document before dragging a new layer to it from a source document, the source layer will be centered in the selection if you hold down the shift key while dragging.
- Linking layers together in the “link” column not only allows those layers to drag together inside a document, but they will remain linked if dragged to another document as well.
- If you have chosen one of the individual Transform commands (Edit> Transform> Scale, etc...) and you want to add another type of Transform to it, simply make your new selection from the menu to add it to your current transform. Because of the interpolation required, it's better for the image's quality to do all of your transforming in one step rather than in several steps.
- Option-click in the eye column next to a layer to hide all layers but that one; Option-click again to re-display all layers. (You can also drag through the eye column to re-display layers.)
- Layers are tremendous memory hogs. The more Layers you have, the slower your computer will run. Try to use the fewest number of layers possible to maximize your machine's speed and merge layers you no longer need.

## Other Uses for Layers

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- Use Layers for controlling the action of filters. Make a duplicate Layer of the same image you are working on, and apply a filter to that Layer. The intensity of the filter can be controlled by using the opacity slider of the Layers menu. Once you find the setting you like, merge or flatten the image.
- Use Layers to build up intensity of images that are very flat. By duplicating the base Layer and stacking them in “Multiply” mode (using the Blend Options pop-up) details that were very faint in the original will be much more apparent.
- Use Layers to tame excessive contrast. In opposition to the above technique, an overly-contrasty image can be softened by stacking duplicate layers in the “Screen” mode.
- Use Layers to “Burn” and “Dodge” images. Put a new Layer on top of an image you'd like to burn and dodge. Fill it with 50% gray (an option in the Edit> Fill... command) set the Layer mode to “Overlay” and then use black or white “paint” to make the image lighter or darker. Black paint (or any paint darker than middle gray) will make the image darker at that point, White paint (or any paint lighter than middle gray) will make the image lighter at that point.
- The same idea as above can be employed with an Adjustment Layer using paint on the Layer to change the opacity of a Levels or Curves (etc.) adjustment.

# UNSHARP MASKING

## Photo 142

### Exercise #3

Unsharp Mask does exactly the opposite of what it sounds like it does; it *sharpens* images. It got its unusual name from a traditional stat camera technique that highlights an image by exposing a blurred film negative (the unsharp mask) with the original film positive. In the digital world, it allows us to sharpen images that have gotten a bit too fuzzy from scanning or other image processing.

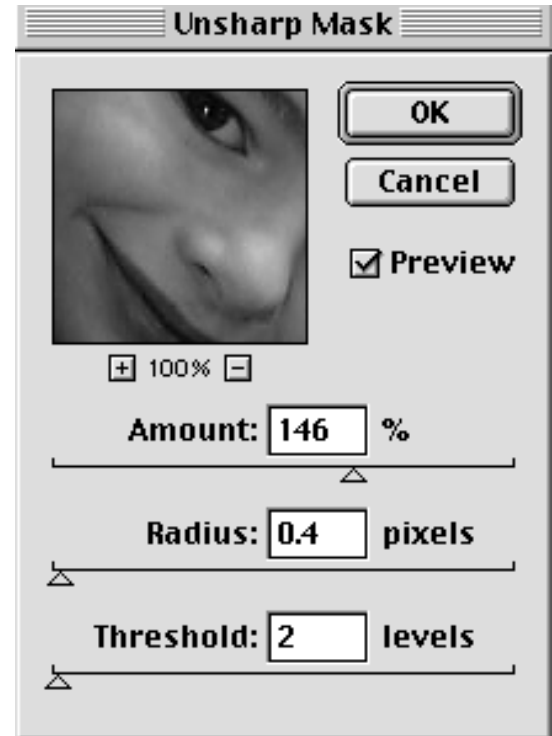
No matter the quality of the scanner, nearly *all* scanned images can use some sharpening. Used properly, Photoshop's Unsharp Mask filter is the very best way to sharpen digitized photographs. If used in a heavy-handed way, however, it can leave images with a crystallized, overly hard-edged look.

