

# DSL732

## Raster 2D Software

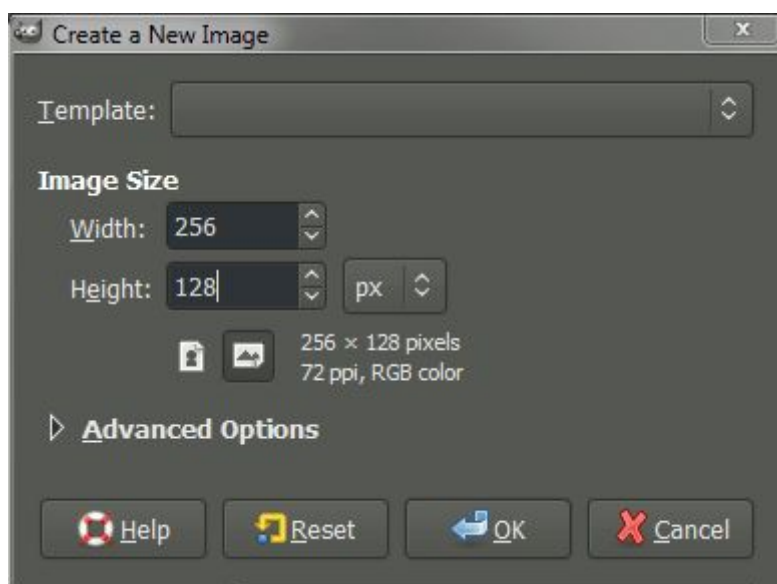
### GIMP

Basics :

Create a new image of appropriate size for your logo:

File → New...

This will open the “Create a New Image” dialog, with options for you to specify:

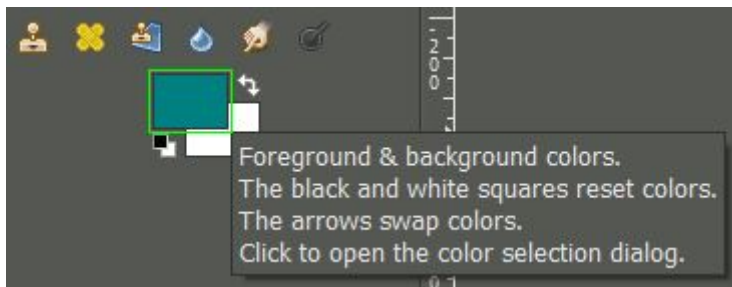


You can make this new image any dimensions you want, but for this tutorial I am going to specify a **Width** of 256 px, and a **Height** of 128 px. I haven't specified any other options. When you're ready, hit "OK" to create the new image.

You'll be presented with the new image on your canvas. Chances are it will be a pure white image at this point (it may be a different color depending on how your GIMP is setup to handle new images - if it is, don't worry).

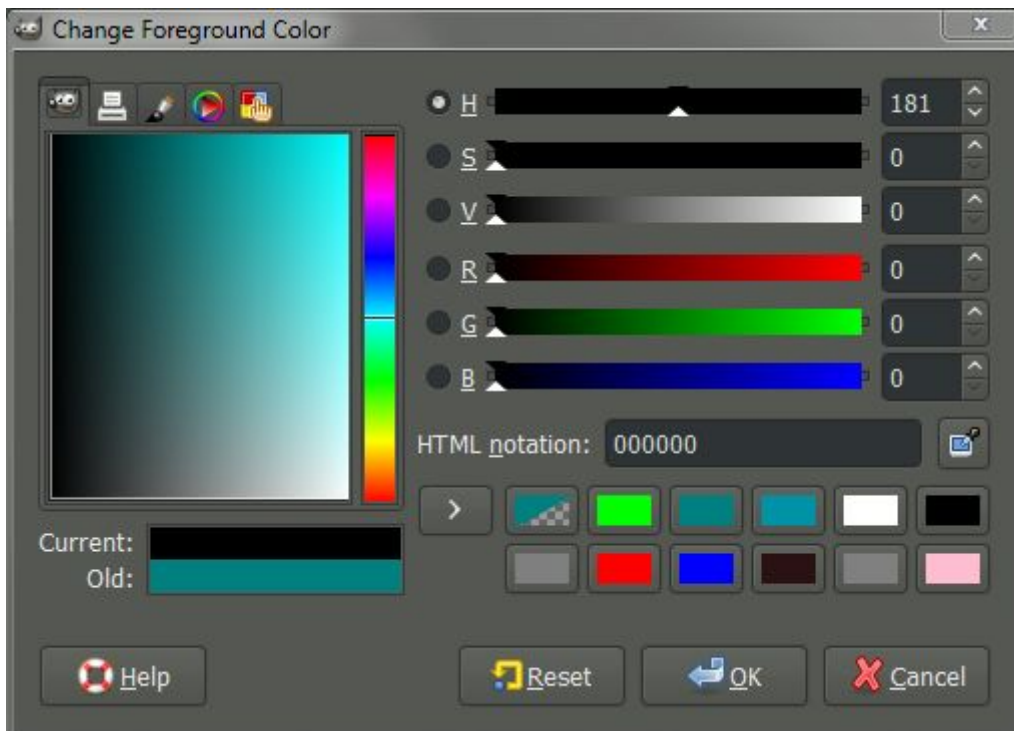
## Fill the New Image with Black

The first thing we are going to do is fill our new image with black. The first step to doing so is to make sure that the **Foreground Color** is appropriately set. Click on the foreground color in the **Color area** to bring up the “Change Foreground Color” dialog (if your foreground color is already black you don’t have to do this step, but it can’t hurt to learn):



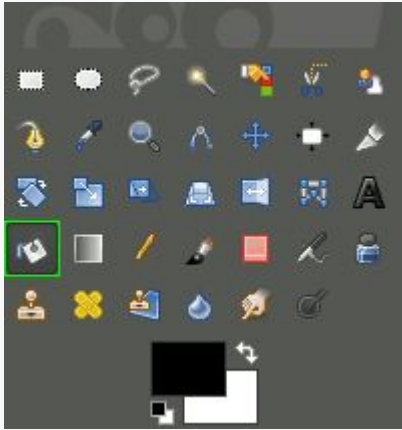
Click the **foreground color** to change.

The “Change Foreground Color” dialog allows you to now set the foreground color. We want to set the color to black  $RGB(0, 0, 0)$ :



With the foreground color set, we can now use the **Bucket Fill Tool** to fill in our image:

Tools → Paint Tools → Bucket Fill



Activating the **Bucket Fill** tool.

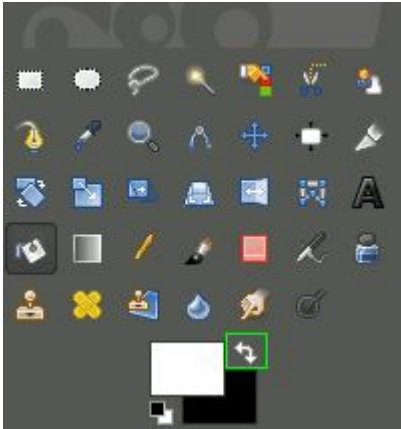


Once the tool is activated, your cursor should appear as to the left. To fill the layer you need only click on the image area at this point. Your image should now fill with black.

## Adding Some Text

Now we want to add text to our image to create our logo with. To see what we're doing, though, will require us to change the foreground color to something other than black (black text on black background doesn't show up so well).

Now, you can follow the above procedures again to set the foreground color. If your background color is already white, though, you can quickly swap foreground/background colors using the **arrows**:

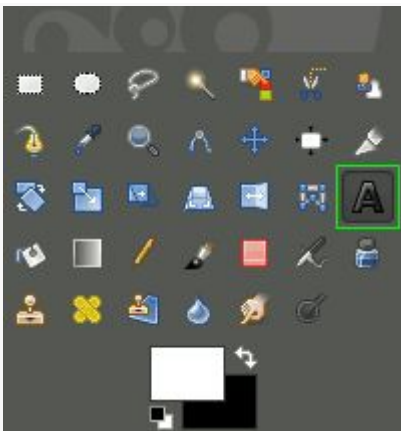


**Swap Foreground/Background** quickly.

You can also use the keyboard shortcut “**X**” to swap the colors.

With the foreground color set to white, we can now use the **Text Tool** to add some text to our image:

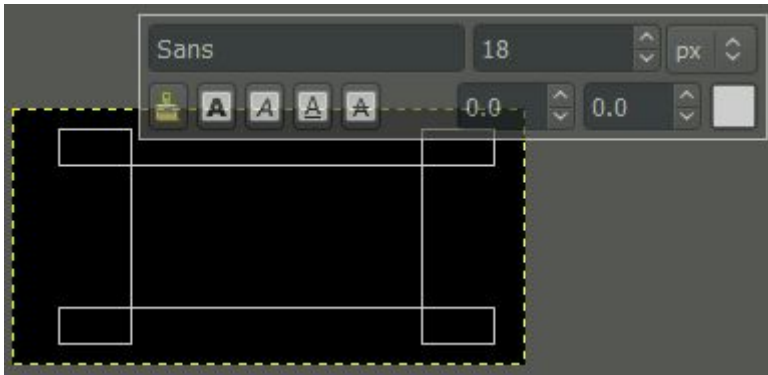
Tools → Text



Activating the **Text Tool**.

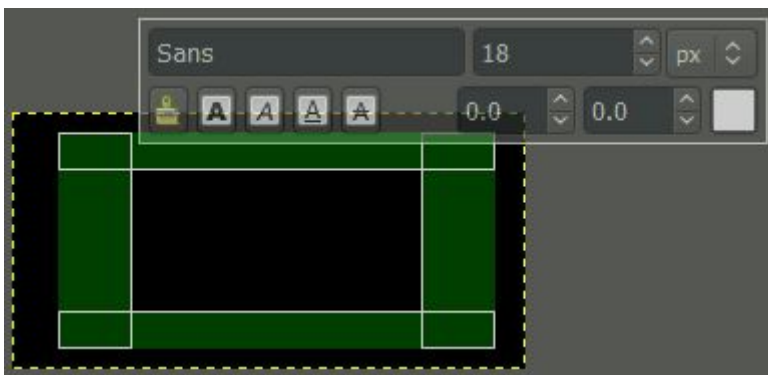
We can now draw a box on our canvas (image) to hold the text. You can click on the canvas where you’d like the top-left corner of your box to be, and drag the mouse down to the bottom right corner. You don’t have to worry about being exact at this point, because you can adjust the boundaries of the box after the fact.

This is what you should see on your canvas after clicking and dragging from the top-left to the bottom-right to define your text box:



Defining the text box boundaries.

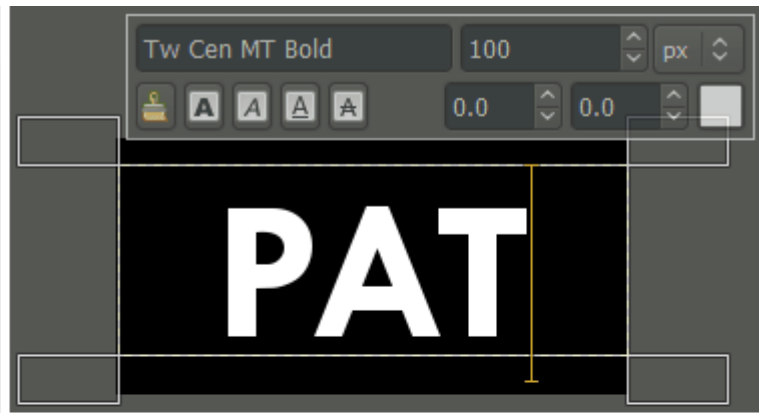
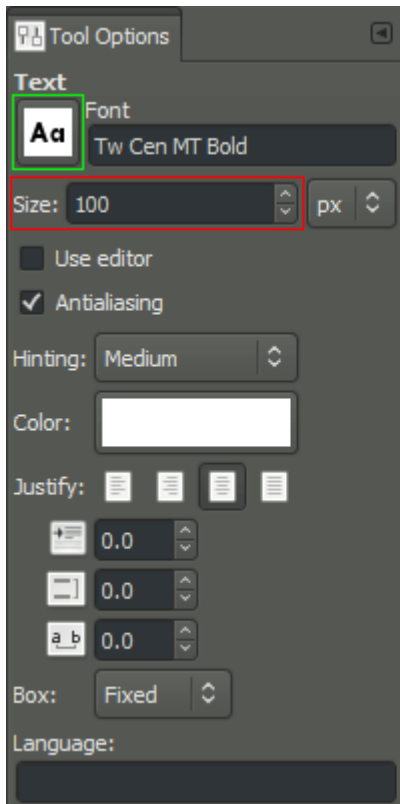
If you'd like to re-size the box for some reason, you can now click and drag in any of the **green areas** shown below:



**Resize handles** to modify text box boundary.

Your text will go into the black box inside the green areas shown above.

Once the text boundary box is sized appropriately, we can just type some text. In my case, I'll use my name:

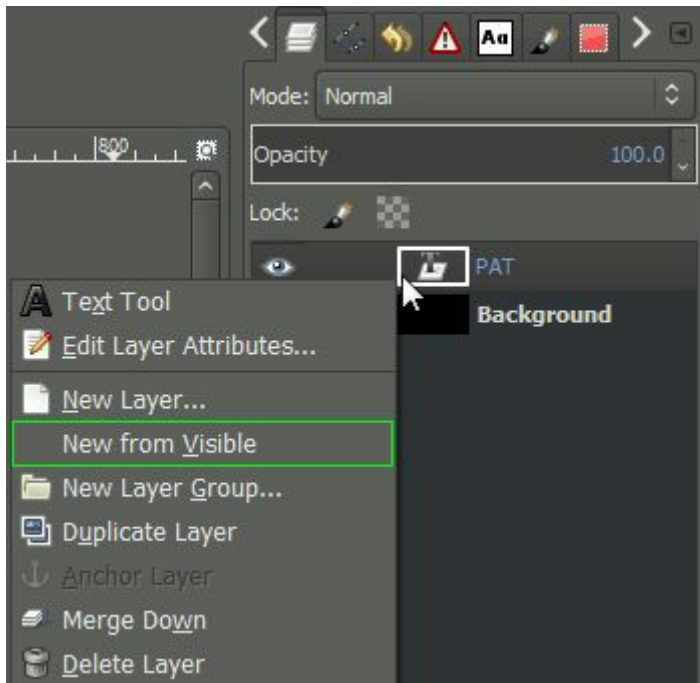


Text Tool Options (left), canvas view (right).

Chances are when you first start entering text, it will be very small on your canvas. So let's have a look at some options on the **Text Tool Options** palette (left, above).

If you want to make your text appear bigger, you can change the **Size** in the field shown. For instance, here I've chosen to set my **Size** to 100px.

You may also not like the font that is chosen by default. In that case, we can change the **Font** to something better by clicking the icon. This will open a drop-down to scroll through all the fonts that GIMP knows about on your system. You can see in my example that I've changed the font to "Tw Cen MT Bold".



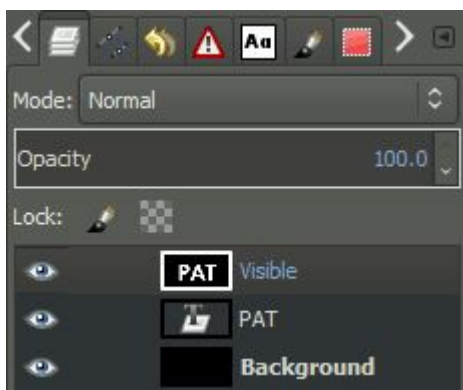
Creating a new layer from all visible layers.

Once we've gotten the text how we want it, we can now create a new layer from all the visible layers so far (the text layer, and the black background layer). On your **Layers** tab, right click on the text layer we just made, and choose "**New from Visible**".

Alternatively, you can also create a new layer from visible using the menu:

Layer → New from Visible

At this point, our layer palette will have three layers on it, the background, the text ("PAT"), and our new layer "Visible":



Notice that there is a white border around the “Visible” layer. This indicates that this layer is currently active, so that any operations we perform will apply to this layer.

Which is good, because we are about to blur this new layer a bit!

To apply a slight Gaussian blur to this layer, we simply invoke the command through the menu:

Filters → Blur → Gaussian Blur...

This will invoke the **Gaussian Blur** dialog, where we can specify how much blur we want to apply:



The defaults were pretty good, but I wanted just a tad more blur, so I increased the **Blur Radius** to 7. When you’re done, just hit “OK”.

## Adding Some Color

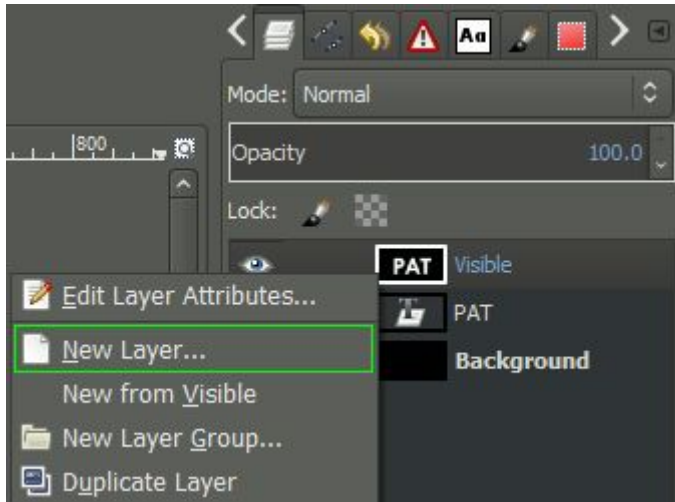
Now that we have our text done, it’s time to add a splash of color!

We are going to add a new layer to our image first:



Layer → New Layer...

Or by Right-Clicking on the “Visible” layer in the layer palette, and choosing “**New Layer...**” from the context menu:



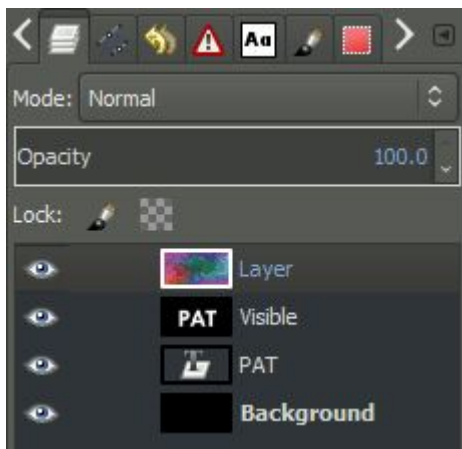
New Layer using the Right-Click context menu.

The “**Create a New Layer**” dialog will appear - it doesn’t matter what it gets filled with, so you can leave it at whatever **Layer Fill Type** it’s set at (White by default I believe). Hit **OK** to create the new layer.

We are now going to fill this new layer with some color to add some interest. To do this we will use the **Plasma** plugin:

Filters → Render → Clouds → Plasma...

