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INKSCAPE SERIES SPECIAL EDITION

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HOW-TO

Written by Mark Crutch

Inkscape - Part 22

Over the course of the previous 21 articles, I've introduced the majority of the tools on Inkscape's main toolbar. There are a few, however, that have yet to be described. This is mainly because I've found them to be less than useful to the work I do with Inkscape, but you may find them invaluable. As usual, the only way to know is to use them yourself, so, over the next few instalments, I'll do my best to give them a fair introduction, starting with the Tweak Tool (shown right).



With the "T" keyboard shortcut already assigned to the Text Tool, the recently added Tweak Tool has had to make do with "W" (or Shift-F2). Its purpose, as suggested by the name, is not to draw or create new objects, but rather to tweak existing ones. Its tweaks fall into three separate modes: objects, nodes and properties. The user interface doesn't really distinguish between them, but without understanding this hidden

distinction, it's easy to become confused about what the tool actually does.

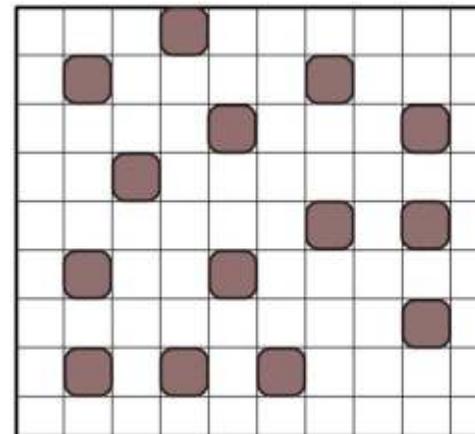
Objects: The Tweak Tool can be used to move, rotate and scale individual objects on the canvas.

Nodes: When used on a path, the tweak tool can be used to move nodes around, sculpting the path shape in ways that can be difficult to do with other tools.

Properties: The tool can be used to change the color of objects and the amount of blur applied to them.

Before diving in to describe the individual tweaks that the tool offers, we first need some objects to experiment on. Create a few small rectangles, circles or stars on the page in a fairly random arrangement. A quick way to do this is to draw one, then drag it around whilst "stamping" it onto the canvas using the Space bar. Whatever approach you take, you

want to create a random cloud of objects. For my example, I've dialled down the randomness by using Extensions > Render > Grid... on a larger rectangle before manually placing my objects. This is simply to make the sometimes subtle effects of the Tweak Tool stand out better.



Before using the Tweak Tool you first have to select some objects for it to work on. Select some of your cloud of objects, but leave a few unselected (or deselect them with a Shift-click afterwards). Now switch to the Tweak Tool using the toolbar icon or one of the

keyboard shortcuts, and take a look at the tool control bar (shown below).

The Width slider sets the size of the tool, and is reflected by a circle around the cursor on the canvas. This circle can be thought of as being like a soft brush in a bitmap editor – the effect is strongest at the center, lessening gradually as you move out towards the circumference. Large sizes allow you to change many objects or nodes at once, though smaller sizes provide finer control. The Force slider allows you to set the strength of the tweaking effect.

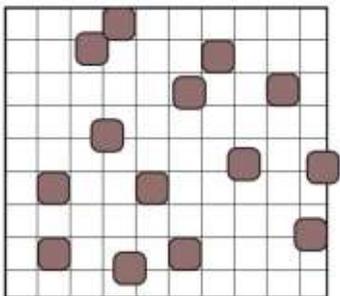
It's possible to change the width and force using keyboard shortcuts, even while drawing. The Left and Right arrow keys change the width, while Up and Down change the force, and the Home and End keys move the width slider to its extremities. If you're using a pressure-sensitive graphics tablet, significant control of the force can be achieved by enabling the button



to the right of the slider, allowing you to control the strength of the force parameter with pen pressure.