Further, Photoshop's Unsharp Mask filter is more powerful than most scanner's sharpening commands, so it is usually best to do your scan with *no* sharpening and use Unsharp Mask when you get the image into Photoshop.

What Unsharp Mask *cannot* do is make out-of-focus pictures into sharply focused ones. If your original camera-image is blurred, there is little that any of Photoshop's sharpening filters can do to fix it. You'll need to reshoot.

The following exercise is designed to show you some of the useful qualities of the Unsharp Mask filter, while pointing out how to help you avoid over sharpening your images.

One point to keep in mind here is that like a lot of other things in Photoshop, each image presents its own unique set of problems and solutions. One of the reasons that Adobe put preview boxes in the filter dialog boxes is that each image needs special treatment; there are no pat answers. In other words, experiment with what works for you and your images.



## The Exercise

Connect to the Server, and find a folder called "Exercises." Inside, there is another folder called "Exercise #3, Unsharp Mask." Open it to find three images you'll be working with. Note that these images are also available on the web at: <<http://www.cod.edu/dept/curto/curto/142/142hand.htm>>

The three images are:

- 1) A divided grayscale and gradient called "DividedGrayscale.psd"
- 2) A grayscale photograph named "LavaRock.tif"
- 3) An RGB image called "Kathleen.tif"

All the images have been "locked" to prevent you from saving any unwanted changes to the originals. If you want to save what you've done, use File> Save As... to save a copy with a different name.

For now, open only the divided grayscale image and leave the others closed. What you will be doing is examining the options available with the Unsharp Mask filter first using the grayscale. Later, you will apply what you have learned to the other two images.

Follow the directions that begin on the next page.

- 1) With the “DividedGrayscale” image open, Go to Filter > Sharpen > Unsharp Mask...

In the dialog box, we have 3 slider scale options to choose from:

#### Δ **Amount**

This setting can range from 1 to 500% and controls the degree to which the filter is applied, with the higher number having the greatest effect. The Amount setting is the most used one in the dialog box, and can either add the greatest degree of improvement or totally destroy the image by over sharpening. The Unsharp Mask filter itself works primarily on the edges of things in images, but also has some effect on flatter areas. Over sharpening brings this out, and gives areas like blue skies a sort of overly intense look. Too high a percentage of Amount tends to make flesh tones look pitted and unpleasant.

#### Δ **Radius**

This distributes the effect of the filter over a range of 0.1 to 100 pixels. Essentially, the Radius setting determines how far-reaching the sharpening is; how large an area of pixels is covered. Low values are most often used as they produce crisp images. High values produce softer (fuzzier) images, but with greater contrast. Too high a setting tends to make the image break up.

#### Δ **Threshold**

This setting controls how Unsharp Mask compares adjacent pixels to determine if they should be sharpened. It compares them in values from 0 (the most sharpening; it examines the whole image) to 255 (essentially no sharpening; it examines no parts of the image.) Usually, low values are used, and Threshold is rarely set above 10.

- 2) In the Unsharp Mask dialog box, set the **Amount to 500%**, the **Radius to 1.0** and the **Threshold to 0**. Make sure you have the Preview box checked. This setting points up how the filter works; it looks for edges of contrast and increases them. Take note of how it takes the solid gray blocks and makes them into gradient blends of tone.
- 3) Leaving **Threshold set at 0**, move the **Radius up to 64** pixels. This means that the filter is now distributing the effect over a range of 64 pixels. The window you are looking at is 256 pixels wide and 256 pixels high, which means that the filter is now affecting  $\frac{1}{4}$  of the image area. Note how the blocks of tone now look like rounded troughs.
- 4) Further **increasing the Radius to 128** pixels ( $\frac{1}{2}$  of the image’s area) makes the tones look like a tower of blocks. It has exaggerated the contrast between adjacent tones so much that some of them have just dropped away.
- 5) **Reset the Radius to 0.3** and then try to find the optimum setting for Amount; one that makes the tonal differences look crisp, but not overly so.
- 6) Once you have found that setting (it was probably somewhere between 15% and 65%), try moving the Radius up. Watch how quickly changes in the Radius setting change the look of the image. Try to find the “best” setting for Radius for this particular image.
- 7) Once you have found the ideal Radius setting (it was probably somewhere between 0.4 and 1.5 pixels), **set the Threshold setting up to 3 or 4** levels. Look at how this setting tends to diminish any abruptness of transitions from one tone to another.
- 8) In “real world” practice, Amount is the setting that gets changed most, with Radius moving slightly over a fairly narrow range and Threshold moving very small amounts at a time, also over a narrow range.