I just left the default values and hit **OK**, but feel free to fiddle with the values. Our layers now look like this:



Here is what my canvas looks like right now (with the plasma layer on top and visible):

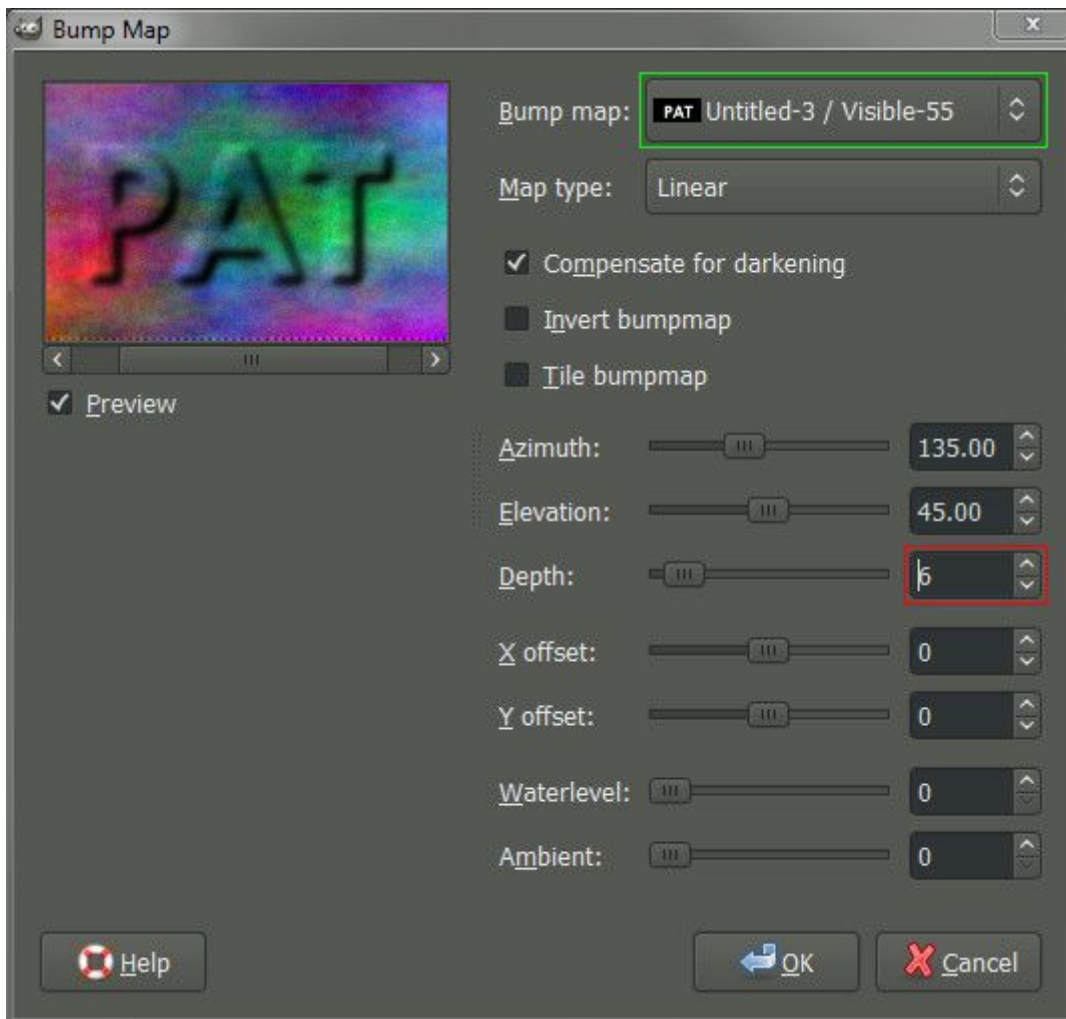


## Bump Mapping

Now we're going to use the text we created earlier to generate a fake 3D shape on this plasma layer. The process is known as "bump mapping". I won't get into the technical details of how this works, as it is best seen rather than explained. Open the **Bump Map** dialog through the menu:

Filters → Map → Bump Map...

The **Bump Map** dialog gives a good preview of what the plugin does:



To get it working correctly, this plugin requires that you properly point to the source for the bump mapping. In our case the source is the text layer we created earlier (the layer was named “Visible”). So we’ll click on the spinner for the **Bump map**, and choose our “Visible” layer from the list.

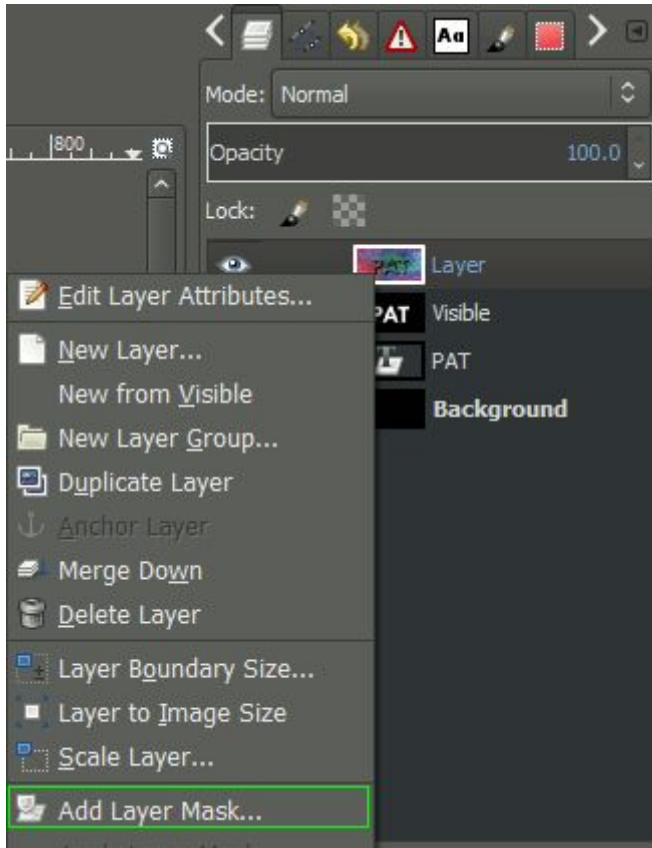
As before, feel free to play with the options. The only one that I changed was the **Depth** to increase the illusion of depth (I finally set the value to 6 in my example). Once it looks good, we’ll hit the **OK** button to apply it to the layer.

## Apply a Layer Mask

Now we are going to use a **Layer Mask** to isolate our bump mapped text. First we need to add a **Layer Mask** to the plasma layer:

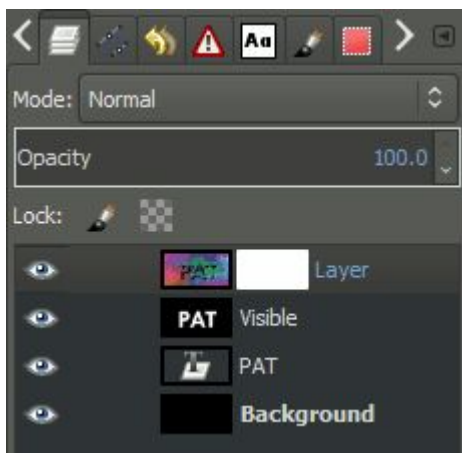
Layer → Mask → Add Layer Mask...

Or Right-Click on the plasma layer and choose “Add Layer Mask...” from the context menu:



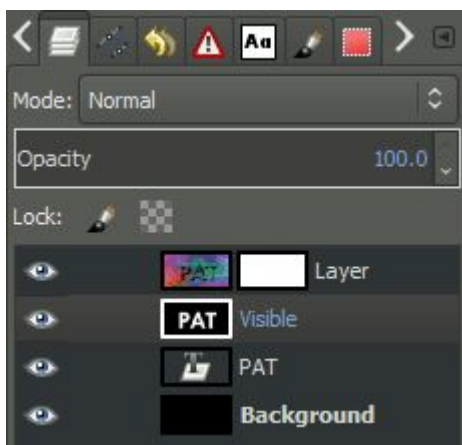
When the “Add a Mask to the Layer” dialog comes up, set the **Initialize Layer Mask to: White** (full opacity).

Once you’ve added a mask to the plasma layer, your layers should now look like this:



Remember, you can tell which layer (or mask) is active by noticing which one has the white border around it. The layers above show that the plasma layers mask is active (there is a white border around the white mask, so it's hard to notice, but *no other* layer/mask has a white border).

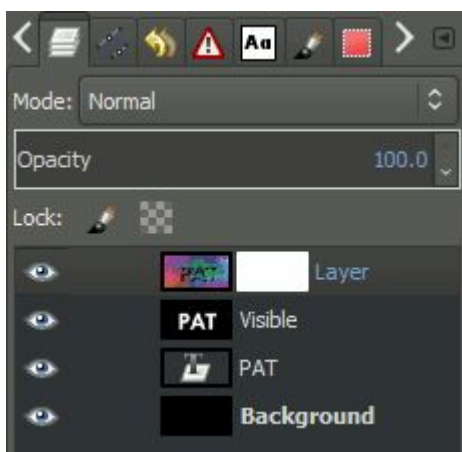
We are going to copy the “Visible” layer, and paste it into the layer mask for the plasma layer. So first, Left-Click on the “Visible” layer in the layers palette to activate it:



Remember, the white border will indicate the layer is active. With the layer active, we want to now copy it:

Edit → Copy

Then we want to make the plasma layer mask active by Left-Clicking on the **mask**:

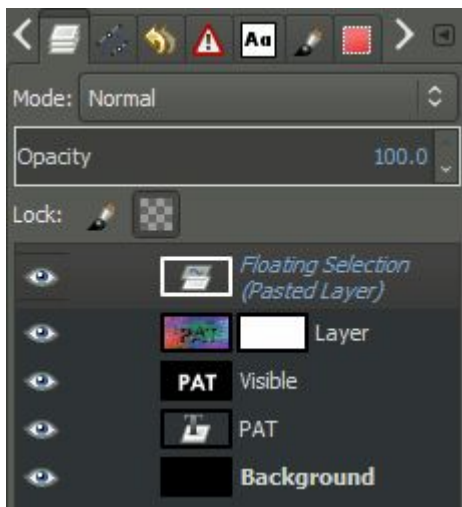


Plasma layer mask now active again.

With the mask active again, we now want to paste the “Visible” layer back into the image:

Edit → Paste

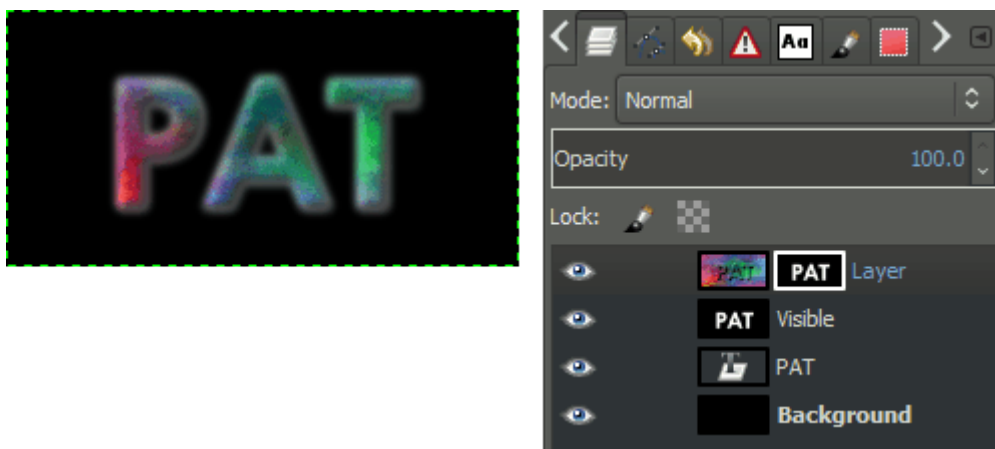
This will now insert a *Floating Selection (Pasted Layer)* into your image:



To get this *Floating Selection* into the mask, we need to **Anchor** it:

Layer → Anchor Layer

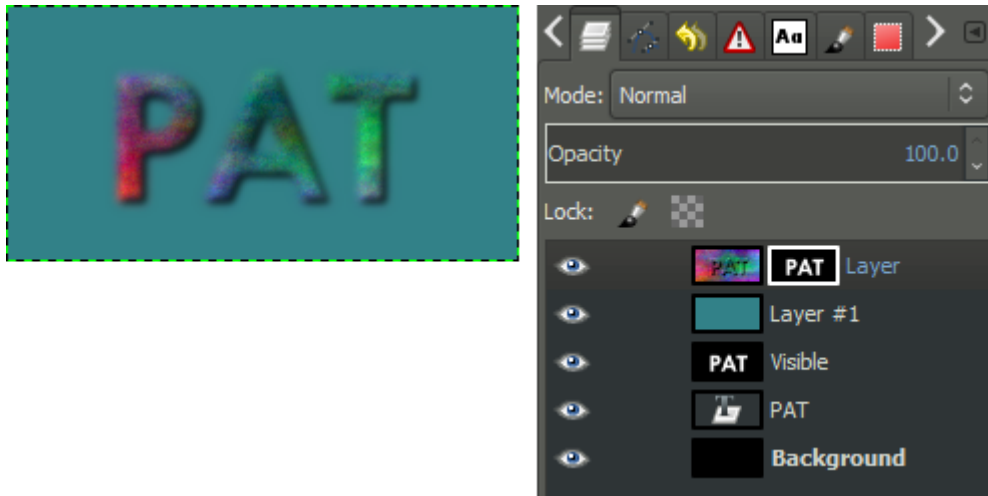
This will **Anchor** the selection down onto the mask. Our image and layers should now look something like this:



We may now want to add a different colored background to help us fine-tune the results we have so far. Add a new layer to the image as we did when [creating the plasma layer](#), and place it

below the plasma layer. (You can click and drag layers to change their order in the palette).

Pick an interesting background color and fill the new layer with this color. The layers should now look like this:



It doesn't look bad, but we can perhaps tighten up the results by adjusting the mask a bit to clarify the edges of the text.

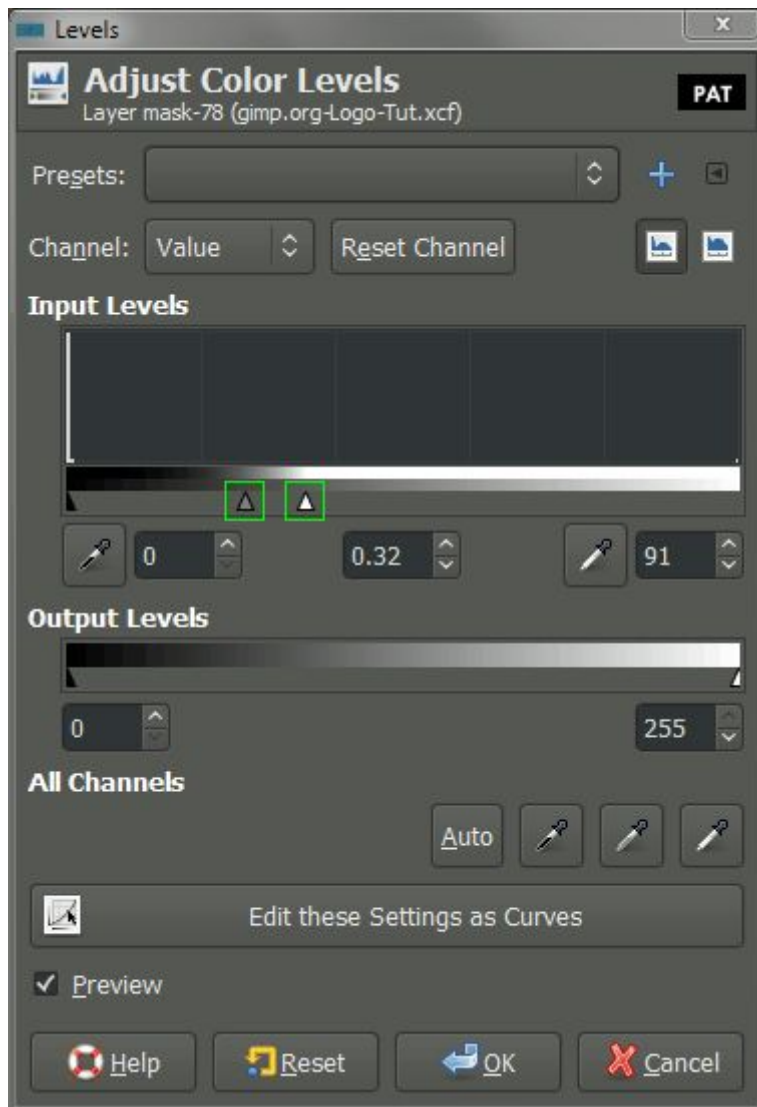
## Adjusting the Levels

I want to clean up the edges of the text with what we have so far. Right now, the mask being used on the plasma layer is a copy of the gaussian blurred text. To make it sharper, we are going to adjust the levels on the mask for that layer.

To do this, we first make sure the layer mask is active by clicking on it. Then we can open the **Adjust Color Levels** dialog through the menu:

Colors → Levels...

With the **Adjust Color Levels** dialog, we now want to sharpen up the edges of the mask a little bit:



What we want to do is adjust the **Gamma** and **White point** sliders. I started by dragging the **White point** slider down to increase the prominence of the plasma layer, then pushed the **Gamma** up to emphasize it more. (If you're following along, you can also just copy my values from above).

The trick is to increase the definition of the edges of the text, without going too far and causing it to look very jagged (aliased). Play with the settings to see how they affect your results. Here is what my plasma layer looks like after applying the above levels to the mask:





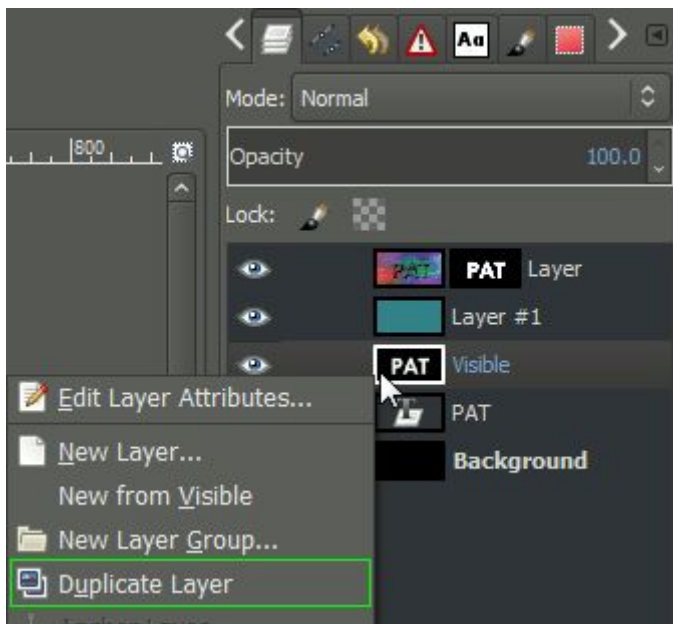
## Creating a Drop Shadow

Now we may want to get a little fancier and add an effect of a drop shadow behind the logo to make it seem as if it's floating above the background. We've already created what we need to generate this effect, we just need to move a couple of things around to do so.

Make a copy of your "Visible" layer that had your original blurred text on it. Select the layer first to activate it, then you can do:

Layer → Duplicate Layer

Or Right-Click on the "Visible" layer, and choose "Duplicate Layer":



This will create a new layer called "Visible copy". Move this layer above your background color layer to just beneath your plasma

layer as shown (you can Left-Click and drag the layer in the palette):



Click and drag the “Visible copy” layer to beneath the plasma layer. This layer will become our shadow, but we need to modify a couple of things first. We’ll first invert the colors of the layer to make the text black using:

Colors → Invert

Then we need to change the layer so that all of the white areas will be transparent. This can be found in the menu:

Layer → Transparency → Color to Alpha...

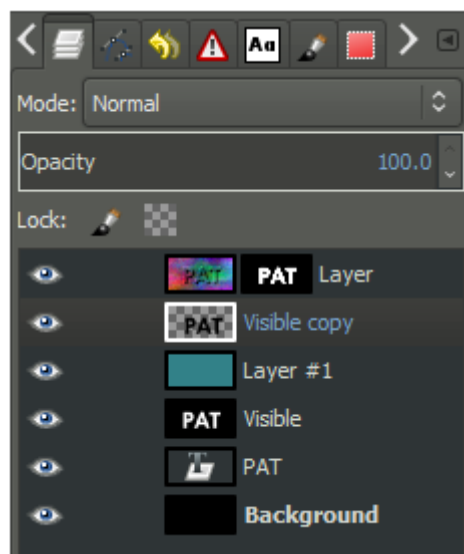
The layer should now have black text over a transparent background. We’ll now just want to shift this layer a bit to simulate a height by offsetting it down and to the right a bit. To do this we can use the **Move Tool**:

Tools → Transform Tools → Move



Activate the **Move Tool**.

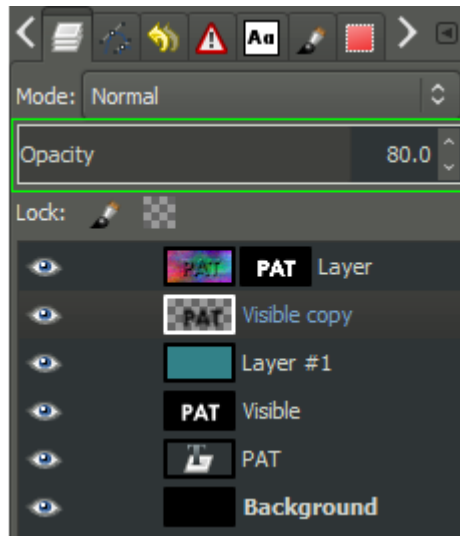
If we hold down **Shift** and click on the canvas, we restrict the **Move Tool** to modifying only the active layer (our shadow layer). Drag the layer to the right and down a bit to simulate the shadow. I ended up with this:



Shadow layer shifted to the right and down a bit.

At this point we can make it a bit more fancy by adding a **Gaussian Blur** to the shadow to spread it out a little more. We can also modify the layer **Opacity**, adjusting it to let the background show through a bit as well.