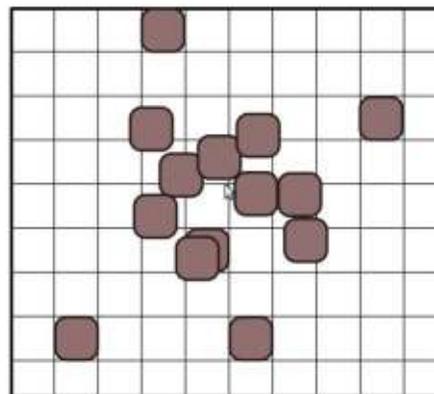
The Mode section contains buttons to select the specific type of tweaking operation you wish to perform. These are radio buttons – only one can be selected at a time. The first six buttons affect objects, the next four affect nodes, and the last three change properties. The Fidelity field seems to apply only to the node editing tweaks, despite remaining enabled when the object tweaks are selected. The Channels radio buttons apply to the two color-related property tweaks, and remain disabled for all others.

Starting from the left, the first of the object tweaks simply moves the selected objects around when they're touched by the tool. Selecting a few of the test objects and randomly scribbling around with the tool results in something like this:



If you move the cursor slowly, or have the force set high, you can use this mode to push objects around indefinitely. By quickly swiping over objects with the force set low, you impart just a small nudge to their positions with each pass.

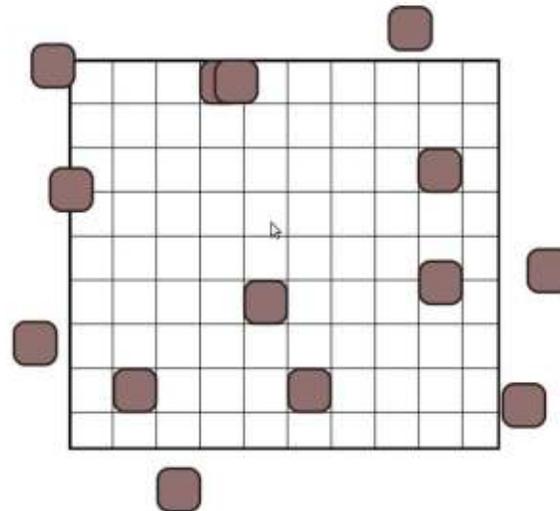
The second radio button invokes a different move mode. In this case the objects are moved towards the cursor, or away from the cursor if the Shift key is held. This is best demonstrated using a very large width setting, so that all the selected objects are within the tool's brush area. By slightly moving the cursor at the middle of the grid, you can see that the selected objects have all moved towards the center (see image below left), while the image below



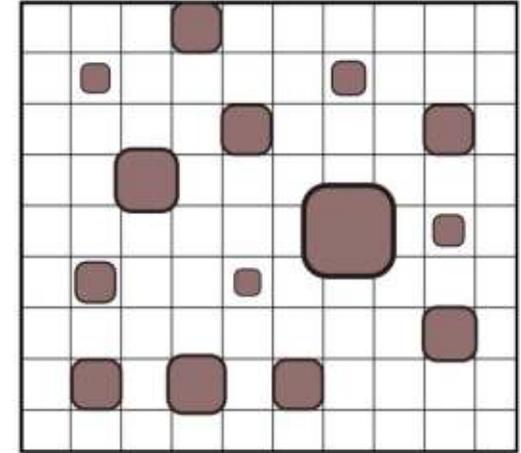
right shows the effect with the Shift key held.

The third tweak tool moves the selected objects randomly – that is, by a random amount in a random direction. The maximum distance is constrained by the force setting. This tool can be used with a large width brush to affect many objects at once, but can also be used to more subtle effect with a small width to introduce just a little randomness into the positions of a few of the selected objects.