- 9) Now **open** the grayscale photograph “**LavaRock.tif**.”
- 10) Set an **Amount of 200%**, a **Radius of 0.4** pixels and a **Threshold of 3**. You can toggle back and forth between the sharpened and the unsharpened image by clicking on the preview button.
- 11) **Change** your Unsharp Mask settings **to 60%, 1.0 pixels and 5 levels**.

*Note that what you are doing is sharpening more over a smaller range in the first example, sharpening less over a greater range in the second example. The Threshold setting helps smooth out the rough transitions in each case.*

Which setting do you prefer? You may want to apply the filter at one setting and do a “Save As...” to the image, then reopen the original “Lava Rock” and apply the filter at the other setting.

- 11) Experiment with other settings. At what point does the image start to look “over sharpened?”
- 12) **Open** the RGB file “**Kathleen.tif**”. Set the **Amount to 100%**, the **Radius to 1.8** pixels and the **Threshold to 3** levels. Toggle back and forth between sharpened and unsharpened, concentrating on Kathleen’s face. This previously fuzzy image now looks pretty sharp, right?
- 13) Now **reset the dialog box to 110%, 0.8 pixels and 4** Levels. Toggle back and forth between the sharpened and the unsharpened image using the Preview checkbox.
- 14) Again concentrate on Kathleen’s face and note how this setting produces sharpening in the eyes, teeth, ear and braid, but doesn’t bring out the pores and wrinkles like the other setting does. Although the Amount is somewhat greater, the combination of the Radius being lower and the Threshold a bit higher sharpens only the parts of the image that have very abrupt transitions of tone, leaving the even-toned areas relatively smooth. You may want to do another “Save As...” as before to compare the effects of these two settings on the same image.

## Unsharp Masking: Some Final Thoughts

Many people find that applying Unsharp Mask at lower settings multiple times is more effective than applying it once at a higher setting. They set the settings to values that work moderately well, then use the Command - F (reapply last filter) command to apply those settings again. Often times this works well, especially because it allows you to apply the filter one more time than is needed, then choose “Undo” to get rid of the last application. Another handy tip here is to combine the option key with Command - F, which will bring up the dialog box (for any filter) with the previous settings set in the box. This allows you to tweak the settings if you’ve gotten them just slightly off.

Settings to try as good “rule of thumb” starting points are as follows:

- Amount: 60% to 100%
- Radius: between 0.2 to 1.6 pixels (see below)
- Threshold: 3 to 6 levels

The best way to determine an approximate Radius setting is to divide the resolution of the image you are sharpening by 200.