Here is the final state of my image, where I applied a **Gaussian Blur** with a 10px radius, and adjusted the shadow layer **Opacity** down to 80:



The End

Here is the final floating logo image when everything is done:



The neat thing about our process is that we can now use any background we want behind the image, and the effects and shadow will still be there:

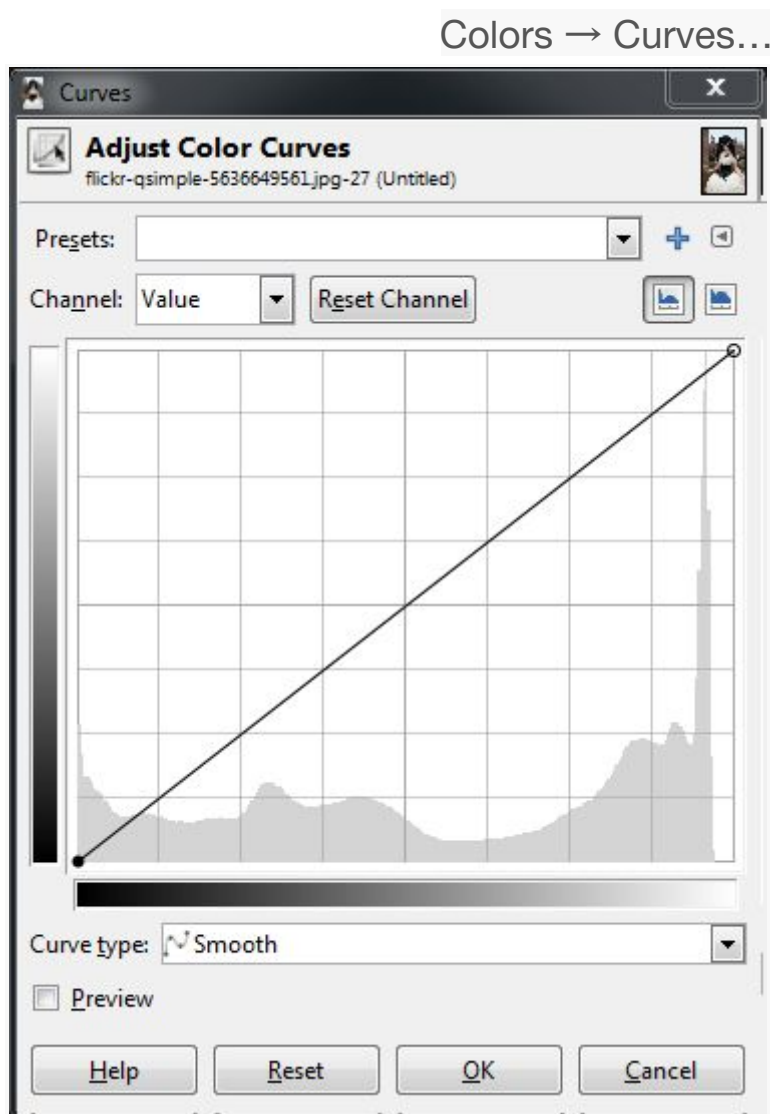


Or we could save it as a PNG file with no background at all, thus allowing whatever background there is to show through:

# PAT

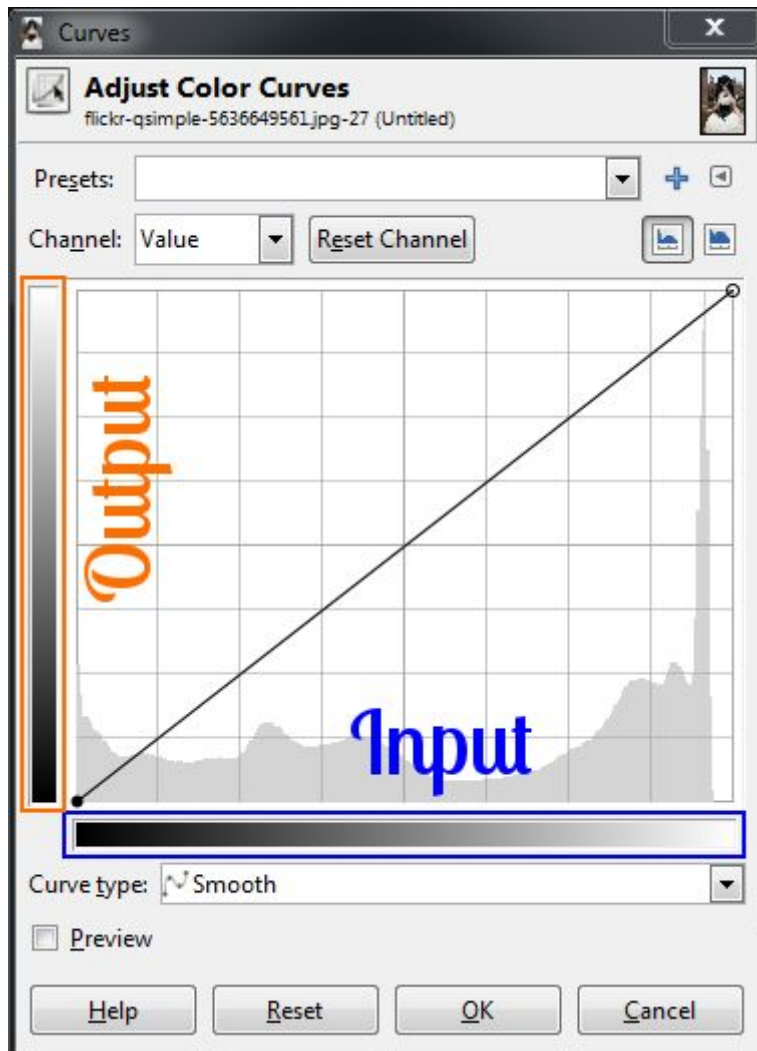
Image Manipulation :

Opening up my **Curves** dialog shows me the following:



We can see that I start off with the curve for the **Value** of the pixels. I could also use the drop down for “**Channel**” to change to red, green or blue curves if I wanted to. For now let’s look at **Value**, though.

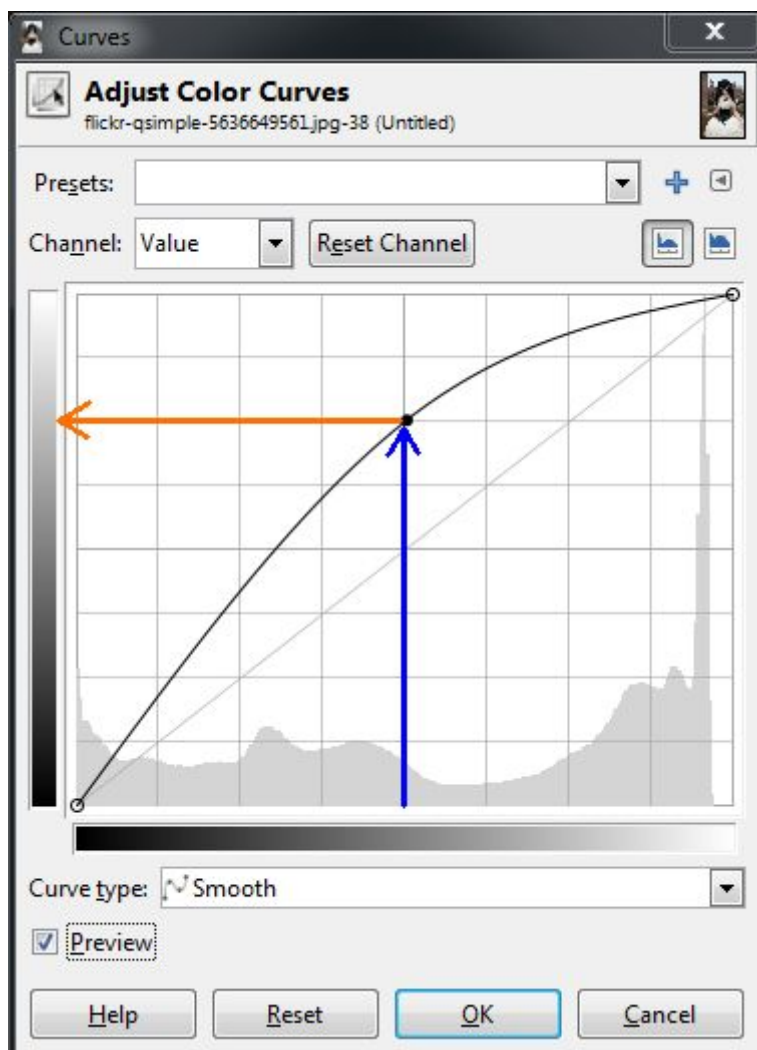
In the main area of the dialog I am presented with a linear curve, behind which I will see a histogram of the value data for the entire image (showing the amount of each value across my image). Notice a spike in the high values on the right, and a small gap at the brightest values.



What we can do right now is to adjust the values of each pixel in the image using this curve. The best way to visualize it is to remember that the bottom range from black to white represents the **current** value of the pixels, and the left range is the **value to be mapped to**.

So to show an example of how this curve will affect your image, suppose I wanted to remap all the values in the image that were in the midtones, and to make them all lighter. I can do this by

clicking on the curve near the midtones, and dragging the curve higher in the Y direction:



What this curve does is takes the values around the midtones, and pushes their values to be much lighter than they were. In this case, values around 128 were re-mapped to now be closer to 192.

Because the curve is set **Smooth**, there will be a gradual transition for all the tones surrounding my point to be pulled in the same direction (this makes for a smoother fall-off as opposed to an abrupt change at one value). Because there is only a single point in the curve right now, this means that all values will be pulled higher.

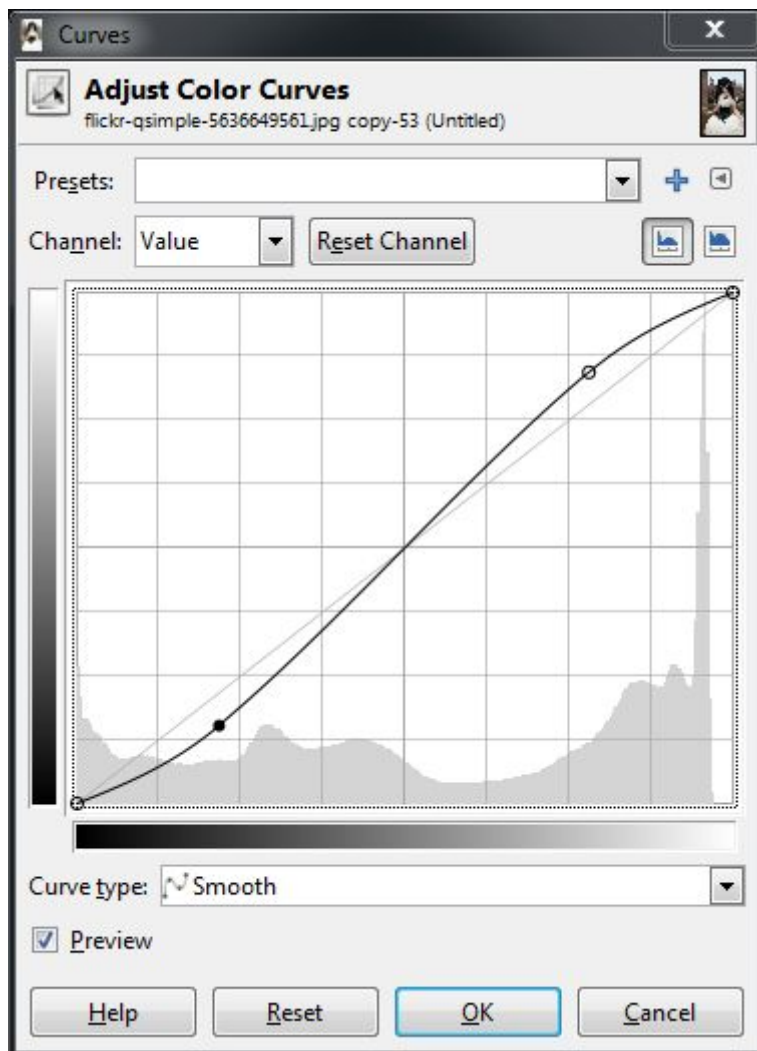


The results of pushing the midtones of the value curve higher (click to compare to original).

Care should be taken when fiddling with these curves to not blow things out or destroy detail, of course. I only push the curves here to illustrate what they do.



A very common curve adjustment you may hear about is to apply a slight “S” curve to your values. The effect of this curve would be to darken the dark tones, and to lighten the light tones - in effect increasing global contrast on your image. For instance, if I click on another point in the curves, and adjust the points to form a shape like so:

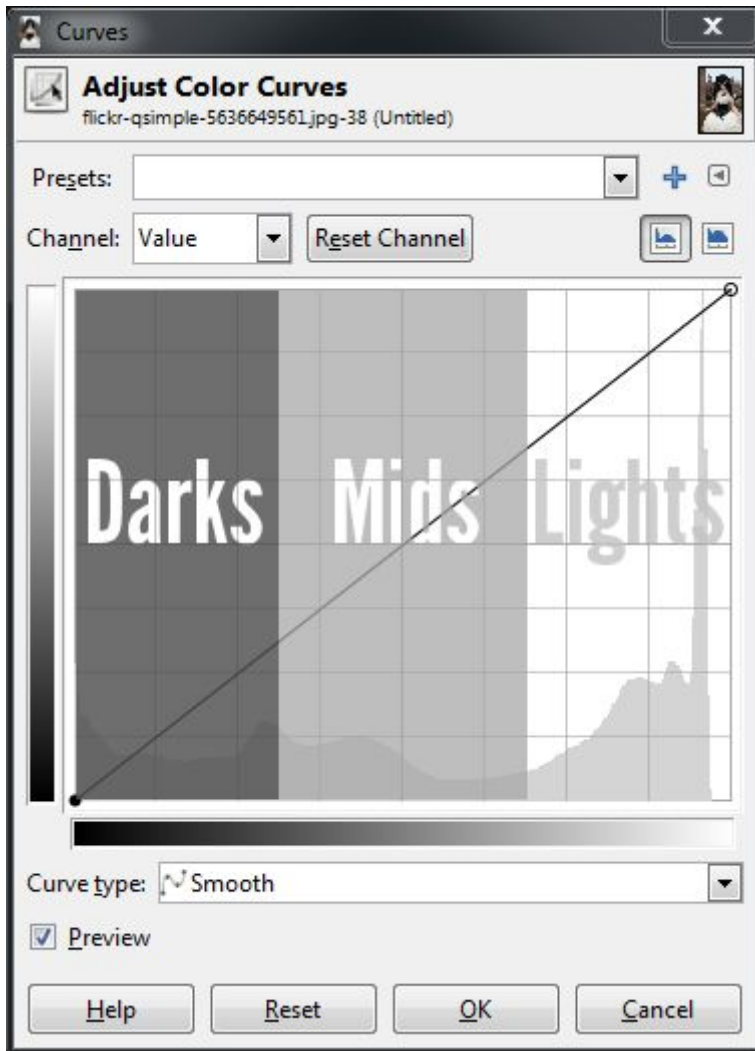


A slight “S” curve

This will now cause dark values to become even darker, while the light values get a small boost. The curve still passes through the midpoint, so middle tones will stay closer to what they were.



Slight “S” curve increases global contrast ([click for original](#)).  
In general, I find it easiest to visualize in terms of which regions in the curve will effect different tones in your image. Here is a quick way to visualize it (that is true for value as well as RGB curves):

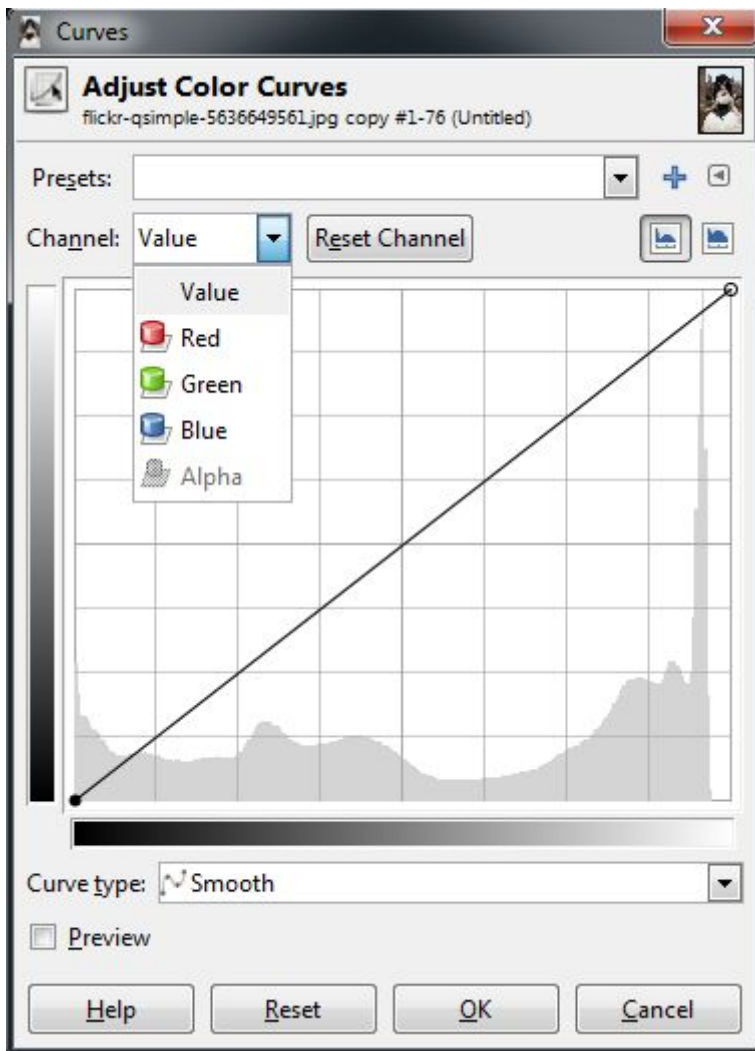


If there is one thing you take away from reading this, let it be the image above.

## Curves: Colors

So how does this apply to other channels? Let's have a look.

The exact same theory applies in the RGB channels as it did with values. The relative positions of the darks, midtones, and lights are still the same in the curve dialog. The primary difference now is that you can control the contribution of color in specific tonal regions of your image.



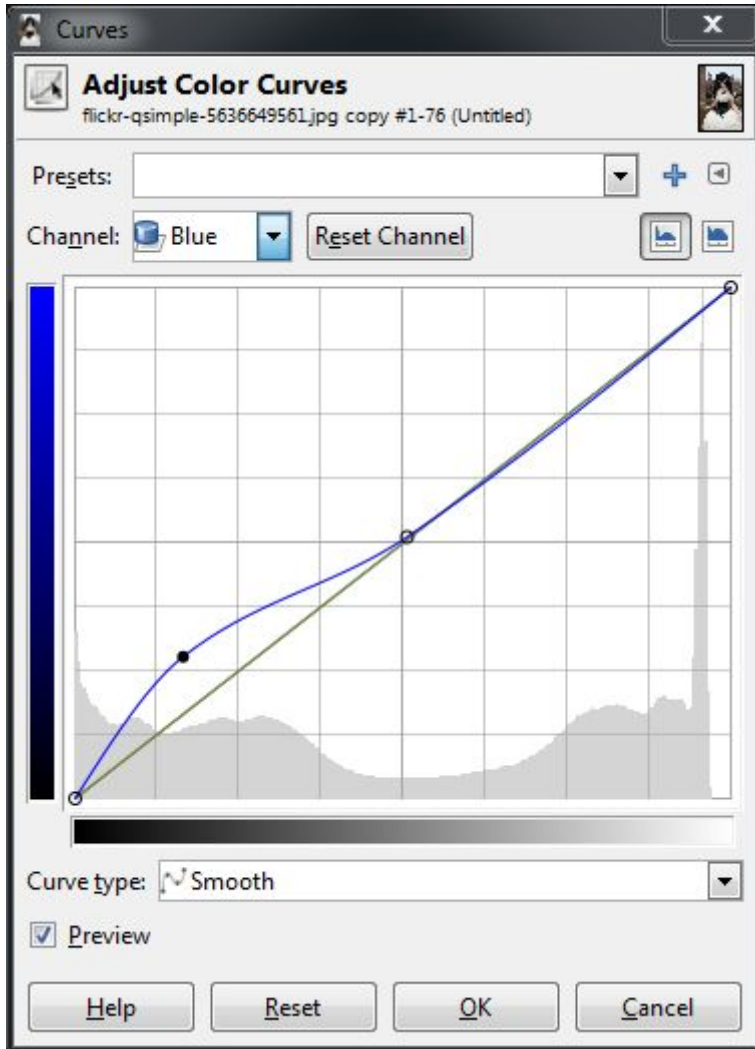
Value, Red, Green, Blue channel picker.