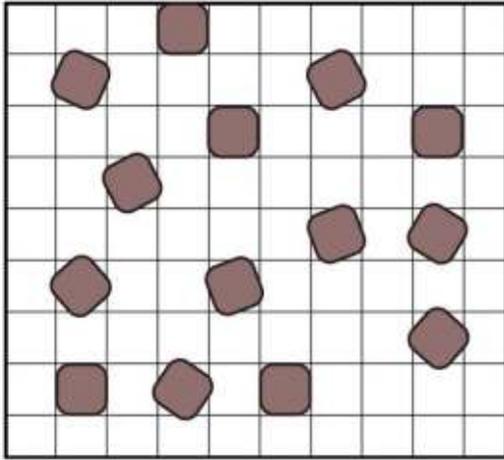
The fourth tool shrinks objects, or grows them if you hold Shift. Again, a large width can be used to shrink or grow several objects at once, while a smaller brush allows you to modify things with more



selectivity. For this example I chose a small width, then wandered around my selected objects pressing and releasing Shift in order to shrink some, grow others, and leave the unselected objects at their original size.



The last of the object-related tweaks changes the rotation of your selected objects. The default is to rotate them clockwise, but as you may have guessed you can hold Shift to rotate them anti-clockwise instead. The Force parameter sets the speed at which the objects will be rotated, though there's no mechanism to constrain the amount to ensure just a little variation, nor to rotate by a random amount to produce more radical results in a single swipe.



The last of the object tweaking tools is, in my opinion, one to avoid. It duplicates the selected objects as you draw over them, or deletes them when Shift is held. Unfortunately, each duplicate is placed perfectly on top of the original, so if your original object is opaque it's impossible to see how many duplicates have been created. It's too easy to accidentally create many hundreds of objects with this mode, especially if the force parameter is large. If you want to create a small number of duplicates then Edit > Duplicate (Ctrl-D) is a better option. For lots of duplicates, Inkscape's "Create Tiled Clones..." dialog is a better option. Even the deletion mode of this tweak is equally well served by the Eraser tool. Clones and the Eraser tool will

be described in more detail in future articles.

I'm going to skip over the node tweaking tools and return to them next time. I'm jumping straight to the three property tweaks because these are applied to selected objects rather than nodes, so I can continue to use the same example image to demonstrate their use.

The first of these tweaks is the eleventh mode button on the toolbar. Its tooltip claims that it "Paints the tool's color upon selected objects", but in my experience it's a little buggy (at least on my 0.48.4 installation). The tool's color can be found at the top right of the tool control bar, to the right of the "Channels" buttons. In theory, it should be possible to set the fill and stroke for the tweak tool while the color button is active, either using the palette at the bottom of the screen, or the Fill and Stroke dialog. In practice however, it's possible to set a fill color, but doing so will set the stroke to black. Setting the stroke to a color will set the fill to "None", which has the same effect as having it set to black when you actually use the tool. When used on objects that have only a fill, it can

be used to change the fill color without modifying the stroke. When used on objects that have only a stroke, it can be used to change the stroke without modifying the fill. But if your objects have both, be very careful when using this tweak unless you want one or the other to tend towards blackness.

With that warning out of the way, using the tool is as simple as selecting the mode button, picking a target color, then painting over the selected objects. They will incrementally change towards the selected color, with the speed of the change being determined by the tool's force setting. If you hold the Shift button, the inverse of the selected color will be used as the target. This also applies to the errant black fill or stroke, which will become a white target instead.