— Examples —

Example image #1: A 72 PPI file.  
 $72 \div 200 = .36$

Example image #2: A 300 PPI file.  
 $300 \div 200 = 1.5$

# EXPLORING COLOR SPACES

## Photo 142

### Exercise #4

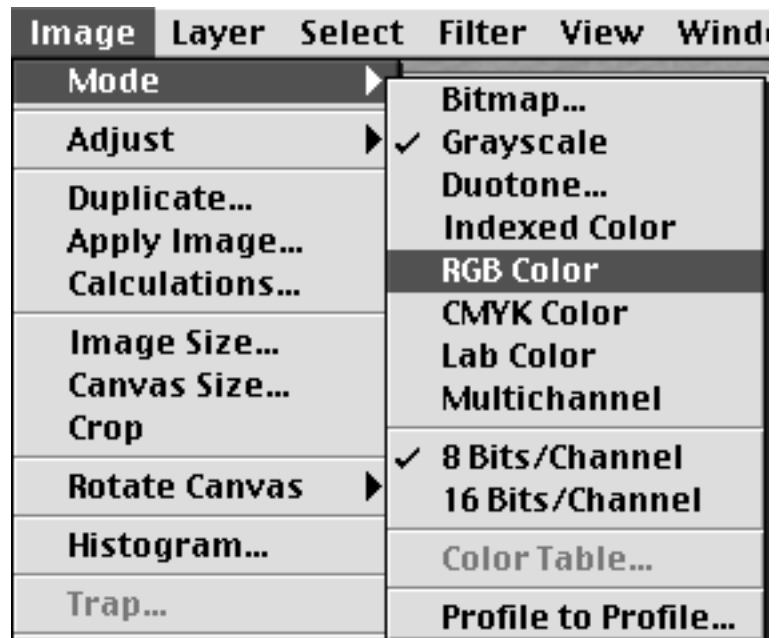
The term “Color Space” is used to define the way in which the appearance of color is calculated and described, either on-screen or in printed form. The reproduction and perception of color is a science, and there can be many ways to describe the same color through different systems of color reproduction.

What is confusing is that some methods (or systems) of describing and reproducing color can create a color that cannot be duplicated by another method. Various color theorists and scientists have tried over the years to create a unified color theory, where all the colors of the visible spectrum are equally represented. Unfortunately, it is not a simple business, especially when colors are reproduced for the eye in different ways at different times.

For example, computer monitors use phosphors that glow in Red, Green and Blue (additive colors) to show us color images, but reproduction of those images in ink must be take place in Cyan, Magenta, Yellow and Black, because additive color theory doesn't work with ink pigments.

What follows is a short exercise devoted to helping you understand the way different color spaces reproduce various colors on the computer, and to help you anticipate when accurate reproduction of colors in one of your images might become difficult.

Follow the Step-By-Step instructions below to begin your exploration of space... color space.



## The Exercise

- 1) Make a new window, 300 by 300 Pixels, 72ppi, background of white, Lab color mode.

*Note: Lab color (sometimes spelled “L\*A\*B” or “lab”) is a system of displaying color where value or “Lightness” is recorded in one channel, and the colors of the image are broken up into two color channels, the “A” and “B” channels.*

- 2) Set the foreground/background colors to their default settings in the tool bar, either by clicking on the small black and white boxes in the toolbar, or by typing the letter “D” on the keyboard.
- 3) Choose the Gradient Tool in the toolbar and choose the “linear gradient” option in the options bar. At the far left corner of the Options Bar, click the little “gradient reset” rectangle to reset all gradient tools to their default settings.
- 4) Then, make sure the Gradient Options Menu has these settings:
  - √ **Normal**
  - √ **100% opacity**
  - √ **transparency and dither checked on**

- 5) Select the “a” channel of your lab image by pressing Command-2.
- 6) Now make a gradient by dragging from the bottom to the top of your window. It will be a grayscale gradient, as you are working in only one channel.
- 7) Switch to the “b” channel by pressing Command-3 and make another gradient, this time dragging from left to right. Again, another grayscale gradient is created.
- 8) Switch back to the composite mode, where you are viewing all 3 channels by pressing Command - ~ (tilde). The tilde sign (~) is at the top left corner of the keyboard.

What you will now see is a full spectrum of bright colors, a representation of the brightest colors the eye can see and that can be reproduced on the monitor. (Remember that these colors have been created through an application of a gradient in the two color channels; the value channel hasn't been affected)

LAB color space is not dependent on computer platform (operating system) or by devices (monitors, scanners, printers, etc.) so it makes a good color space to trade or share images between differing hardware and operating system environments.