You choose which channel you want to adjust from the “**Channel**” drop-down.

To begin demonstrating what happens here it helps to have an idea of generally what effect you would like to apply to your image. This is often the hardest part of adjusting the color tones if you don't have a clear idea to start with.

For example, perhaps we wanted to “cool” down the shadows of our image. “Cool” shadows are commonly seen during the day in shadows out of direct sunlight. The light that does fall in shadows is mostly reflected light from a blue-ish sky, so the shadows will trend slightly more blue.

To try this, let's adjust the **Blue** channel to be a little more prominent in the darker tones of our image, but to get back to normal around the midtones and lighter.



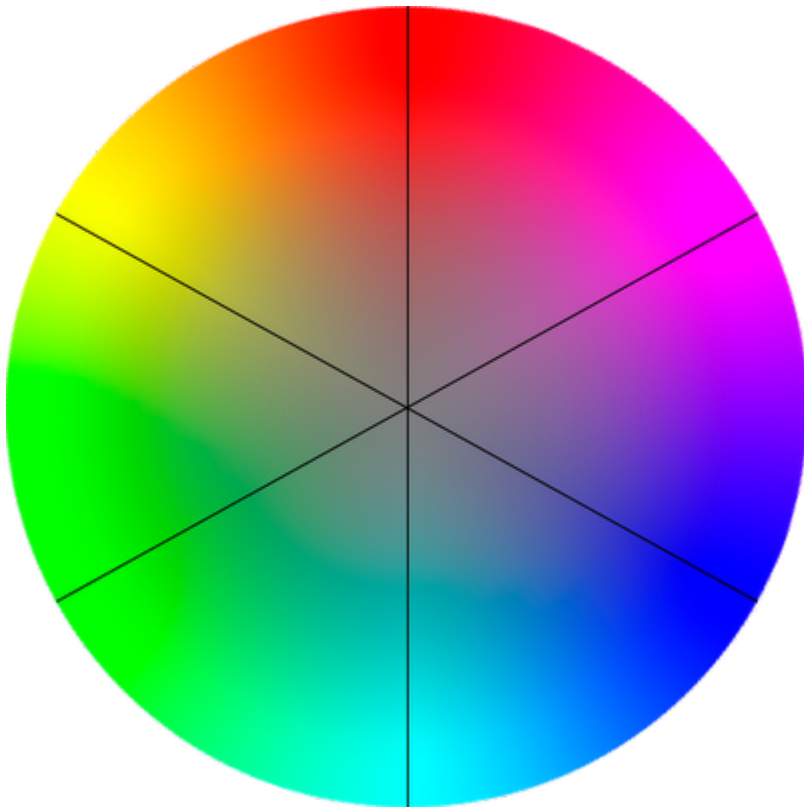
Boosting blues in darker tones



Pushing up blues in darker tones (click for original).

Now, here's a question: If I wanted to "cool" the darker tones with more blue, what if I wanted to "warm" the lighter tones by adding a little yellow?

Well, there's no "Yellow" curve to modify, so how to approach that? Have a look at this HSV color wheel below:



The thing to look out for here is that opposite your blue tones on this wheel, you'll find yellow. In fact, for each of the Red, Green, and Blue channels, the opposite colors on the color wheel will show you what an absence of that color will do to your image. So remember:

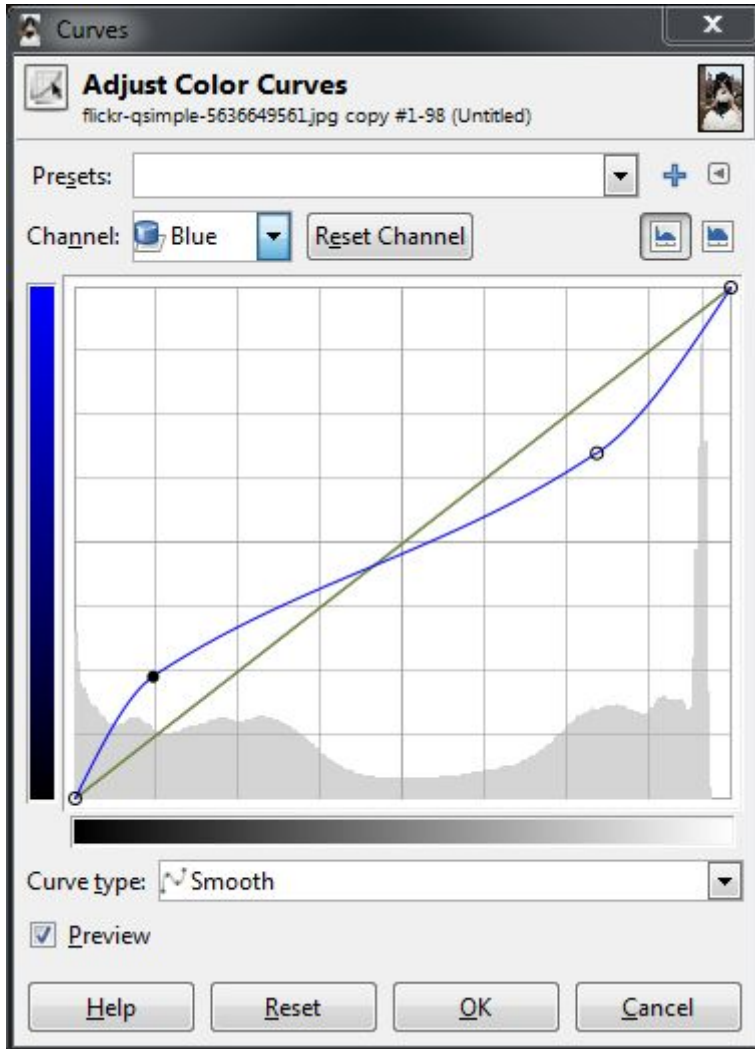
Red → Cyan

Green → Magenta

Blue → Yellow

What this means to you while manipulating curves is that if you drag a curve for blue up, you will boost the blue in that region of your image. If instead you drag the curve for blue down, you will be **removing** blues (or boosting the **Yellows** in that region of your image).

So to boost the blues in the dark tones, but increase the yellow in the lighter tones, you could create a sort of “reverse” S-curve in the blue channel:

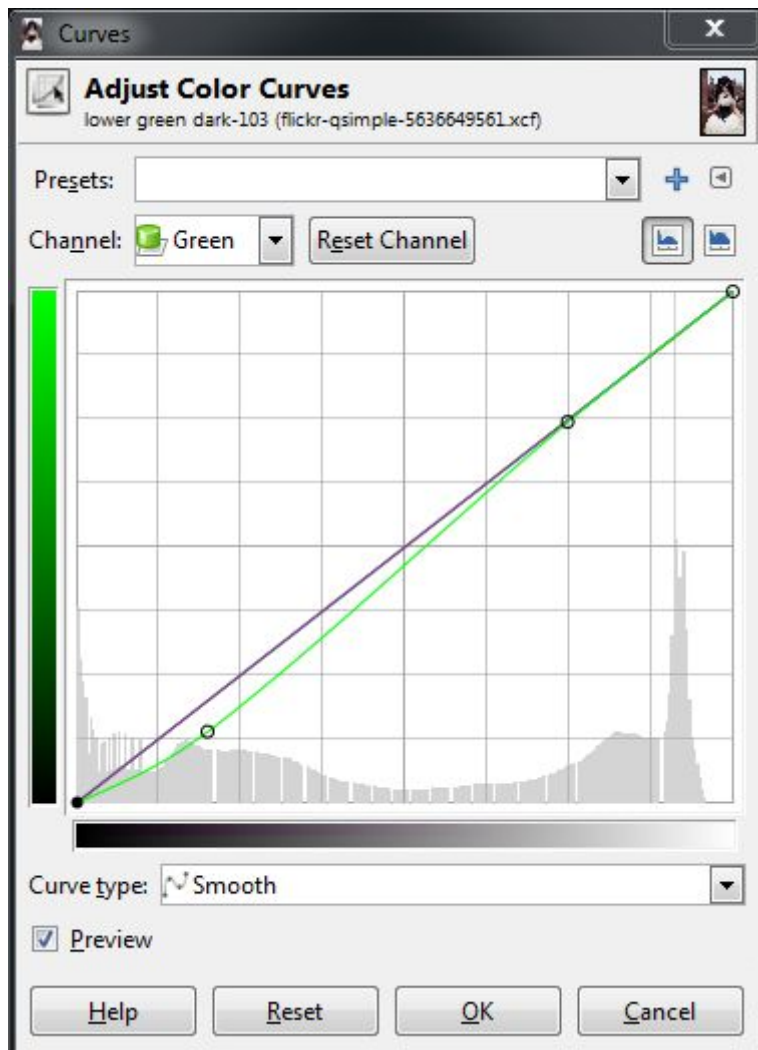






Boost blues in darks, boost yellow in high tones (click for original).  
In the green channel for instance, you can begin to introduce more magenta into the tones by decreasing the curve. So dropping the green curve in the dark tones, and letting it settle

back to normal towards the high tones will produce results like this:





Suppressing the **green** channel in darks/mids adds a bit of **magenta** (click for original).

In isolation, these curves are fun to play with, but I think that perhaps walking through some actual examples of color toning/grading would help to illustrate what I'm talking about

here. I'll choose a couple of common toning examples to show what happens when you begin mixing all three channels up.

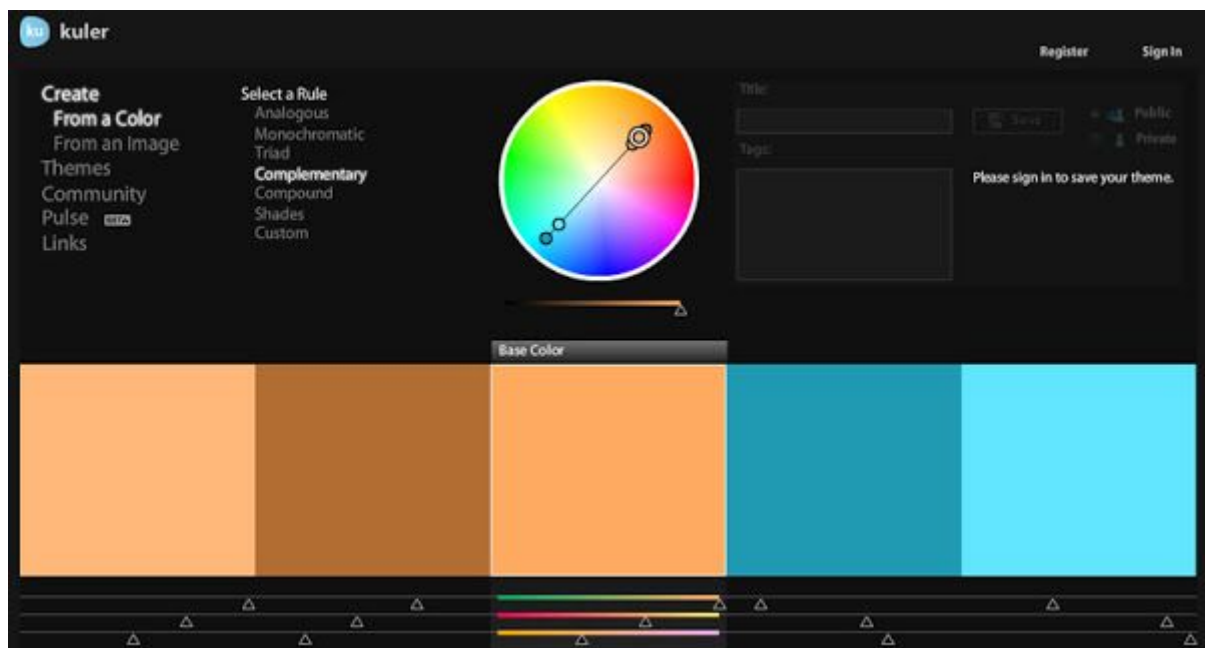
## Color Toning/Grading

### Orange and Teal Hell

I use the (*cinema film*) term *color grading* here because the first adjustment we will have a look at to illustrate curves is a horrible hollywood trend that is best described by [Todd Miro on his blog](#).

*Grading* is a term for color toning on film, and Todd's post is a funny look at the prevalence of orange and teal in modern film palettes. So it's worth a look just to see how silly this is (and hopefully to raise awareness of the obnoxiousness of this practice).

The general thought here is that caucasian skin tones trend towards orange, and if you have a look at a complementary color on the color wheel, you'll notice that directly opposite orange is a teal color.



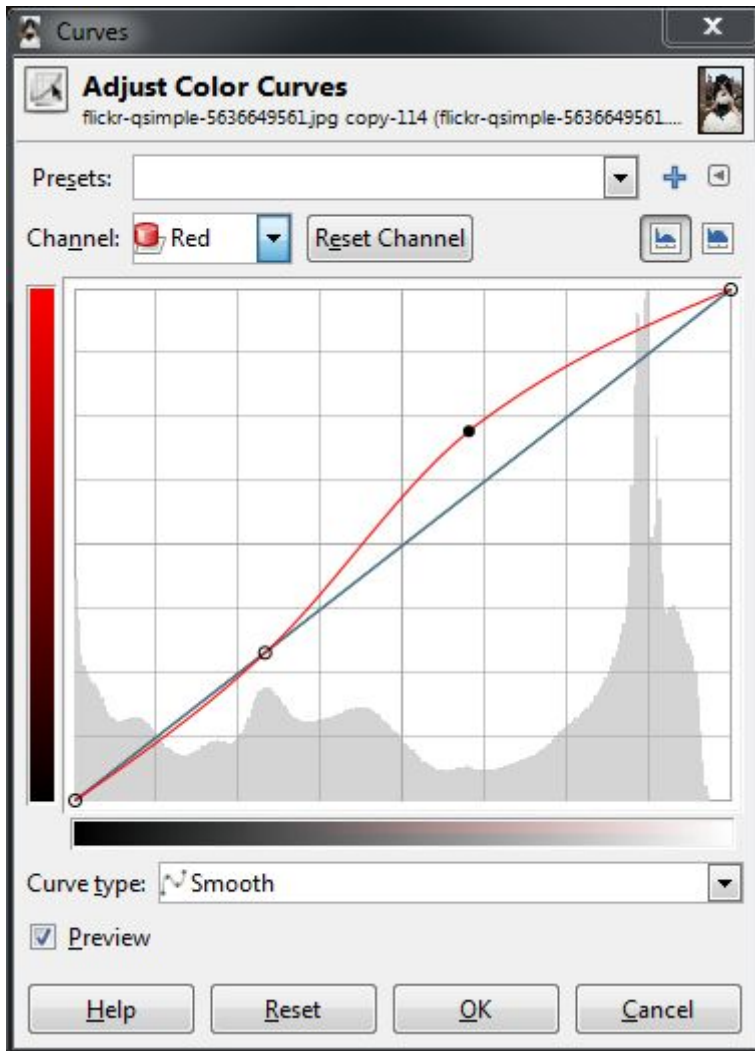
Screenshot from [Kuler](#) borrowed from Todd.

If you don't already know about it, Adobe has online a fantastic tool for color visualization and palette creation called [Kuler Adobe Color CC](#). It lets you work on colors based on some classic rules, or even generate a color palette from images. Well worth a visit and a fantastic bookmark for fiddling with color.

So a quick look at the desired effect would be to keep/boost the skin tones into a sort of orange-y pinkish color, and to push the darker tones into a teal/cyan combination. (Colorists on films tend to use a Lift, Gamma, Gain model, but we'll just try this out with our curves here).

Quick disclaimer - I am purposefully exaggerating these modifications to illustrate what they do. Like most things, moderation and restraint will go a long ways towards not causing your viewers eyeballs to bleed. *Remember - **light touch!***

So I know that I want to see my skin tones head into an orange-ish color. In my image the skin tones are in the upper mids/low highs range of values, so I will start around there.

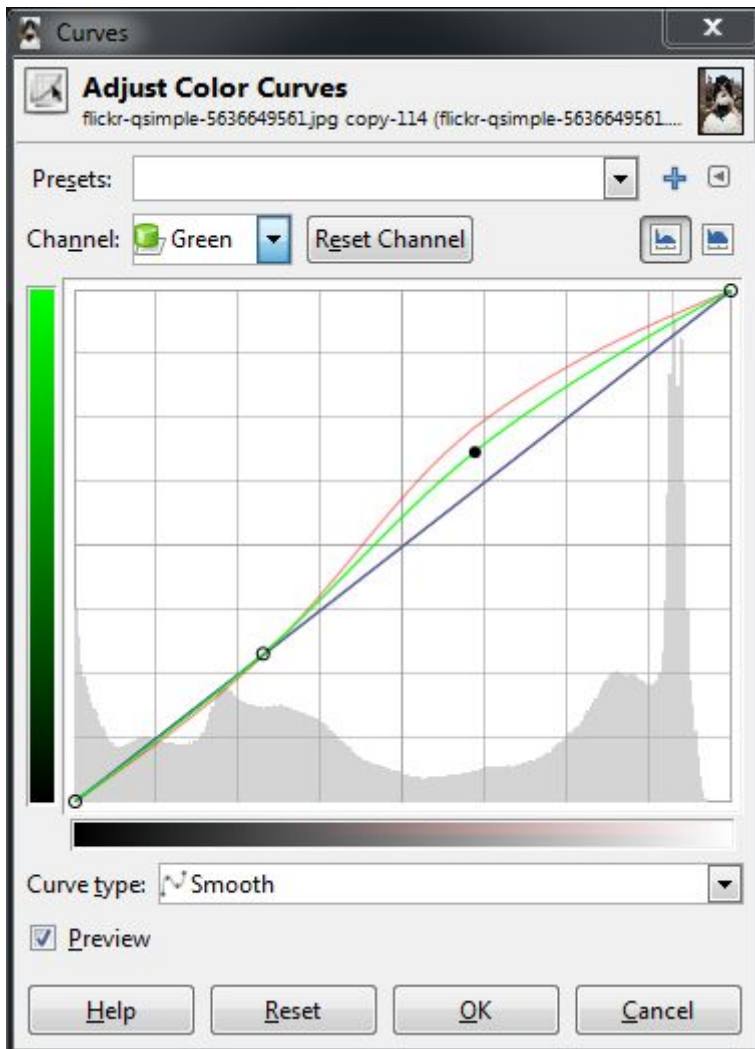


What I've done is put a point around the low midtones to anchor the curve closer to normal for those tones. This lets me fiddle with the red channel and to isolate it roughly to the mid and high tones only. The skin tones in this image in the red channel will fall toward the upper end of the mids, so I've boosted the reds there. Things may look a little weird at first:



If you look back at the color wheel again, you'll notice that between red and green, there is a yellow, and if you go a bit closer towards red the yellow turns to more of an orange. What this means is that if we add some more green to those same tones, the overall colors will start to shift towards an orange.