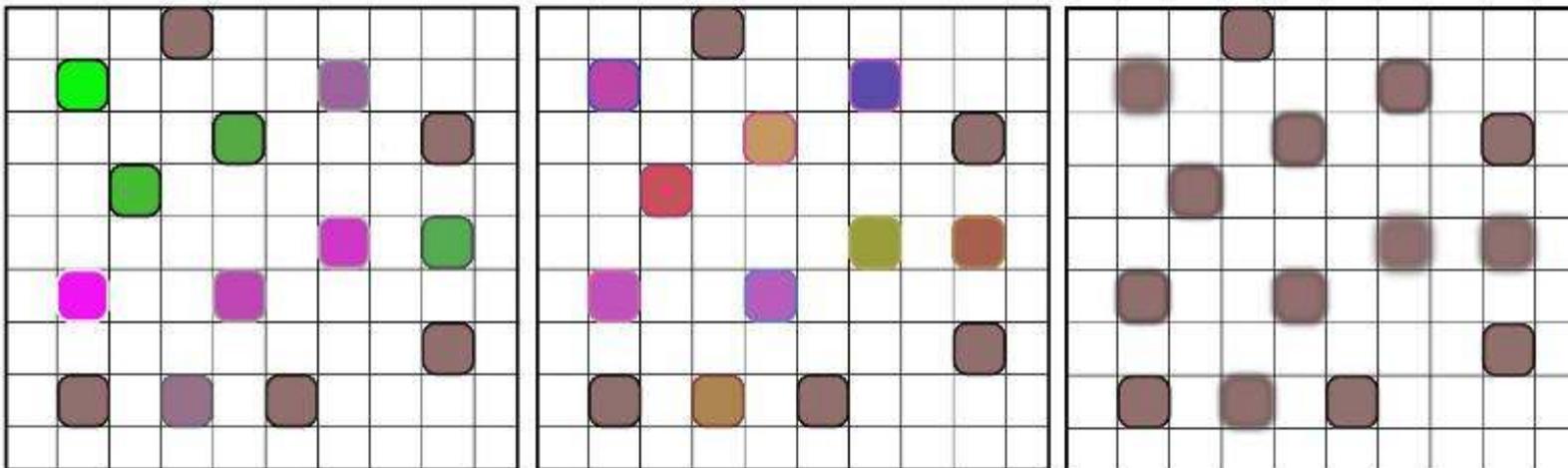
The penultimate button also affects the color of the selected objects, but does so by randomly jittering the color values by a small amount. As you might expect, the maximum size of this amount is set by the tool's Force. For both these color-changing tweaks, you can further limit the effect using the Channels buttons, labelled H, S, L

and O, which correspond to Hue, Saturation, Lightness and Opacity respectively. If you want to randomise the opacity of your objects while keeping their colors intact, for example, you should disable all but the O button before painting with the tool.

The last tweak changes the blur of the selected objects, increasing it as you swipe over them, or decreasing it when the Shift key is held. This is best used with a small value for the Force parameter, otherwise it's easy to blur objects so quickly that they virtually disappear into a puff of smoke – or rather into a slight smudge that's barely visible on the screen.

The image on the following page shows all three of the property tweaks applied to the test image. The target color for the first test was bright green, resulting in bright pink for the inverse color. Compare this "directed" change of color with the more random selection in the second image. The third example shows different levels of blur as the result of setting a small Force value and drawing repeatedly over several of the objects.

Between the “objects” and “properties” modes, the tweak tool offers a wide range of ways to add a little variation to otherwise homogeneous collections of shapes. Unfortunately it's not possible to combine multiple tweaks at the same time in order to move, rotate, shrink, color and blur some objects all in a single operation. Being able to do so would make more sense of the duplicate mode – consider duplicating and randomising the position at the same time – but the tool offers no such facility, somewhat neutering its object manipulating abilities. Where the tweak tool is perhaps at its most useful, however, is in dealing with nodes in a path, which will be the subject of the next part of the series.



Mark's Inkscape created webcomic, 'Monsters, Inked' is now available to buy as a book from <http://www.peppertop.com/shop/>



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HOW-TO

Written by Mark Crutch

Inkscape - Part 23

Previously we looked at using Inkscape's Tweak Tool to change objects and properties. This time we'll take a look at its arguably more useful ability to modify paths. The path tweaks are affected by the Width and Force sliders that were described last time, and are chosen by selecting one of the four buttons that I've outlined with a red box in the tool control bar image shown below.