- 9) Using the Mode submenu of the Image menu, switch your image from LAB mode to RGB mode. (Image> Mode> RGB)
- 10) Toggle back and forth between the two color spaces by using “undo” (Command-Z).
- 11) The colors may change a bit, but not much, because you are moving between two compatible color spaces, where every color in one color space has a matching color in the other space.
- 12) Now, change the color space to CMYK (Image> Mode> CMYK) and watch what happens.
- 13) Use Command-Z again to toggle back and forth between the two color spaces.
- 14) The colors dull almost uniformly, because the combination of CMYK dyes (which is what this color space is representing) cannot reproduce those bright colors. Remember this is still 24-bit color, where millions of colors are possible, but the reality is that very bright, saturated colors are not available when outputting in CMYK.
- 15) Return the file to RGB color space (Command-Z) and under the View menu, near the top, you will see two options: Proof Colors and Gamut Warning. Check them both “on” (this will require 2 separate trips to the menu)

### **CMYK Preview**

When this option is checked, Photoshop will do a quick, on-screen recalculation of your file so you can see what it will look like in CMYK color space. This keeps you from having to actually do the conversion, which can be time-consuming, especially with big files.

### **Gamut Warning**

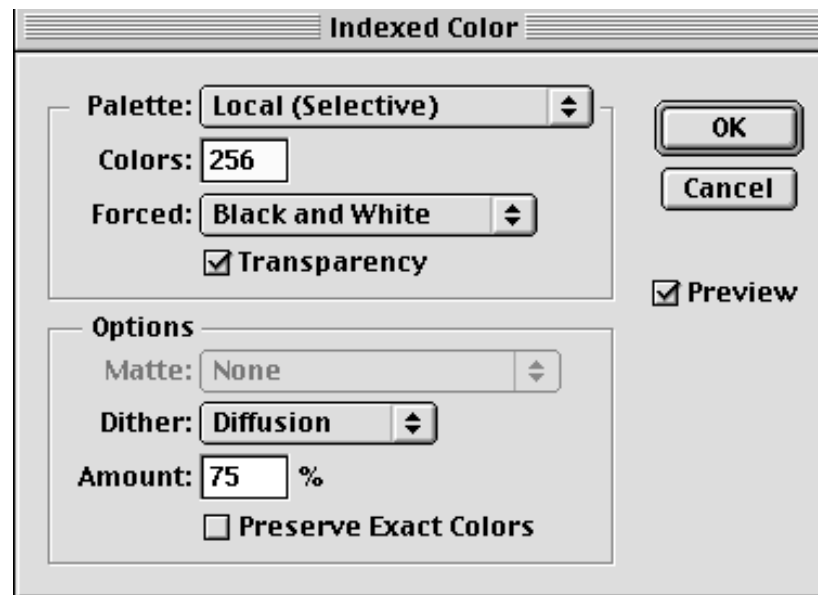
Checking this option puts a gray “mask” over your image in areas where the colors in your RGB file will not translate to CMYK accurately; colors that are known as being “out of gamut.” By using the Sponge tool, set to desaturate, you can reduce the saturation of the color in those areas and bring the color back into line with the potential CMYK color space. A somewhat more accurate method for reducing unwanted saturation appears at the end of this section.

- 16) Before proceeding, return to the View menu and “uncheck” the Gamut Warning and CMYK preview options.
- 17) Next, make sure your file is in RGB and then, from the Image> Mode menu, select “Indexed Color...” A dialog box appears.

### Indexed Color

Indexed Color is a mode that offers 8-bit color, meaning that only 256 colors are possible. It would seem that realistic color would not be possible with this system, and if you were printing the images, you would be right; there aren't enough colors in 8-bit color to make photo-realistic printed images. However, if you were going to use the image on screen only, Indexed color images have some advantages; namely, they are very small when saved, as not much color information (color “depth”) needs to be saved with them. The fewer the colors, the smaller the file can be. The impression of full color is given on screen through the use of “dithering,” wherein adjacent colors are used to fool the eye into believing that there are more colors there than really exist.

The World Wide Web is a popular spot for Indexed Color images, as images saved in the indexed color file format of GIF (Graphics Interchange Format, alternately pronounced “Jiff” or “Giff” - the latter with a hard “G”) are small and download over a modem reasonably quickly, and most Web browsers will automatically view GIF images embedded in web pages. In order for a file to be saved as a GIF, it must first be transformed into Indexed Color (8-bit) mode. For images that are not photographic, like a logo or similar graphic, the GIF format is the way to go, as the colors look good, even if viewed on an 8-bit monitor. For “true” photographic reproduction in the on line world, however, JPEG (Joint Photographic Experts Group) format files give the best quality because the image can remain in 24-bit mode.