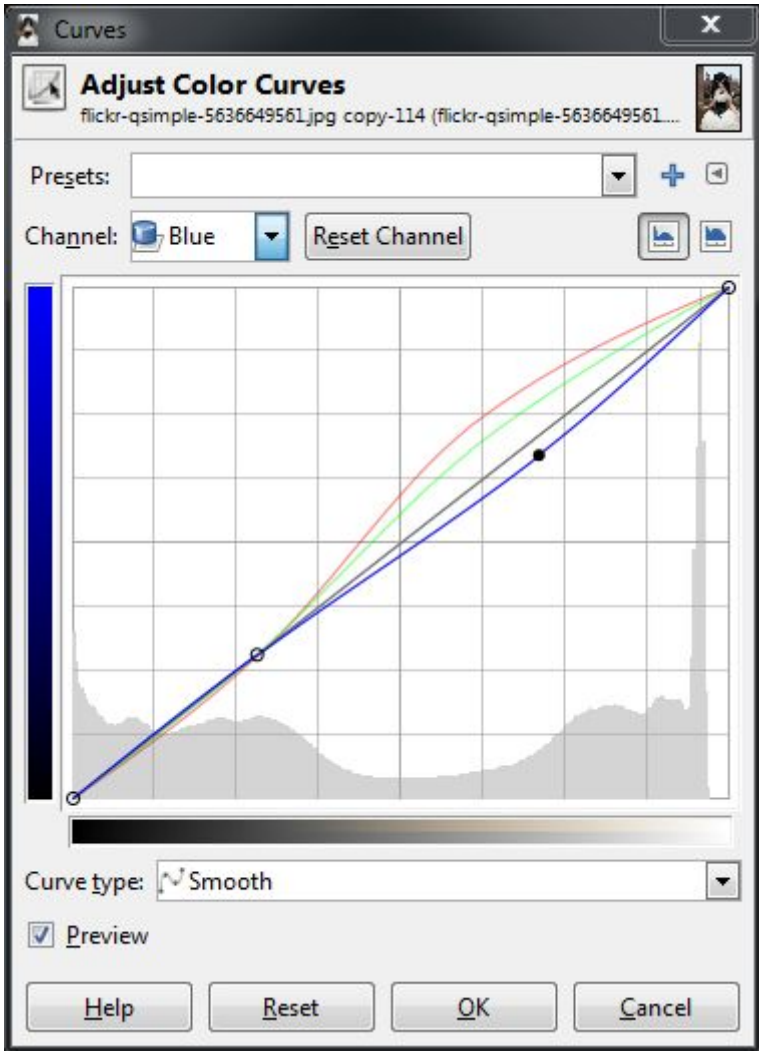
So we can switch to the green channel now, put a point in the lower midtones again to hold things around normal, and slightly boost the green. Don't boost it all the way to the reds, but about 2/3rds or so to taste.







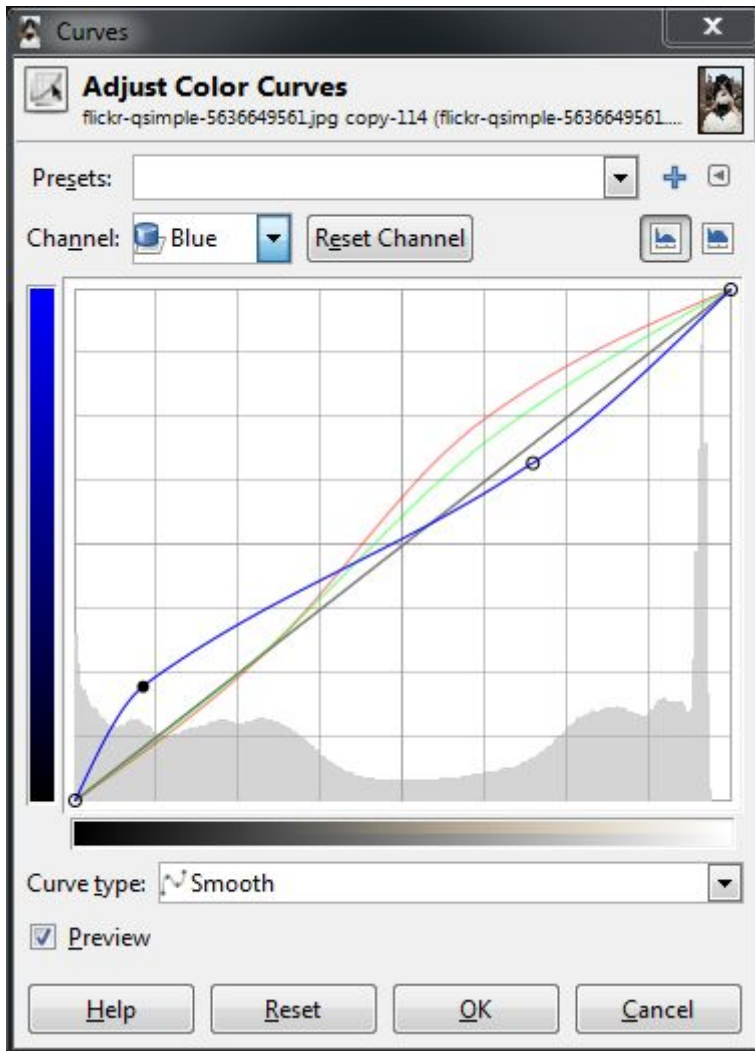
This puts a little more red/orange-y color into the tones around the skin. You could further adjust this by perhaps including a bit more yellow as well. To do this, I would again put an anchor point in the low mid tones on the blue channel, then slightly drop the blue curve in the upper tones to introduce a bit of yellow.





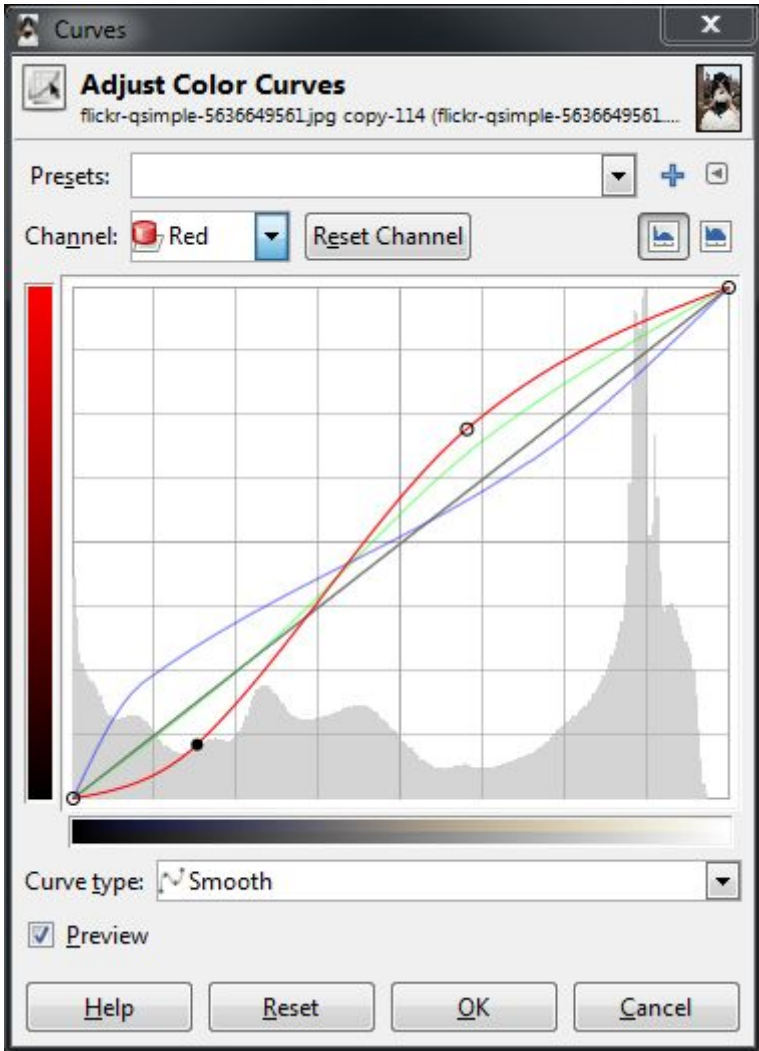
Remember, we're experimenting here so feel free to try things out as we move along. I may consider the upper tones to be finished at the moment, and now I would want to look at introducing a more blue/teal color into the darker tones.

I can start by boosting a bit of blues in the dark tones. I'm going to use the anchor point I already created, and just push things up a bit.



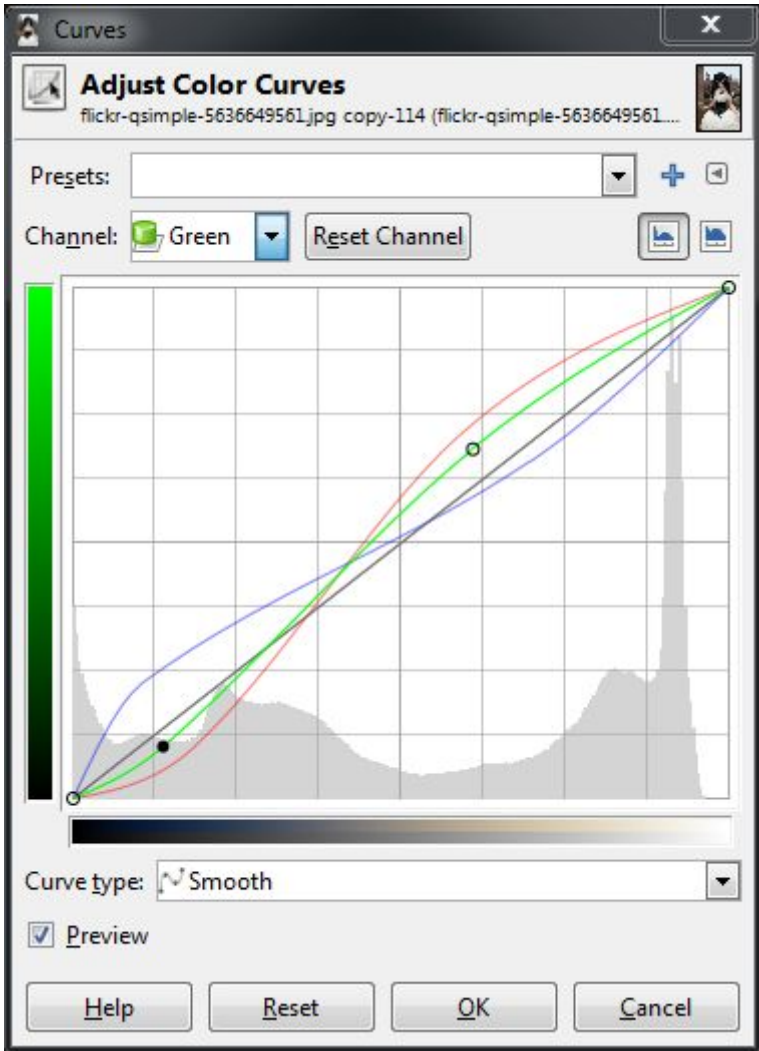


Now I want to make the darker tones a bit more teal in color. Remember the color wheel - **teal** is the absence of red - so we will drop down the red channel in the lower tones as well.





And finally to push a very slight magenta into the dark tones as well, I'll push down the green channel a bit.

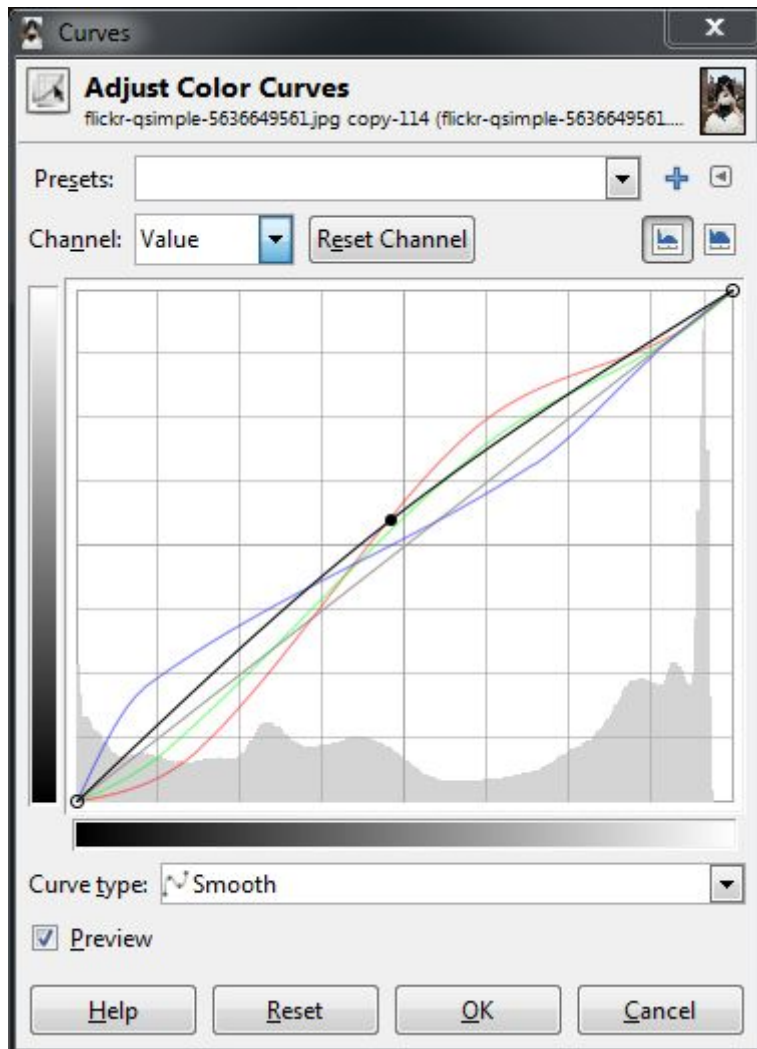






If I wanted to go a step further, I could also put an anchor point up close to the highest values to keep the brightest parts of the image closer to a white instead of carrying over a color cast from our previous operations.

If your previous operations also darkened the image a bit, you could also now revisit the **Value** channel, and make modifications there as well. In my case I bumped the midtones of the image just a bit to brighten things up slightly.



# Vector 2D Software

## Inkscape

Basics :

### Panning the canvas

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There are many ways to pan (scroll) the document canvas. Try **Ctrl+arrow** keys to scroll by keyboard. (Try this now to scroll this document down.) You can also drag the canvas by the middle mouse button. Or, you can use the scrollbars (press **Ctrl+B** to show or hide them). The **wheel** on your mouse also works for scrolling vertically; press **Shift** with the wheel to scroll horizontally.

### Zooming in or out

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The easiest way to zoom is by pressing **-** and **+** (or **=**) keys. You can also use **Ctrl+middle click** or **Ctrl+right click** to zoom in, **Shift+middle click** or **Shift+right click** to zoom out, or rotate the mouse wheel with **Ctrl**. Or, you can click in the zoom entry field (in the bottom right corner of the document window), type a precise zoom value in %, and press **Enter**. We also have the Zoom tool (in the toolbar on left) which lets you to zoom into an area by dragging around it.

Inkscape also keeps a history of the zoom levels you've used in this work session. Press the **]** key to go back to the previous zoom, or **Shift+]** to go forward.

### Inkscape tools

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The vertical toolbar on the left shows Inkscape's drawing and editing tools. In the top part of the window, below the menu, there's the *Commands bar* with general command buttons and the *Tool Controls bar* with controls that are specific to each tool. The *status bar* at the bottom of the window will display useful hints and messages as you work.

Many operations are available through keyboard shortcuts. Open **Help > Keys and Mouse** to see the complete reference.

## Creating and managing documents

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To create a new empty document, use **File > New** or press **Ctrl+N**. To create a new document from one of Inkscape's many templates, use **File > New from Template...** or press **Ctrl+Alt+N**

To open an existing SVG document, use **File > Open** (**Ctrl+O**). To save, use **File > Save** (**Ctrl+S**), or **Save As** (**Shift+Ctrl+S**) to save under a new name. (Inkscape may still be unstable, so remember to save often!)

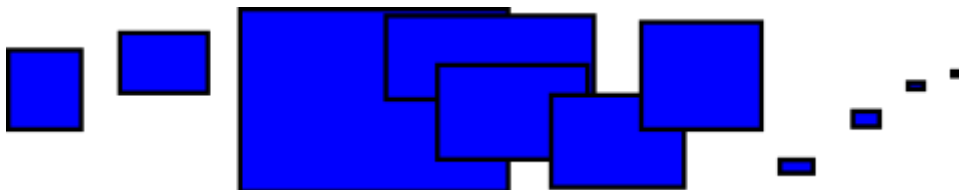
Inkscape uses the SVG (Scalable Vector Graphics) format for its files. SVG is an open standard widely supported by graphic software. SVG files are based on XML and can be edited with any text or XML editor (apart from Inkscape, that is). Besides SVG, Inkscape can import and export several other formats (EPS, PNG).

Inkscape opens a separate document window for each document. You can navigate among them using your window manager (e.g. by **Alt+Tab**), or you can use the Inkscape shortcut, **Ctrl+Tab**, which will cycle through all open document windows. (Create a new document now and switch between it and this document for practice.) Note: Inkscape treats these windows like tabs in a web browser, this means the **Ctrl+Tab** shortcut only works with documents running in the same process. If you open multiple files from a file browser or launch more than one Inkscape process from an icon it will not work.

## Creating shapes

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Time for some nice shapes! Click on the Rectangle tool in the toolbar (or press **F4**) and click-and-drag, either in a new empty document or right here:



As you can see, default rectangles come up blue, with a black *stroke* (outline), and fully opaque. We'll see how to change that below. With other tools, you can also create ellipses, stars, and spirals:



These tools are collectively known as *shape tools*. Each shape you create displays one or more diamond-shaped *handles*; try dragging them to see how the shape responds. The Controls panel for a shape tool is another way to tweak a shape; these controls affect the currently selected shapes (i.e. those that display the handles) *and* set the default that will apply to newly created shapes.

To *undo* your last action, press `Ctrl+Z`. (Or, if you change your mind again, you can *redo* the undone action by `Shift+Ctrl+Z`.)

## Moving, scaling, rotating

---

The most frequently used Inkscape tool is the *Selector*. Click the topmost button (with the arrow) on the toolbar, or press `F1` or `Space`. Now you can select any object on the canvas. Click on the rectangle below.



You will see eight arrow-shaped handles appear around the object. Now you can:

- *Move* the object by dragging it. (Press `Ctrl` to restrict movement to horizontal and vertical.)
- *Scale* the object by dragging any handle. (Press `Ctrl` to preserve the original height/width ratio.)

Now click the rectangle again. The handles change. Now you can:

- *Rotate* the object by dragging corner handles. (Press `Ctrl` to restrict rotation to 15 degree steps. Drag the cross mark to position the center of rotation.)
- *Skew* (shear) the object by dragging non-corner handles. (Press `Ctrl` to restrict skewing to 15 degree steps.)

While in *Selector*, you can also use the numeric entry fields in the Controls bar (above the canvas) to set exact values for coordinates (X and Y) and size (W and H) of the selection.

## Transforming by keys

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One of Inkscape's features that set it apart from most other vector editors is its emphasis on keyboard accessibility. There's hardly any command or action that is impossible to do from keyboard, and transforming objects is no exception.

You can use the keyboard to move (arrow keys), scale (< and > keys), and rotate ([ and ] keys) objects. Default moves and scales are by 2 px; with Shift, you move by 10 times that. Ctrl+> and Ctrl+< scale up or down to 200% or 50% of the original, respectively. Default rotates are by 15 degrees; with Ctrl, you rotate by 90 degrees.

However, perhaps the most useful are *pixel-size transformations*, invoked by using Alt with the transform keys. For example, Alt+arrows will move the selection by 1 pixel *at the current zoom* (i.e. by 1 *screen pixel*, not to be confused with the px unit which is an SVG length unit independent of zoom). This means that if you zoom in, one Alt+arrow will result in a *smaller* absolute movement which will still look like one-pixel nudge on your screen. It is thus possible to position objects with arbitrary precision simply by zooming in or out as needed.

Similarly, Alt+> and Alt+< scale selection so that its visible size changes by one screen pixel, and Alt+[ and Alt+] rotate it so that its farthest-from-center point moves by one screen pixel.

Note: Linux users may not get the expected results with the Alt+arrow and a few other key combinations if their Window Manager catches those key events before they reach the inkscape application. One solution would be to change the WM's configuration accordingly.

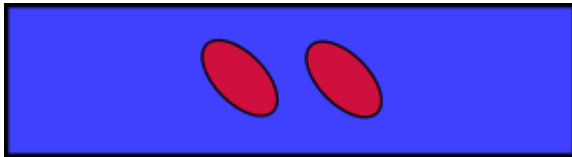
## Multiple selections

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You can select any number of objects simultaneously by Shift+clicking them. Or, you can drag around the objects you need to select; this is called *rubberband selection*. (Selector creates rubberband when dragging from an empty space; however, if you press Shift before starting to drag, Inkscape will always create the rubberband.) Practice by selecting all three of the shapes below:



Now, use rubberband (by drag or Shift+drag) to select the two ellipses but not the rectangle:



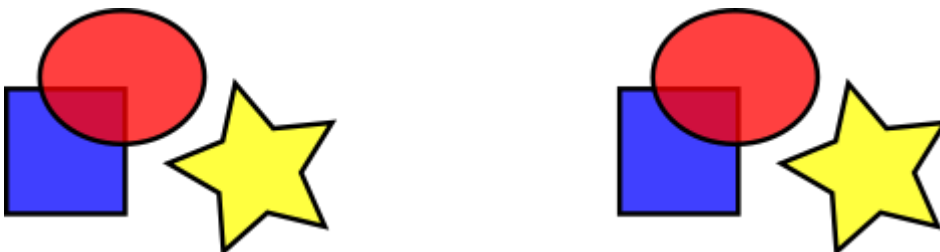
Each individual object within a selection displays a *selection cue* — by default, a dashed rectangular frame. These cues make it easy to see at once what is selected and what is not. For example, if you select both the two ellipses and the rectangle, without the cues you would have hard time guessing whether the ellipses are selected or not.