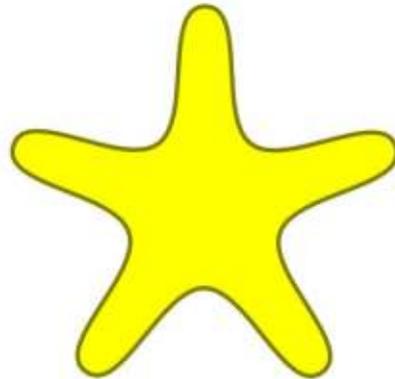
Because these tweaks modify the nodes in a path, our previous array of objects won't make for a particularly useful example. Instead we need to create a new path or object to work on. There are some rules, though, which practically limit what we will draw as an example path:

- The tweak tool works on only closed paths. If it's used on an open path, it will be turned into a closed one.
- It doesn't work well on straight paths or path segments.
- It doesn't work well on paths with only two nodes, even if those paths

are curved.

- If it's used on an object, such as a circle or rectangle, that object will be converted to a path.

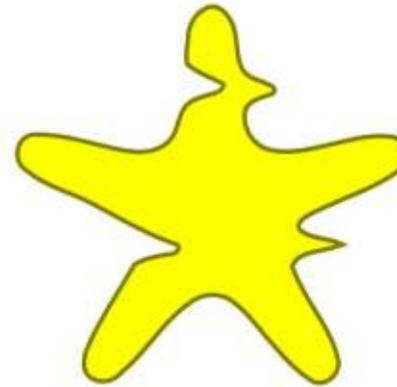
So our example really needs to be a closed, curvy path with more than two nodes. A quick option is to use the Star tool with the Roundness parameter turned up a little to produce a rounded star which will be turned into a path when we start to tweak it.



As usual with the Tweak Tool, you have to select the objects you wish to work on before switching to the tool. You don't, however, have to select the individual nodes

you want to change – they're all fair game for tweaking. Actually, you'll often find that the connected nature of nodes means that changes will be made to the shape of your path that extend far beyond what the Width parameter would imply.

With our rounded star selected, and the "Push" tweak enabled, let's make a couple of steady sweeps of the tool from left to right.



It's pretty clear what has happened: parts of the path have been pushed away from the tool as it moved across the shape. First the left side was pushed into the

middle then, as the tool passed over the boundary of the shape, the right side was pushed further out. Essentially the path is distorted in the direction that the tool is moved, and this tweak actually feels a lot like pushing watercolor paint around on a page by blowing through a drinking straw. The amount of distortion depends not only on the Width and Force parameters, but also on the speed at which you move the tool. If you move it slowly enough you can even cut an object into separate pieces.

At this point it's worth introducing the Fidelity parameter, over on the right of the tool control bar. This controls the number of nodes that are created as you tweak. Manually converting this rounded star to a path results in 10 nodes. The example above had the Fidelity set to 10, and resulted in the final path having 41 nodes. Increasing Fidelity to 50 and re-tweaking the original gave 59 nodes, while a fidelity of 80 gave



over 150 nodes. Increasing the Fidelity to 100 created many thousands of nodes, and slowed my computer down to a crawl. I recommend keeping this value to 50 or below – the accuracy created by the extra nodes is rarely worth the trade-off, in my experience.

The next button on the tool control bar is the Shrink/Grow mode. This doesn't take its directional cue from the movement of the tool, but instead it will always move nodes in towards the center of the path – or outwards, away from the center, if the Shift key is held. This example used Shrink for the top half of the star, and Grow for the bottom half.

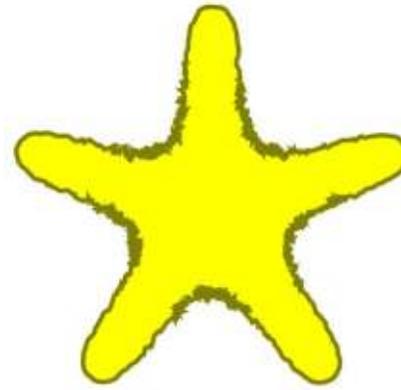


The penultimate node tweak is Attract/Repel. In its normal mode, the path is distorted as though it's being attracted towards the center

of the tool; with Shift, the path is instead repelled away from the center of the tool.