*Here's the Indexed Color dialog box. Though this dialog box is useful for exploring the options for converting images to GIF format, most of the work of making GIFs is done with Photoshop's File> Save for the Web... dialog.*

The dialog box for transforming an image to Indexed Color has several options that need to be set: Palette, Colors, Forced, Matte, Dither and Amount. There are also check boxes for Transparency, Preserve Exact Colors and Preview.

— **Palette** refers to what group of colors the computer will use to dither the image into a single-channel picture. Options here include:

**Exact** – Creates a palette using the exact colors appearing in the RGB image--an option available only if the image uses 256 or fewer colors. Because the image's palette contains all colors in the image, there is no dithering.

**System (Windows)** – uses the 256 colors that are native to the Microsoft Windows operating system. Note that these are not *exactly* the same 256 colors that are native to the Macintosh operating system.

**System (Mac OS)** – uses the 256 colors that are native to the Macintosh operating system. Note that these are not *exactly* the same 256 colors that are native to the Microsoft Windows operating system.

**Web** – uses the 216 colors that are common to both Macintosh and Windows machines. If images are to be distributed on the web, this option ensures that the colors will be the same on either platform, but will utilize a smaller, 216 color palette.

**Uniform** – Creates a palette by uniformly sampling colors from the RGB color cube. For example, if Photoshop takes 6 evenly spaced color levels each of red, green, and blue, the combination produces a uniform palette of 216 colors (6 cubed = 6 x 6 x 6 = 216). The total number of colors displayed in an image corresponds to the nearest perfect cube (8, 27, 64, 125, or 216) that is less than the value in the Colors text box.

*The next 3 options in this dialog box (Perceptual, Selective and Adaptive), you can choose between using a local palette based on the current image's colors or a master palette created in Photoshop's companion, Adobe ImageReady.*

**Perceptual** - Creates a custom palette by giving priority to colors for which the human eye has greater sensitivity.

**Selective** - Creates a color table similar to the Perceptual color table, but favoring broad areas of color and the preservation of Web colors. This option usually produces images with the greatest color integrity.

**Adaptive** - Creates a palette by sampling the colors from the spectrum appearing most commonly in the image. For example, an RGB image with only the colors green and blue produces a palette made primarily of greens and blues. Most images concentrate colors in particular areas of the spectrum. To control a palette more precisely, first select a part of the image containing the colors you want to emphasize. Photoshop weights the conversion toward these colors.

**Custom** - Creates a custom palette using the Color Table dialog box. Either edit the color table and save it for later use or click Load to load a previously created color table. (See Customizing indexed color tables (Photoshop).) This option also displays the current adaptive palette, which is useful for previewing the colors most often used in the image.

**Previous** - Uses the custom palette from the previous conversion, making it easy to convert several images with the same custom palette.

- **Colors** refers to how many individual colors will be saved in the image. You can specify exactly how many colors should appear in your image by typing a number between 2 and 256 in the box. Choosing any one of the first 3 options in the Palette pull-down menu will set the Colors number to a fixed point.
- **Forced** causes Photoshop to give preference to the colors that you select in the pull-down menu. With some options in the Palette menu, Forced is grayed out.
- **Matte** GIF images can support transparency in web browsers. This option allows you to choose the color that any transparent pixels will be seen against. If there are no transparent pixels, Matte is grayed out.
- **Dither** patterns are set (not surprisingly) in the Dither section of the dialog. None uses no dithering, Pattern uses a pattern of repeating dots, and Diffusion tries to make the image look as smooth and photographic as possible. Diffusion, therefore, is the normal choice here.
- **Amount** refers to the amount of dithering that takes place.
- **Preserve Exact Colors** tries to keep the colors of your image intact as it is moved from a 3-channel image to a single-channel GIF.

Experiment with several settings for transforming your image from 24-bit to 8-bit color, using Command-Z to toggle back and forth between the two. Find settings that make your test image look most natural. Note that Index Color settings that work well for one image may not work for another image. It all depends on what colors the image has and how they are distributed.