Shift+clicking on a selected object excludes it from the selection. Select all three objects above, then use Shift+click to exclude both ellipses from the selection leaving only the rectangle selected.

Pressing Esc deselects any selected objects. Ctrl+A selects all objects in the current layer (if you did not create layers, this is the same as all objects in the document).

## Grouping

Several objects can be combined into a *group*. A group behaves as a single object when you drag or transform it. Below, the three objects on the left are independent; the same three objects on the right are grouped. Try to drag the group.



To create a group, you select one or more objects and press Ctrl+G. To ungroup one or more groups, select them and press Ctrl+U. Groups themselves may be grouped, just like any other objects; such recursive groups may go down to arbitrary depth. However,

**Ctrl+U** only ungroups the topmost level of grouping in a selection; you'll need to press **Ctrl+U** repeatedly if you want to completely ungroup a deep group-in-group.

You don't necessarily have to ungroup, however, if you want to edit an object within a group. Just **Ctrl+click** that object and it will be selected and editable alone, or **Shift+Ctrl+click** several objects (inside or outside any groups) for multiple selection regardless of grouping. Try to move or transform the individual shapes in the group (above right) without ungrouping it, then deselect and select the group normally to see that it still remains grouped.

## Fill and stroke

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Probably the simplest way to paint an object some color is to select an object, and click a swatch in the palette below the canvas to paint it (change its fill color). Alternatively, you can open the Swatches dialog from the View menu (or press **Shift+Ctrl+W**), select an object, and click a swatch to paint it (change its fill color).

More powerful is the Fill and Stroke dialog from the Object menu (or press **Shift+Ctrl+F**). Select the shape below and open the Fill and Stroke dialog.

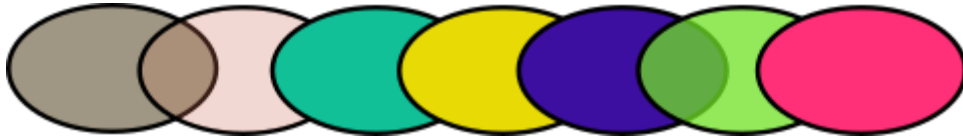


You will see that the dialog has three tabs: Fill, Stroke paint, and Stroke style. The Fill tab lets you edit the *fill* (interior) of the selected object(s). Using the buttons just below the tab, you can select types of fill, including no fill (the button with the X), flat color fill, as well as linear or radial gradients. For the above shape, the flat fill button will be activated.

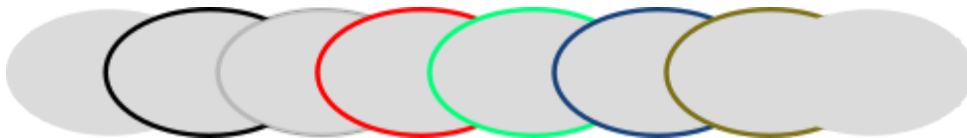
Further below, you see a collection of *color pickers*, each in its own tab: RGB, CMYK, HSL, and Wheel. Perhaps the most convenient is the Wheel picker, where you can rotate the triangle to choose a hue on the wheel, and then select a shade of that hue within the triangle. All color pickers contain a slider to set the *alpha* (opacity) of the selected object(s).



Whenever you select an object, the color picker is updated to display its current fill and stroke (for multiple selected objects, the dialog shows their *average* color). Play with these samples or create your own:



Using the Stroke paint tab, you can remove the *stroke* (outline) of the object, or assign any color or transparency to it:



The last tab, Stroke style, lets you set the width and other parameters of the stroke:



Finally, instead of flat color, you can use *gradients* for fills and/or strokes:



When you switch from flat color to gradient, the newly created gradient uses the previous flat color, going from opaque to transparent. Switch to the Gradient tool (Ctrl+F1) to drag the *gradient handles* — the controls connected by lines that define the direction and length of the gradient. When any of the gradient handles is selected (highlighted blue), the Fill and Stroke dialog sets the color of that handle instead of the color of the entire selected object.

Yet another convenient way to change a color of an object is by using the Dropper tool (F7). Just click anywhere in the drawing with that tool, and the picked color will be assigned to the selected object's fill (Shift+click will assign stroke color).

## Duplication, alignment, distribution

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One of the most common operations is *duplicating* an object (Ctrl+D). The duplicate is placed exactly above the original and is selected, so you can drag it away by mouse or by arrow keys. For practice, try to fill the line with copies of this black square:



Chances are, your copies of the square are placed more or less randomly. This is where the Align and Distribute dialog (Shift+Ctrl+A) is useful. Select all the squares (Shift+click or drag a rubberband), open the dialog and press the “Center on horizontal axis” button, then the “Make horizontal gaps between objects equal” button (read the button tooltips). The objects are now neatly aligned and distributed equispacedly. Here are some other alignment and distribution examples:

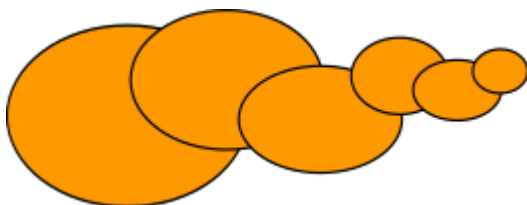


## Z-order

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The term *z-order* refers to the stacking order of objects in a drawing, i.e. to which objects are on top and obscure others. The two commands in the Object menu, Raise to Top (the Home key) and Lower to Bottom (the End key), will move your selected objects to the very top or very bottom of the current layer's z-order. Two more commands, Raise (PgUp) and Lower (PgDn), will sink or emerge the selection *one step only*, i.e. move it past one non-selected object in z-order (only objects that overlap the selection count, based on their respective bounding boxes).

Practice using these commands by reversing the z-order of the objects below, so that the leftmost ellipse is on top and the rightmost one is at the bottom:



A very useful selection shortcut is the **Tab** key. If nothing is selected, it selects the bottommost object; otherwise it selects the object *above the selected object(s)* in z-order. **Shift+Tab** works in reverse, starting from the topmost object and proceeding downwards. Since the objects you create are added to the top of the stack, pressing **Shift+Tab** with nothing selected will conveniently select the object you created *last*. Practice the **Tab** and **Shift+Tab** keys on the stack of ellipses above.

## Selecting under and dragging selected

---

What to do if the object you need is hidden behind another object? You may still see the bottom object if the top one is (partially) transparent, but clicking on it will select the top object, not the one you need.

This is what **Alt+click** is for. First **Alt+click** selects the top object just like the regular click. However, the next **Alt+click** at the same point will select the object *below* the top one; the next one, the object still lower, etc. Thus, several **Alt+clicks** in a row will cycle, top-to-bottom, through the entire z-order stack of objects at the click point. When the bottom object is reached, next **Alt+click** will, naturally, again select the topmost object.

[If you are on Linux, you might find that **Alt+click** does not work properly. Instead, it might be moving the whole Inkscape window. This is because your window manager has reserved **Alt+click** for a different action. The way to fix this is to find the Window Behavior configuration for your window manager, and either turn it off, or map it to use the Meta key (aka Windows key), so Inkscape and other applications may use the Alt key freely.]

This is nice, but once you selected an under-the-surface object, what can you do with it? You can use keys to transform it, and you can drag the selection handles. However, dragging the object itself will reset the selection to the top object again (this is how click-and-drag is designed to work — it selects the (top) object under cursor first, then drags the selection). To tell Inkscape to drag *what is selected now* without selecting anything else, use **Alt+drag**. This will move the current selection no matter where you drag your mouse.

Practice **Alt+click** and **Alt+drag** on the two brown shapes under the green transparent rectangle:



## Selecting similar objects

---

Inkscape can select other objects similar to the object currently selected. For example, if you want to select all the blue squares below first select one of the blue squares, and use **Edit > Select Same > Fill Color** from the menu. All the objects with a fill color the same shade of blue are now selected.



In addition to selecting by fill color, you can select multiple similar objects by stroke color, stroke style, fill & stroke, and object type.

## Inkscape Shapes :

Inkscape has four versatile *shape tools*, each tool capable of creating and editing its own type of shapes. A shape is an object which you can modify in ways unique to this shape type, using draggable *handles* and numeric *parameters* that determine the shape's appearance.

For example, with a star you can alter the number of tips, their length, angle, rounding, etc. — but a star remains a star. A shape is “less free” than a simple path, but it's often more interesting and useful. You can always convert a shape to a path (**Shift+Ctrl+C**), but the reverse conversion is not possible.

The shape tools are *Rectangle*, *Ellipse*, *Star*, and *Spiral*. First, let's look at how shape tools work in general; then we'll explore each shape type in detail.

## General tips

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A new shape is created by dragging on canvas with the corresponding tool. Once the shape is created (and so long as it is selected), it displays its handles as white diamond, square or round marks (depending on the tools), so you can immediately edit what you created by dragging these handles.

All four kinds of shapes display their handles in all four shape tools as well as in the Node tool (F2). When you hover your mouse over a handle, it tells you in the statusbar what this handle will do when dragged or clicked with different modifiers.

Also, each shape tool displays its parameters in the *Tool Controls bar* (which runs horizontally above the canvas). Usually it has a few numeric entry fields and a button to reset the values to defaults. When shape(s) of the current tool's native type are selected, editing the values in the Controls bar changes the selected shape(s).

Any changes made to the Tool Controls are remembered and used for the next object you draw with that tool. For example, after you change the number of tips of a star, new stars will have this number of tips as well when drawn. Moreover, even simply selecting a shape sends its parameters to the Tool Controls bar and thus sets the values for newly created shapes of this type.

When in a shape tool, selecting an object can be done by clicking on it. Ctrl+click (select in group) and Alt+click (select under) also work as they do in Selector tool. Esc deselects.

## Rectangles

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A *rectangle* is the simplest but perhaps the most common shape in design and illustration. Inkscape attempts to make creating and editing rectangles as easy and convenient as possible.

Switch to the Rectangle tool by F4 or by clicking its toolbar button. Draw a new rectangle alongside this blue one:

draw here



Then, without leaving the Rectangle tool, switch selection from one rectangle to the other by clicking on them.

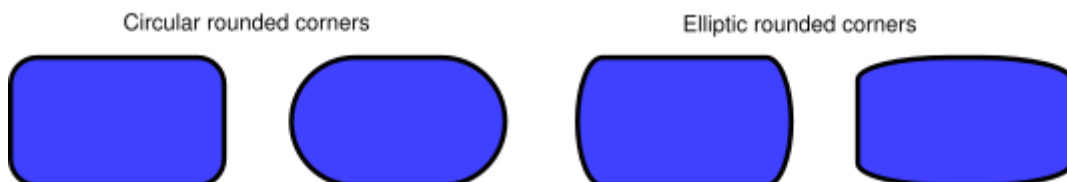
Rectangle drawing shortcuts:

- With **Ctrl**, draw a square or an integer-ratio (2:1, 3:1, etc) rectangle.
- With **Shift**, draw around the starting point as center.

As you see, the selected rectangle (the just-drawn rectangle is always selected) shows three handles in three of its corners. In fact, these are four handles, but two of them (in the top right corner) overlap if the rectangle is not rounded. These two are the *rounding handles*; the other two (top left and bottom right) are *resize handles*.

Let's look at the rounding handles first. Grab one of them and drag down. All four corners of the rectangle become rounded, and you can now see the second rounding handle — it stays in the original position in the corner. If you want circular rounded corners, that is all you need to do. If you want corners which are rounded farther along one side than along the other, you can move that other handle leftwards.

Here, the first two rectangles have circular rounded corners, and the other two have elliptic rounded corners:

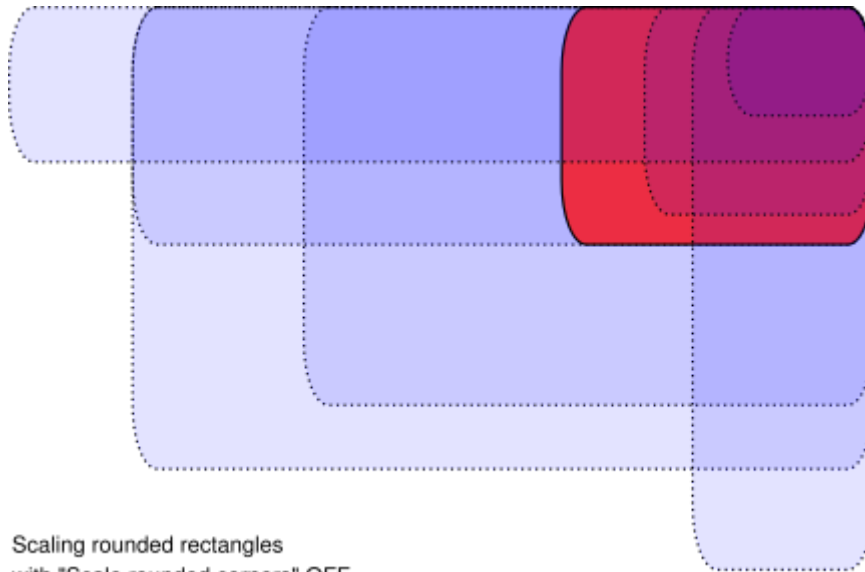


Still in the Rectangle tool, click on these rectangles to select, and observe their rounding handles.

Often, the radius and shape of the rounded corners must be constant within the entire composition, even if the sizes of the rectangles are different (think diagrams with rounded boxes of various sizes). Inkscape makes this easy. Switch to the Selector tool; in its Tool Controls bar, there's a group of four toggle buttons, the second from the left showing two

concentric rounded corners. This is how you control whether the rounded corners are scaled when the rectangle is scaled or not.

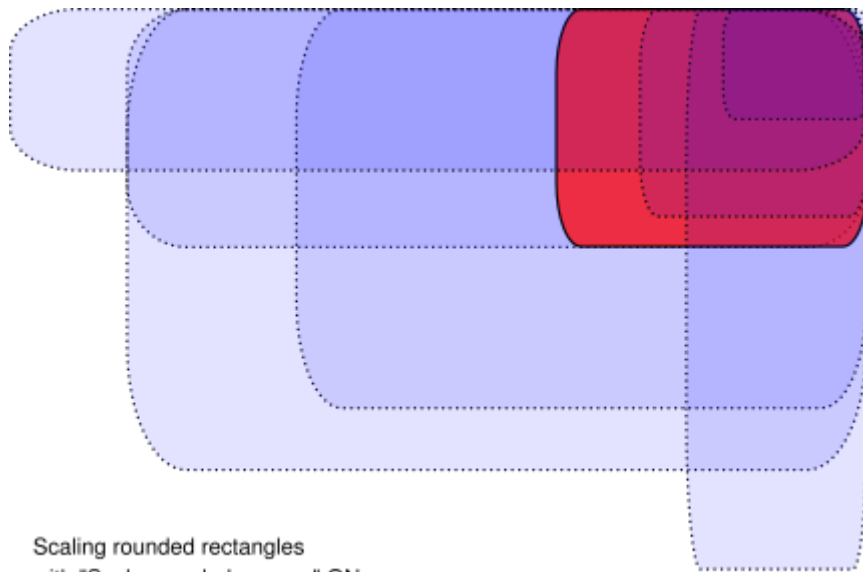
For example, here the original red rectangle is duplicated and scaled several times, up and down, to different proportions, with the “Scale rounded corners” button *off*:



Scaling rounded rectangles  
with "Scale rounded corners" OFF

Note how the size and shape of the rounded corners is the same in all rectangles, so that the roundings align exactly in the top right corner where they all meet. All the dotted blue rectangles are obtained from the original red rectangle just by scaling in Selector, without any manual readjustment of the rounding handles.

For a comparison, here is the same composition but now created with the “Scale rounded corners” button *on*:



Now the rounded corners are as different as the rectangles they belong to, and there isn't a slightest agreement in the top right corner (zoom in to see). This is the same (visible) result as you would get by converting the original rectangle to a path (`Ctrl+Shift+C`) and scaling it as path.

Here are the shortcuts for the rounding handles of a rectangle:

- Drag with `Ctrl` to make the other radius the same (circular rounding).
- `Ctrl+click` to make the other radius the same without dragging.
- `Shift+click` to remove rounding.

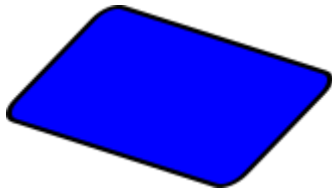
You may have noticed that the Rectangle tool's Controls bar shows the horizontal ( $R_x$ ) and vertical ( $R_y$ ) rounding radii for the selected rectangle and lets you set them precisely using any length units. The **Not rounded** button does what it says — removes rounding from the selected rectangle(s).

An important advantage of these controls is that they can affect many rectangles at once. For example, if you want to change all rectangles in the layer, just do `Ctrl+A` (**Select All**) and set the parameters you need in the Controls bar. If any non-rectangles are selected, they will be ignored — only rectangles will be changed.

Now let's look at the resize handles of a rectangle. You might wonder, why do we need them at all, if we can just as well resize the rectangle with Selector?



The problem with Selector is that its notion of horizontal and vertical is always that of the document page. By contrast, a rectangle's resize handles scale it *along that rectangle's sides*, even if the rectangle is rotated or skewed. For example, try to resize this rectangle first with Selector and then with its resize handles in Rectangle tool:

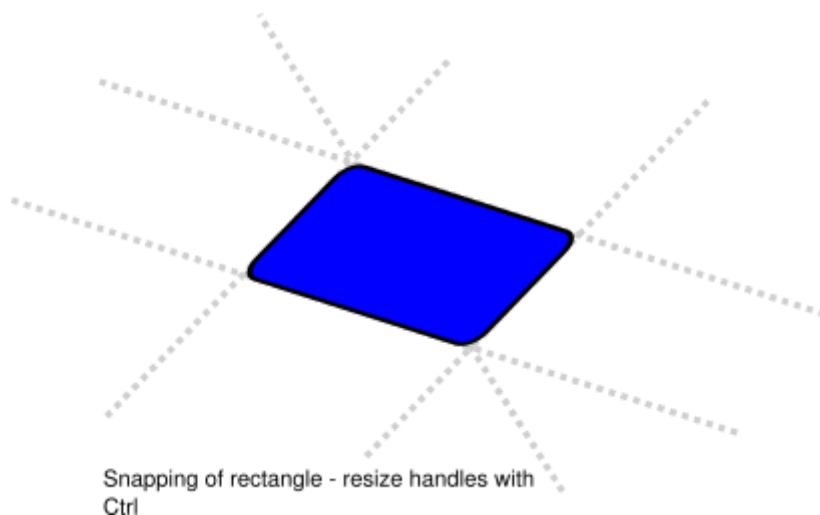


Since the resize handles are two, you can resize the rectangle into any direction or even move it along its sides. Resize handles always preserve the rounding radii.

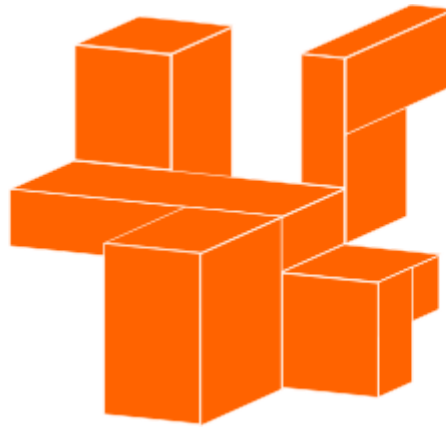
Here are the shortcuts for the resize handles:

- Drag with **Ctrl** to snap to the sides or the diagonal of the rectangle. In other words, Ctrl preserves either width, or height, or the width/height ratio of the rectangle (again, in its own coordinate system which may be rotated or skewed).