This is useful for sculpting the shape of a path. By moving the tool around the outside of the path, you can pull it outwards – making it bigger. Moving it around the inside of the path, on the other hand, pulls it inwards – making it smaller. Holding Shift simply reverses the direction of the pull. Try using this to shave away part of an object, or to make it gently bulge outwards. If you go too far in one direction either hold Shift, or move the cursor from outside the shape to inside, or vice versa.

The final tweak promises so much, but delivers so little. In theory the Roughen tweak should introduce some randomness and chaos into the shape of your path. What actually happens is that the randomness largely cancels itself out, leaving you with a lot of extra nodes that haven't moved very far. The best results seem to come from using a large value for Width in order to smother as much of the path as you can with the tool. Even with both the Width and the Force at their maxima, I was still able to produce only this:



I suppose the Roughen tweak is living up to its name in this case. The path certainly looks rougher in parts. But because the effect is stronger towards the center of the tool, the roughness hasn't been applied evenly around the path. Trying to draw the tool over the outline in an effort to spread the effect just results in it cancelling itself out again, producing a less rough result. To make matters worse, the rough areas now have huge numbers of nodes – this example resulted in our 10 node star growing to almost 2,000 nodes!

If you do want to randomise a path, a better option is usually to be found in the “Jitter Nodes...” extension. This requires a little preparatory work because it just moves nodes and their handles, rather than creating them. You

have to manually create a number of nodes beforehand, otherwise your jittering will be rather ineffective.

Before we can even think about creating new nodes, we need to ensure that our object is a path. In the case of our example star, it's not. That's not a problem as we've converted plenty of shapes to paths in the past, so it should be a familiar operation by now: just select the object and use Path > Object to Path (Shift-Ctrl-C). Now we've got a star-shaped path made up of 10 nodes, but if we try to jitter those few nodes, all we'll succeed in doing is slightly distorting the shape.

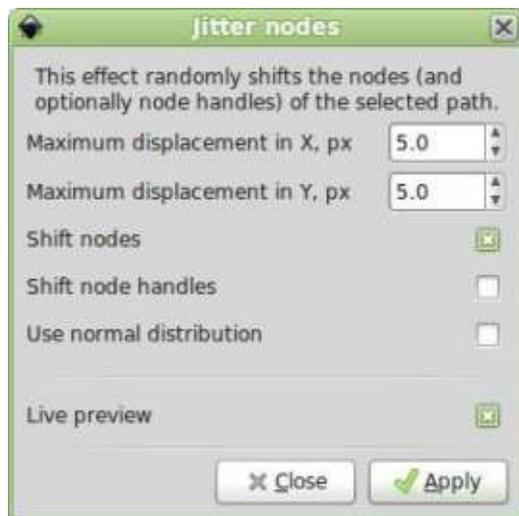
By switching to the Node tool (F2), our 10 nodes become visible. Next we have to select them all by pressing Ctrl-A or using Edit > Select All. Press the Insert key on the keyboard and a new node will be created between each pair of selected nodes. Now we have 20 nodes, which is better, but still not enough. Fortunately the newly created nodes have automatically been added to our selection, so all we have to do is press Insert again, and again, and again. 20 nodes becomes 40, then 80, and so on. I

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stopped at 160 because this gave me a fairly dense arrangement of nodes for jittering, without asking Inkscape to deal with excessive numbers.