Once you've experimented with these settings, go to the File menu and choose "Save for Web..." This dialog box is a *much* more powerful version of the dialog you've just gone over. One of the big differences is that it allows you to save your image as either a GIF or in the other popular web file format, a JPEG. JPEG images can be multi-channel, RGB images. As a rule of thumb, JPEGs are better for photographic images on the web, while GIFs are better for images that have areas of flat color, like text or other graphics.

Note that there are tabs at the top left corner of the dialog box that allow you to see previews of the original, the optimized view of the original (with your settings applied), 2-up (optimized and original) and 4-up (3 optimized and the original). Choosing 4-up is the most logical choice.

Clicking in each of the Optimized preview windows allows you to change the parameters for that window. You can always compare the changes you've made to one window to your original image, choosing a variety of settings to see which one works the best.

When you click "OK", you save an image with the parameters set for the highlighted preview. It's interesting to note that you save a *copy* of your original, so the original remains unchanged. This is a great way to get a Layered image into web-ready format.

Understanding how a GIF works should help you navigate through the Save for the Web dialog.

## Putting it all Together

Now try opening one of your favorite RGB images and trying some Mode transformations on it. See what happens when you move from RGB to CMYK.

Can you make your image look the way you want it in all three color modes?

Give some thought to when, why and how you would use LAB, RGB, CMYK and Indexed color modes. What are the determining factors for this choice?

How low a resolution setting can you use with Indexed Color and still have your image look good on screen?

Can you make a smaller JPEG or a smaller GIF from an image? Do the images look good in both formats?

As you can see from this exercise, there is no single "best" mode for correct reproduction of colors.

Hopefully, this information will help you to more accurately predict the way the colors in your images will reproduce.

## Reducing Saturation in Photoshop Images

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As you've seen throughout this last exercise, changing color spaces forces the colors of an image to change. One of the biggest problems is in converting from an RGB editing space to a CMYK space for print. The culprit here is oversaturation; the colors that are viewable in RGB aren't printable in CMYK.

You may want to try the following technique to reduce the saturation of the colors in an RGB image so they will change less when converted to CMYK:

- 1) With your image in RGB Mode, go to **Select > Color Range...** . Once there, drag the pop-up menu on the top of the dialog box down to "out-of-gamut" and click "OK." The color range control will make a selection based on what colors fall outside the gamut of CMYK reproduction. The determination of "what colors fall outside the gamut of CMYK reproduction" is taken from what is set under **File> Color Settings> CMYK setup**. Any change in that setting will produce a different set of out-of-gamut colors.
- 2) This is a hard-edge selection, so you may want to feather it slightly after you click the "OK" button. (**Select > Feather...**)
- 3) Then use the **Image > Adjust > Hue/Saturation (Command-U)** control to reduce the saturation of the selected area by keeping the pop-up menu set to "Master" and dragging the Saturation slider to the left.
- 4) You may want to reduce the saturation of the image a small amount at first, then repeat the **Select > Color Range...** command, and return to the Hue/Saturation control so you aren't overly reducing the saturation of colors that are "on the edge" of being out of CMYK range.

## Exercises – The Final Word

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When you've finished the Exercises, remember to fill in the last page of this handout and hand it in to your instructor. Don't forget to put your name on your sheet!





# PHOTO 142 EXERCISE RECORD

Turn in this sheet to show that you've completed the exercises. No additional pictures or other materials are necessary; just this sheet.

Grades for exercise completion will be awarded as follows:

Number Completed	Grade
4 .....	A
3 .....	B
2 .....	C
1 .....	D
0 .....	F

**Your Name:** \_\_\_\_\_

For each exercise, please list when you did it, and jot down *at least one new thing* you learned from it.

**Exercise:** *Channels*

**Date Completed:**

**Something I Learned:**

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**Exercise:** *Layers*

**Date Completed:**

**Something I Learned:**

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**Exercise:** *Unsharp Mask*

**Date Completed:**

**Something I Learned:**

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**Exercise:** *Color Space*

**Date Completed:**

**Something I Learned:**