Here is the same rectangle, with the gray dotted lines showing the directions to which the resize handles stick when dragged with Ctrl(try it):



By slanting and rotating a rectangle, then duplicating it and resizing with its resize handles, 3D compositions can be created easily:



Several rectangles copied and resized by handles, mostly with Ctrl

Here are some more examples of rectangle compositions, including rounding and gradient fills:

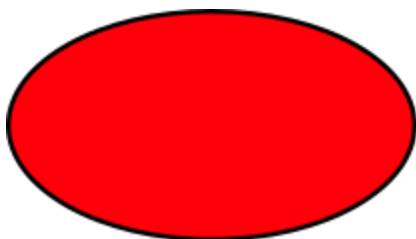


## Ellipses

The Ellipse tool (F5) can create ellipses and circles, which you can turn into segments or arcs. The drawing shortcuts are the same as those of the rectangle tool:

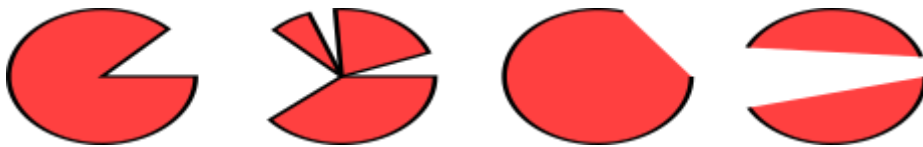
- With **Ctrl**, draw a circle or an integer-ratio (2:1, 3:1, etc.) ellipse.
- With **Shift**, draw around the starting point as center.

Let's explore the handles of an ellipse. Select this one:

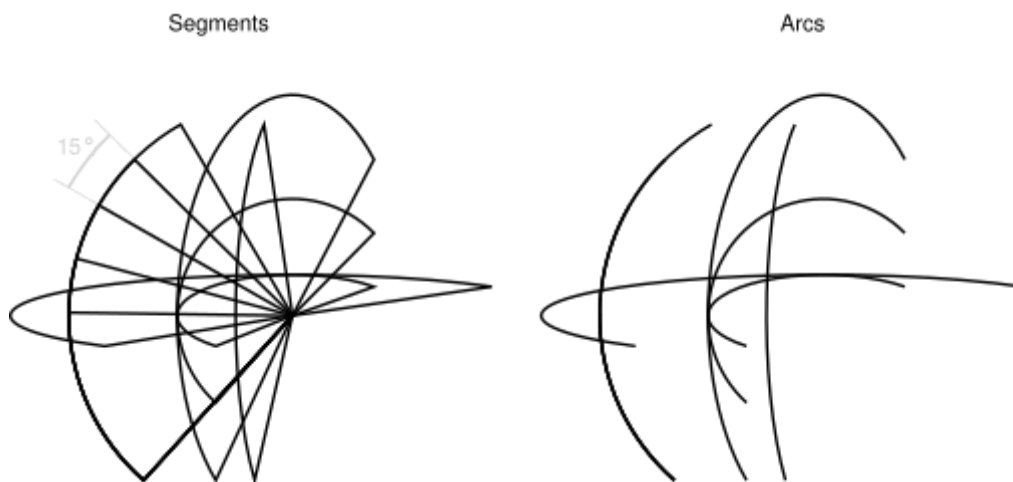


Once again, you see three handles initially, but in fact they are four. The rightmost handle is two overlapping handles that let you “open” the ellipse. Drag that rightmost handle, then

drag the other handle which becomes visible under it, to get a variety of pie-chart segments or arcs:



To get a *segment* (an arc plus two radii), drag *outside* the ellipse; to get an *arc*, drag *inside* it. Above, there are 4 segments on the left and 3 arcs on the right. Note that arcs are unclosed shapes, i.e. the stroke only goes along the ellipse but does not connect the ends of the arc. You can make this obvious if you remove the fill, leaving only stroke:



Note the fan-like group of narrow segments on the left. It was easy to create using *angle snapping* of the handle with **Ctrl**. Here are the arc/segment handle shortcuts:

- With **Ctrl**, snap the handle every 15 degrees when dragging.
- **Shift+click** to make the ellipse whole (not arc or segment).

The snap angle can be changed in Inkscape Preferences (in **Behavior > Steps**).

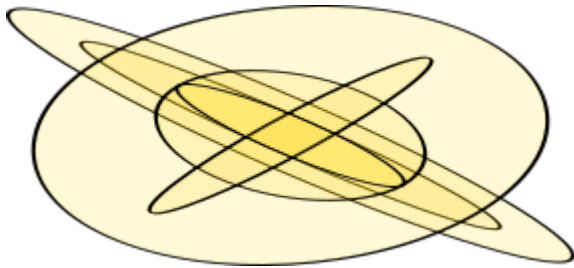
The other two handles of the ellipse are used for resizing it around its center. Their shortcuts are similar to those of the rounding handles of a rectangle:

- Drag with **Ctrl** to make a circle (make the other radius the same).
- **Ctrl+click** to make a circle without dragging.

And, like the rectangle resize handles, these ellipse handles adjust the height and width of the ellipse in *the ellipse's own coordinates*. This means that a rotated or skewed ellipse can

easily be stretched or squeezed along its original axes while remaining rotated or skewed.

Try to resize any of these ellipses by their resize handles:

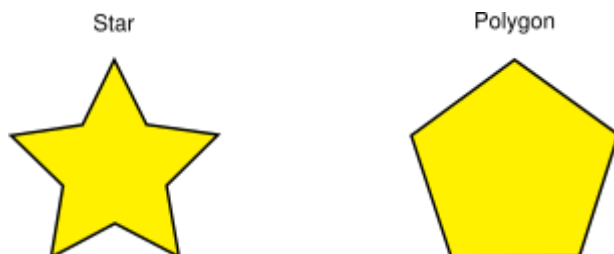


## Stars

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Stars are the most complex and the most exciting Inkscape shape. If you want to wow your friends by Inkscape, let them play with the Star tool. It's endlessly entertaining — outright addictive!

The Star tool can create two similar but distinct kinds of objects: stars and polygons. A star has two handles whose positions define the length and shape of its tips; a polygon has just one handle which simply rotates and resizes the polygon when dragged:



In the Controls bar of the Star tool, the first two buttons control how the shape is drawn (regular polygon or star). Next, a numeric field sets the *number of vertices* of a star or polygon. This parameter is only editable via the Controls bar. The allowed range is from 3 (obviously) to 1024, but you shouldn't try large numbers (say, over 200) if your computer is slow.

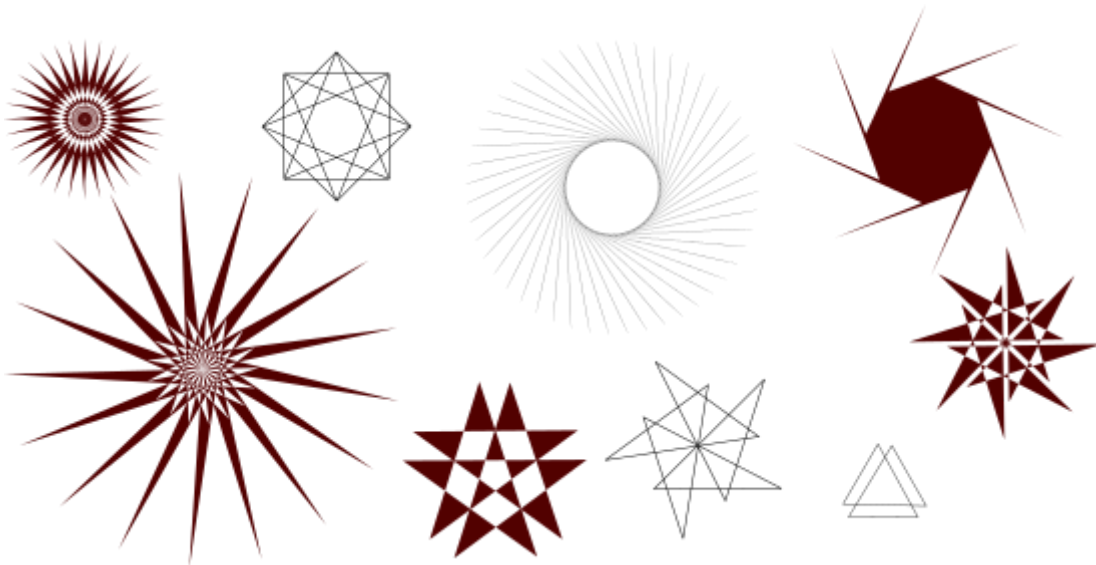
When drawing a new star or polygon,

- Drag with **Ctrl** to snap the angle to 15 degree increments.

Naturally, a star is a much more interesting shape (though polygons are often more useful in practice). The two handles of a star have slightly different functions. The first handle (initially it is on a vertex, i.e. on a *convex* corner of the star) makes the star rays longer or shorter,

but when you rotate it (relative to the center of the shape), the other handle rotates accordingly. This means you cannot skew the star's rays with this handle.

The other handle (initially in a *concave* corner between two vertices) is, conversely, free to move both radially and tangentially, without affecting the vertex handle. (In fact, this handle can itself become vertex by moving farther from the center than the other handle.) This is the handle that can skew the star's tips to get all sorts of crystals, mandalas, snowflakes, and porcupines:



If you want just a plain regular star without any such lacework, you can make the skewing handle behave as the non-skewing one:

- Drag with **Ctrl** to keep the star rays strictly radial (no skew).
- **Ctrl+click** to remove the skew without dragging.

As a useful complement for the on-canvas handle dragging, the Controls bar has the **Spoke ratio** field which defines the ratio of the two handles' distances to the center.

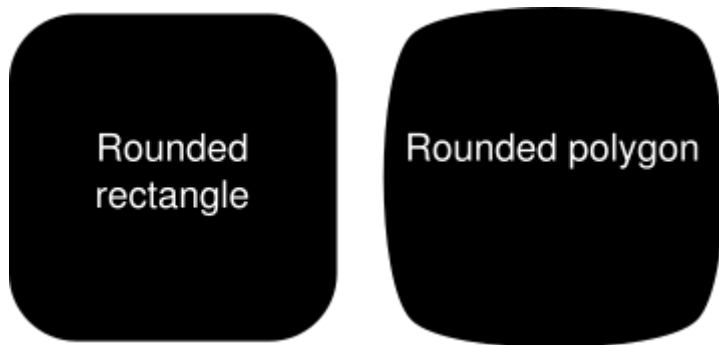
Inkscape stars have two more tricks in their bag. In geometry, a polygon is a shape with straight line edges and sharp corners. In the real world, however, various degrees of curvilinearity and roundedness are normally present — and Inkscape can do that too.

Rounding a star or polygon works a bit differently from rounding a rectangle, however. You don't use a dedicated handle for this, but

- **Shift+drag** a handle tangentially to round the star or polygon.
- **Shift+click** a handle to remove rounding.

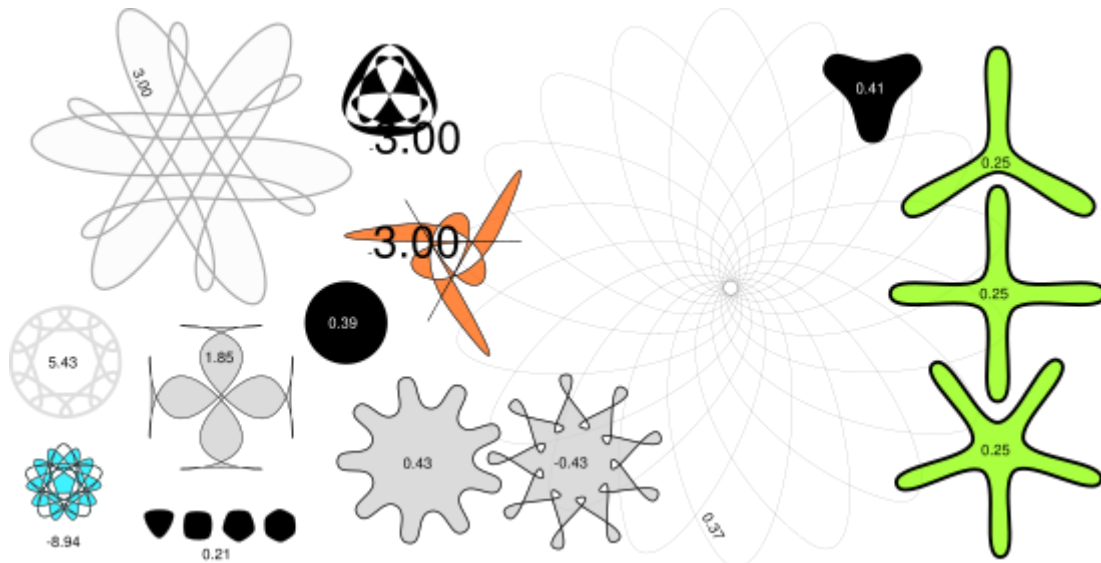
“Tangentially” means in a direction perpendicular to the direction to the center. If you “rotate” a handle with Shift counterclockwise around the center, you get positive roundedness; with clockwise rotation, you get negative roundedness. (See below for examples of negative roundedness.)

Here's a comparison of a rounded square (Rectangle tool) with a rounded 4-sided polygon (Star tool):

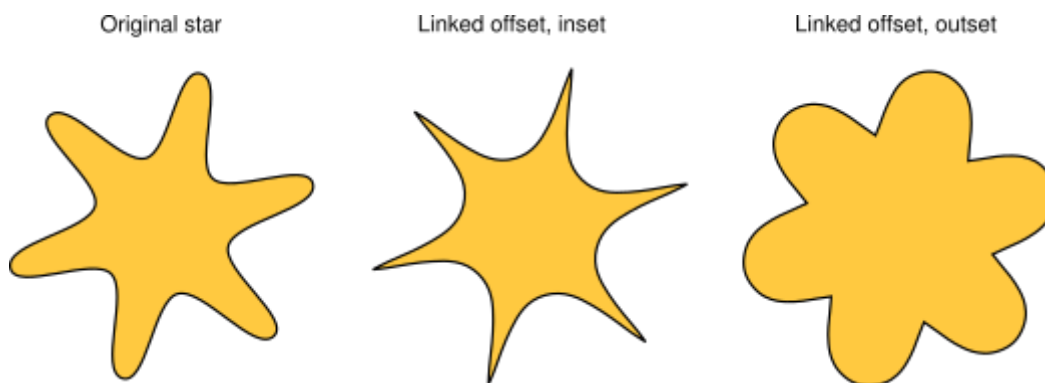


As you can see, while a rounded rectangle has straight line segments in its sides and circular (generally, elliptic) roundings, a rounded polygon or star has no straight lines at all; its curvature varies smoothly from the maximum (in the corners) to the minimum (mid-way between the corners). Inkscape does this simply by adding collinear Bezier tangents to each node of the shape (you can see them if you convert the shape to path and examine it in Node tool).

The ***Rounded*** parameter which you can adjust in the Controls bar is the ratio of the length of these tangents to the length of the polygon/star sides to which they are adjacent. This parameter can be negative, which reverses the direction of tangents. The values of about 0.2 to 0.4 give “normal” rounding of the kind you would expect; other values tend to produce beautiful, intricate, and totally unpredictable patterns. A star with a large roundedness value may reach far beyond the positions of its handles. Here are a few examples, each indicating its roundedness value:



If you want the tips of a star to be sharp but the concaves smooth or vice versa, this is easy to do by creating an *offset* (Ctrl+J) from the star:



Shift+dragging star handles in Inkscape is one of the finest pursuits known to man. But it can get better still.

To closer imitate real world shapes, Inkscape can *randomize* (i.e. randomly distort) its stars and polygons. Slight randomization makes a star less regular, more humane, often funny; strong randomization is an exciting way to obtain a variety of crazily unpredictable shapes. A rounded star remains smoothly rounded when randomized. Here are the shortcuts:

- Alt+drag a handle tangentially to randomize the star or polygon.
- Alt+click a handle to remove randomization.

As you draw or handle-drag-edit a randomized star, it will “tremble” because each unique position of its handles corresponds to its own unique randomization. So, moving a handle without Alt re-randomizes the shape at the same randomization level, while Alt-dragging it keeps the same randomization but adjusts its level. Here are stars whose parameters are

exactly the same, but each one is re-randomized by very slightly moving its handle  
(randomization level is 0.1 throughout):

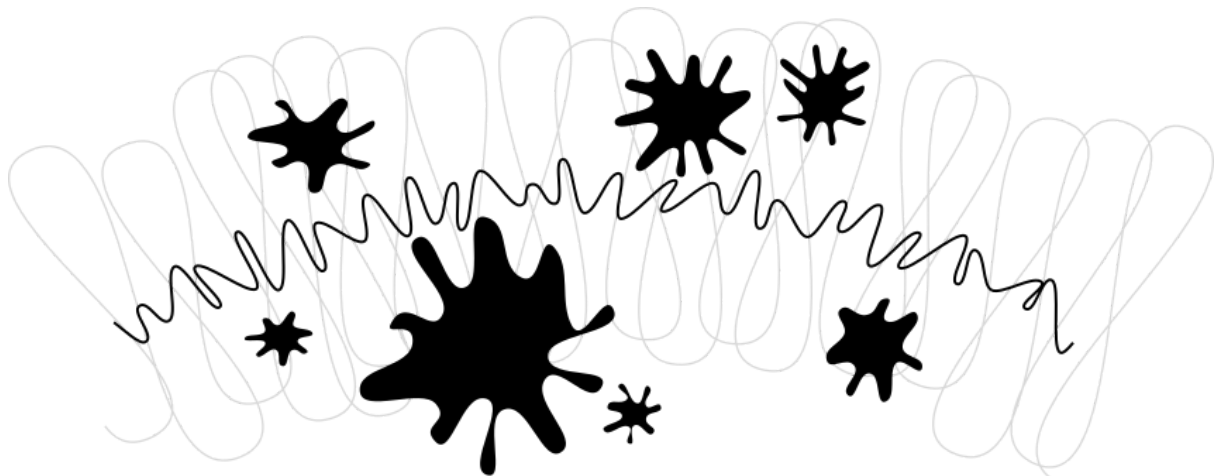


And here is the middle star from the previous row, with the randomization level varying from -0.2 to 0.2:



Alt+drag a handle of the middle star in this row and observe as it morphs into its neighbors on the right and left — and beyond.

You will probably find your own applications for randomized stars, but I am especially fond of rounded amoeba-like blotches and large roughened planets with fantastic landscapes:



## Spirals

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Inkscape's spiral is a versatile shape, and though not as immersing as the star, it is sometimes very useful. A spiral, like a star, is drawn from the center; while drawing as well as while editing,

- **Ctrl+drag** to snap angle to 15 degree increments.

Once drawn, a spiral has two handles at its inner and outer ends. Both handles, when simply dragged, roll or unroll the spiral (i.e. “continue” it, changing the number of turns).

Other shortcuts:

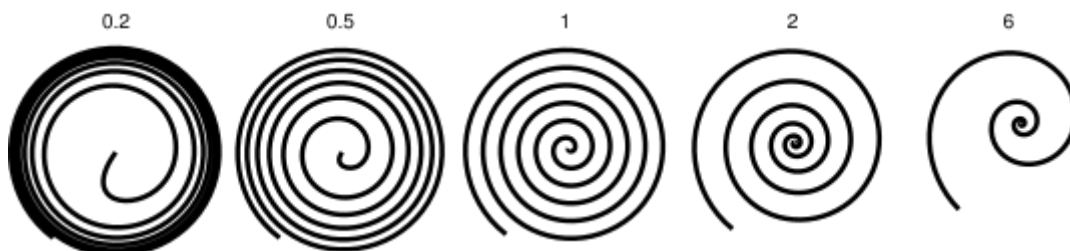
Outer handle:

- **Shift+drag** to scale/rotate around center (no rolling/unrolling).
- **Alt+drag** to lock radius while rolling/unrolling.

Inner handle:

- **Alt+drag** vertically to converge/diverge.
- **Alt+click** to reset divergence.
- **Shift+click** to move the inner handle to the center.

The *divergence* of a spiral is the measure of nonlinearity of its winds. When it is equal to 1, the spiral is uniform; when it is less than 1 (**Alt+drag** upwards), the spiral is denser on the periphery; when it is greater than 1 (**Alt+drag** downwards), the spiral is denser towards the center:

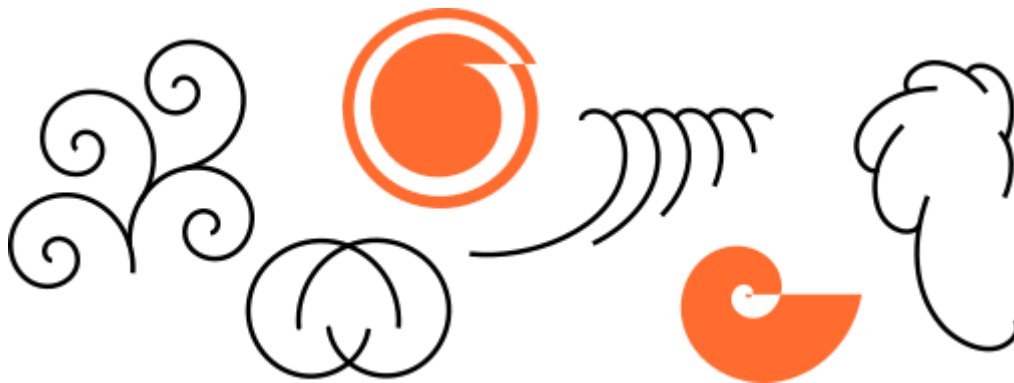


The maximum number of spiral turns is 1024.

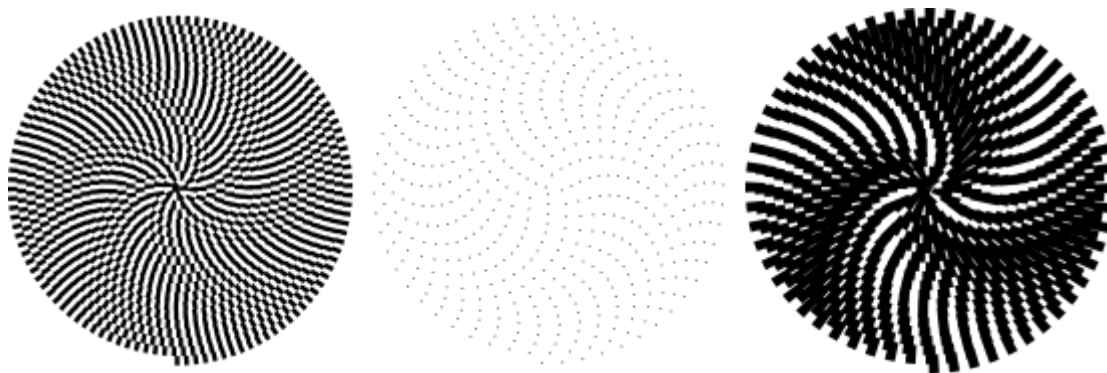
Just as the Ellipse tool is good not only for ellipses but also for arcs (lines of constant curvature), the Spiral tool is useful for making curves of *smoothly varying* curvature.

Compared to a plain Bezier curve, an arc or a spiral is often more convenient because you can make it shorter or longer by dragging a handle along the curve without affecting its

shape. Also, while a spiral is normally drawn without fill, you can add fill and remove stroke for interesting effects.



Especially interesting are spirals with dotted stroke — they combine the smooth concentration of the shape with regular equispaced marks (dots or dashes) for beautiful moire effects:



## Inkscape Advanced :

### Pasting techniques

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After you copy some object(s) by **Ctrl+C** or cut by **Ctrl+X**, the regular **Paste** command (**Ctrl+V**) pastes the copied object(s) right under the mouse cursor or, if the cursor is outside the window, to the center of the document window. However, the object(s) in the clipboard still remember the original place from which they were copied, and you can paste back there by **Paste in Place** (**Ctrl+Alt+V**).

Another command, **Paste Style** (**Shift+Ctrl+V**), applies the style of the (first) object on the clipboard to the current selection. The “style” thus pasted includes all the fill, stroke, and

font settings, but not the shape, size, or parameters specific to a shape type, such as the number of tips of a star.

Yet another set of paste commands, **Paste Size**, scales the selection to match the desired size attribute of the clipboard object(s). There are a number of commands for pasting size and are as follows: Paste Size, Paste Width, Paste Height, Paste Size Separately, Paste Width Separately, and Paste Height Separately.

**Paste Size** scales the whole selection to match the overall size of the clipboard object(s).

**Paste Width/Paste Height** scale the whole selection horizontally/vertically so that it matches the width/height of the clipboard object(s). These commands honor the scale ratio lock on the Selector Tool controls bar (between W and H fields), so that when that lock is pressed, the other dimension of the selected object is scaled in the same proportion; otherwise the other dimension is unchanged. The commands containing “Separately” work similarly to the above described commands, except that they scale each selected object separately to make it match the size/width/height of the clipboard object(s).

Clipboard is system-wide - you can copy/paste objects between different Inkscape instances as well as between Inkscape and other applications (which must be able to handle SVG on the clipboard to use this).

## **Drawing freehand and regular paths**

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The easiest way to create an arbitrary shape is to draw it using the Pencil (freehand) tool (F6):



If you want more regular shapes, use the Pen (Bezier) tool (Shift+F6):



With the Pen tool, each **click** creates a sharp node without any curve handles, so a series of clicks produces a sequence of straight line segments. **click and drag** creates a smooth Bezier node with two collinear opposite handles. Press **Shift** while dragging out a handle to rotate only one handle and fix the other. As usual, **Ctrl** limits the direction of either the current line segment or the Bezier handles to 15 degree increments. Pressing **Enter** finalizes the line, **Esc** cancels it. To cancel only the last segment of an unfinished line, press **Backspace**.

In both freehand and bezier tools, the currently selected path displays small square *anchors* at both ends. These anchors allow you to *continue* this path (by drawing from one of the anchors) or *close* it (by drawing from one anchor to the other) instead of creating a new one.

## Editing paths

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Unlike shapes created by shape tools, the Pen and Pencil tools create what is called *paths*. A path is a sequence of straight line segments and/or Bezier curves which, as any other Inkscape object, may have arbitrary fill and stroke properties. But unlike a shape, a path can be edited by freely dragging any of its nodes (not just predefined handles) or by directly dragging a segment of the path. Select this path and switch to the Node tool (F2):



You will see a number of gray square *nodes* on the path. These nodes can be *selected* by **click**, **Shift+click**, or by **dragging** a rubberband - exactly like objects are selected by the Selector tool. You can also click a path segment to automatically select the adjacent nodes. Selected nodes become highlighted and show their *node handles* - one or two small circles connected to each selected node by straight lines. The **!** key inverts node selection in the

current subpath(s) (i.e. subpaths with at least one selected node); **Alt+!** inverts in the entire path.

Paths are edited by **dragging** their nodes, node handles, or directly dragging a path segment. (Try to drag some nodes, handles, and path segments of the above path.) **Ctrl** works as usual to restrict movement and rotation. The **arrow** keys, **Tab**, **[**, **]**, **<**, **>** keys with their modifiers all work just as they do in selector, but apply to nodes instead of objects. You can add nodes anywhere on a path by either double clicking or by **Ctrl+Alt+click** at the desired location.

You can delete nodes with **Del** or **Ctrl+Alt+click**. When deleting nodes it will try to retain the shape of the path, if you desire for the handles of the adjacent nodes to be retracted (not retaining the shape) you can delete with **Ctrl+Del**. Additionally, you can duplicate (**Shift+D**) selected nodes. The path can be broken (**Shift+B**) at the selected nodes, or if you select two endnodes on one path, you can join them (**Shift+J**).

A node can be made *cusp* (**Shift+C**), which means its two handles can move independently at any angle to each other; *smooth* (**Shift+S**), which means its handles are always on the same straight line (collinear); *symmetric* (**Shift+Y**), which is the same as smooth, but the handles also have the same length; and *auto-smooth* (**Shift+A**), a special node that automatically adjusts the handles of the node and surrounding auto-smooth nodes to maintain a smooth curve. When you switch the type of node, you can preserve the position of one of the two handles by hovering your mouse over it, so that only the other handle is rotated/scaled to match.

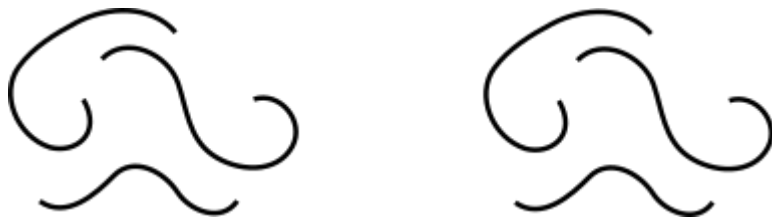
Also, you can *retract* a node's handle altogether by **Ctrl+clicking** on it. If two adjacent nodes have their handles retracted, the path segment between them is a straight line. To pull out the retracted node, **Shift+drag** away from the node.

## **Subpaths and combining**

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A path object may contain more than one *subpath*. A subpath is a sequence of nodes connected to each other. (Therefore, if a path has more than one subpath, not all of its

nodes are connected.) Below left, three subpaths belong to a single compound path; the same three subpaths on the right are independent path objects:



Note that a compound path is not the same as a group. It's a single object which is only selectable as a whole. If you select the left object above and switch to node tool, you will see nodes displayed on all three subpaths. On the right, you can only node-edit one path at a time.

Inkscape can **Combine** paths into a compound path (Ctrl+K) and **Break Apart** a compound path into separate paths (Shift+Ctrl+K). Try these commands on the above examples. Since an object can only have one fill and stroke, a new compound path gets the style of the first (lowest in z-order) object being combined.

When you combine overlapping paths with fill, usually the fill will disappear in the areas where the paths overlap:



This is the easiest way to create objects with holes in them. For more powerful path commands, see “Boolean operations” below.

## Converting to path

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Any shape or text object can be *converted to path* (Shift+Ctrl+C). This operation does not change the appearance of the object but removes all capabilities specific to its type (e.g. you can't round the corners of a rectangle or edit the text anymore); instead, you can now

edit its nodes. Here are two stars - the left one is kept a shape and the right one is converted to path. Switch to node tool and compare their editability when selected:

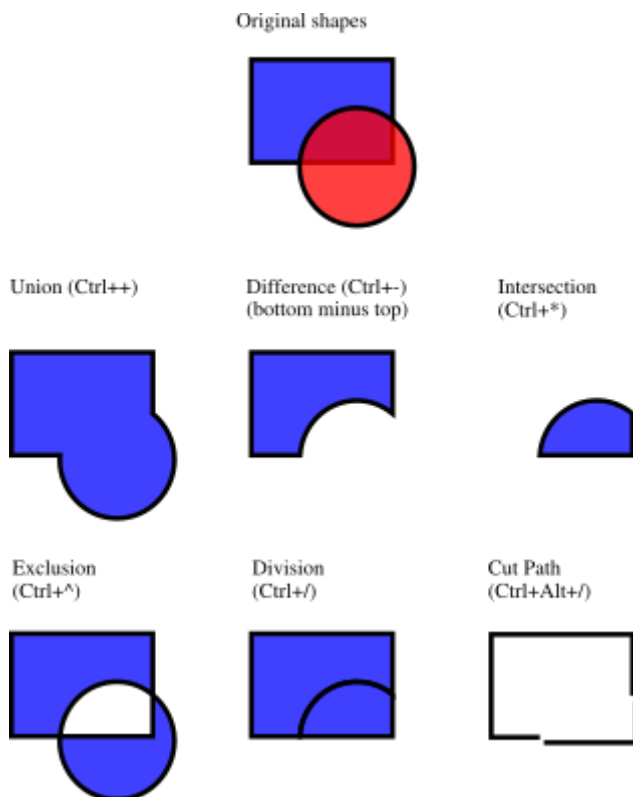


Moreover, you can convert to a path (“outline”) the *stroke* of any object. Below, the first object is the original path (no fill, black stroke), while the second one is the result of the Stroke to Path command (black fill, no stroke):



## Boolean operations

The commands in the Path menu let you combine two or more objects using *boolean operations*:



The keyboard shortcuts for these commands allude to the arithmetic analogs of the boolean operations (union is addition, difference is subtraction, etc.). The **Difference** and **Exclusion** commands can only apply to two selected objects; others may process any number of objects at once. The result always receives the style of the bottom object.

The result of the **Exclusion** command looks similar to **Combine** (see above), but it is different in that **Exclusion** adds extra nodes where the original paths intersect. The difference between **Division** and **Cut Path** is that the former cuts the entire bottom object by the path of the top object, while the latter only cuts the bottom object's stroke and removes any fill (this is convenient for cutting fill-less strokes into pieces).

## Inset and outset

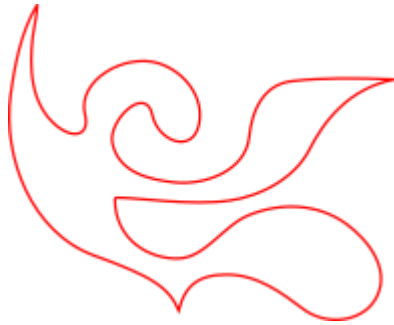
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Inkscape can expand and contract shapes not only by scaling, but also by *offsetting* an object's path, i.e. by displacing it perpendicular to the path in each point. The corresponding commands are called **Inset** (Ctrl+I) and **Outset** (Ctrl+O). Shown below is the original path (red) and a number of paths inset or outset from that original:



The plain **Inset** and **Outset** commands produce paths (converting the original object to path if it's not a path yet). Often, more convenient is the **Dynamic Offset** (Ctrl+J) which creates an object with a draggable handle (similar to a shape's handle) controlling the offset distance. Select the object below, switch to the node tool, and drag its handle to get an idea:

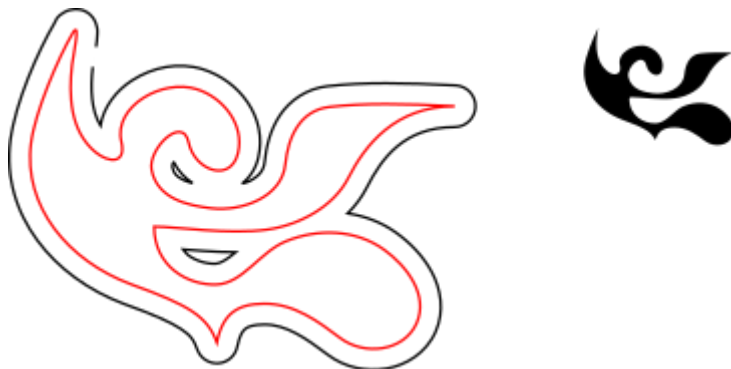




Such a *dynamic offset object* remembers the original path, so it does not “degrade” when you change the offset distance again and again. When you don't need it to be adjustable anymore, you can always convert an offset object back to path.

Still more convenient is a *linked offset*, which is similar to the dynamic variety but is connected to another path which remains editable. You can have any number of linked offsets for one source path. Below, the source path is red, one offset linked to it has black stroke and no fill, the other has black fill and no stroke.

Select the red object and node-edit it; watch how both linked offsets respond. Now select any of the offsets and drag its handle to adjust the offset radius. Finally, note how you can move or transform the offset objects independently without losing their connection with the source.



## Simplification

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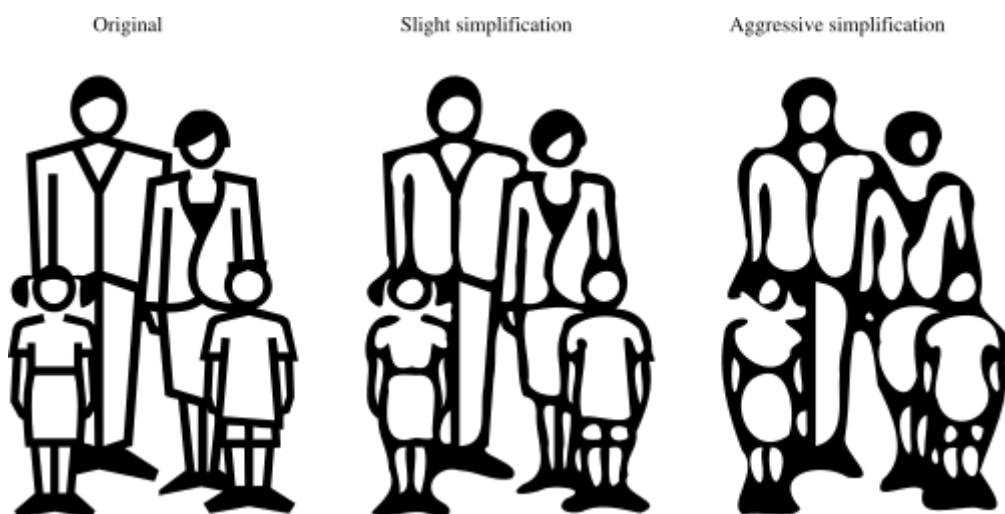
The main use of the *Simplify* command (Ctrl+L) is reducing the number of nodes on a path while *almost* preserving its shape. This may be useful for paths created by the Pencil tool, since that tool sometimes creates more nodes than necessary. Below, the left shape is as created by the freehand tool, and the right one is a copy that was simplified. The original

path has 28 nodes, while the simplified one has 17 (which means it is much easier to work with in node tool) and is smoother.



The amount of simplification (called the *threshold*) depends on the size of the selection. Therefore, if you select a path along with some larger object, it will be simplified more aggressively than if you select that path alone. Moreover, the ***Simplify*** command is *accelerated*. This means that if you press **Ctrl+L** several times in quick succession (so that the calls are within 0.5 sec from each other), the threshold is increased on each call. (If you do another Simplify after a pause, the threshold is back to its default value.) By making use of the acceleration, it is easy to apply the exact amount of simplification you need for each case.

Besides smoothing freehand strokes, ***Simplify*** can be used for various creative effects. Often, a shape which is rigid and geometric benefits from some amount of simplification that creates cool life-like generalizations of the original form - melting sharp corners and introducing very natural distortions, sometimes stylish and sometimes plain funny. Here's an example of a clipart shape that looks much nicer after ***Simplify***:



## Creating text

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Inkscape is capable of creating long and complex texts. However, it's also pretty convenient for creating small text objects such as heading, banners, logos, diagram labels and captions, etc. This section is a very basic introduction into Inkscape's text capabilities.

Creating a text object is as simple as switching to the Text tool (F8), clicking somewhere in the document, and typing your text. To change font family, style, size, and alignment, open the Text and Font dialog (Shift+Ctrl+T). That dialog also has a text entry tab where you can edit the selected text object - in some situations, it may be more convenient than editing it right on the canvas (in particular, that tab supports as-you-type spell checking).

Like other tools, Text tool can select objects of its own type - text objects -so you can click to select and position the cursor in any existing text object (such as this paragraph).

One of the most common operations in text design is adjusting spacing between letters and lines. As always, Inkscape provides keyboard shortcuts for this. When you are editing text, the Alt+< and Alt+> keys change the *letter spacing* in the current line of a text object, so that the total length of the line changes by 1 pixel at the current zoom (compare to Selector tool where the same keys do pixel-sized object scaling). As a rule, if the font size in a text object is larger than the default, it will likely benefit from squeezing letters a bit tighter than the default. Here's an example:

Original

# Inspiration

Letter spacing decreased

# Inspiration

The tightened variant looks a bit better as a heading, but it's still not perfect: the distances between letters are not uniform, for example the “a” and “t” are too far apart while “t” and “i” are too close. The amount of such bad kerns (especially visible in large font sizes) is greater in low quality fonts than in high quality ones; however, in any text string and in any font you will probably find pairs of letters that will benefit from kerning adjustments.

Inkscape makes these adjustments really easy. Just move your text editing cursor between the offending characters and use `Alt+arrows` to move the letters right of the cursor. Here is the same heading again, this time with manual adjustments for visually uniform letter positioning:

Letter spacing decreased, some letter pairs manually kerned

# Inspiration

In addition to shifting letters horizontally by `Alt+Left` or `Alt+Right`, you can also move them vertically by using `Alt+Up` or `Alt+Down`:

# Inspiration

Of course you could just convert your text to path (`Shift+Ctrl+C`) and move the letters as regular path objects. However, it is much more convenient to keep text as text - it remains editable, you can try different fonts without removing the kerns and spacing, and it takes much less space in the saved file. The only disadvantage to the “text as text” approach is that you need to have the original font installed on any system where you want to open that SVG document.

Similar to letter spacing, you can also adjust *line spacing* in multi-line text objects. Try the `Ctrl+Alt+<` and `Ctrl+Alt+>` keys on any paragraph in this tutorial to space it in or out so that the overall height of the text object changes by 1 pixel at the current zoom. As in Selector, pressing `Shift` with any spacing or kerning shortcut produces 10 times greater effect than without Shift.

## XML editor

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The ultimate power tool of Inkscape is the XML editor (`Shift+Ctrl+X`). It displays the entire XML tree of the document, always reflecting its current state. You can edit your drawing and watch the corresponding changes in the XML tree. Moreover, you can edit any text, element, or attribute nodes in the XML editor and see the result on your canvas. This is the

best tool imaginable for learning SVG interactively, and it allows you to do tricks that would be impossible with regular editing tools.

## Further learning resources :

Text based tutorials for [GIMP](#) & [Inkscape](#)

You can also follow these [vlogs](#) on youtube for quick troubleshooting or tool-based lessons.