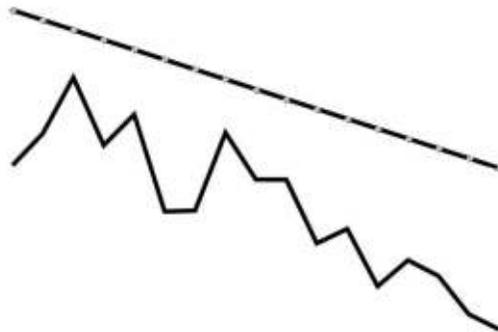


You need to switch back to the Select tool (F1) and ensure your path is selected before launching the Jitter Nodes extension using the menu entry: Extensions >



Modify Path > Jitter Nodes... Once the dialog opens, the first thing to do – and this is the case with many of Inkscape's extensions – is to check the “Live preview” checkbox at the bottom. This will allow you to modify the controls in the dialog and see the results applied to the canvas prior to committing them with the Apply button.

The rest of the controls are fairly simple. The first two spinboxes are used to set the amount that each node or handle can be shifted in the X and Y directions. Usually you would want to set these to the same value, but there are occasions when you want more movement in one direction than the other. For example, creating a line with lots of nodes, then jittering them in only one direction, is a quick and easy way to make a fake line graph.



The next two controls determine whether the positions of the nodes or their handles will be shifted. Shifting the nodes gives a more distorted line; shifting the handles produces more spikes and sharp transitions; choosing both will give you a more distorted line that also has spikes and sharp angles. The last control simply determines how the random shifts are selected. If this is checked they will follow the “bell curve” shape of a normal distribution, meaning that small shifts are more likely than large shifts. In theory this can give a more natural appearance, but in practice the difference isn't really noticeable in many cases.

So what of our rounded star, now that we've converted it to a path, added nodes and jittered it?



it's probably a lot closer to the result you were looking for.

As I mentioned last time, I rarely make use of the tweak tool. I find it too difficult to control accurately, with the effects often being far too subtle or far too strong. Using a pressure sensitive graphics tablet can certainly help, as it's easier to dynamically modify the Force as you work, but often – as in the case of the Roughen example – you can get better results using other methods.



Mark's Inkscape created webcomic, 'Monsters, Inked' is now available to buy as a book from <http://www.peppertop.com/shop/>



HOW-TO

Written by Mark Crutch

Inkscape - Part 24

Next in my collection of “Inkscape tools I rarely use” is the zoom tool, or magnifying glass. At this point some of you may be wondering how I manage to use Inkscape without using the zoom tool, but the truth is that the program offers so many other ways to zoom that, although I'm constantly zooming in and out, I never actually use the tool that's dedicated to the task. Let's look at what the tool can do first, before examining other ways to zoom that may mean you never use it again.



You can activate the zoom tool by clicking on the icon in the tool palette, or by pressing either of two keyboard shortcuts: F3 or Z.

Once active you can zoom in simply by clicking within the drawing area. To zoom back out again, hold Shift while you click. The amount by which you zoom in or out is fixed as a percentage in the Steps pane of the application preferences (File > Inkscape Preferences). By default, it is set to 141%, although Inkscape does round the actual zoom amount a little so that zooming up

from 100% follows a sequence of 100% > 141% > 200% > 283% > 400% > 566% > 800% and so on. With this value zooming in twice approximately doubles the percentage zoom factor, but you can change the preference to something else if you wish.



Alternatively – and this is probably the best way to use the zoom tool – you can click and drag to define the area you want to zoom into. Inkscape's view will be adjusted so that the rectangle you've dragged is fully enclosed in the window. By dragging towards the edge of the drawing area this feature therefore works as a



combined zoom and pan in one operation.

That's it for the zoom tool. Two ways to zoom in (click, or click-drag) and one way to zoom out (Shift-click). Admittedly there are some buttons on the tool control bar, but they don't actually have any effect on the zoom tool itself. Instead they just provide a few useful zoom levels that are also available via the View > Zoom menu, even when you haven't got the zoom tool selected.

The icon theme used on my Linux Mint box mixes the styles of the icons somewhat – on other systems the first three buttons are often styled as magnifying glasses in the same way as the remaining images. Regardless of the icons used, the functionality remains the same. Dealing with each button from left to right – or top to bottom if you're looking at the View > Zoom menu – the functions are as shown in the table below:

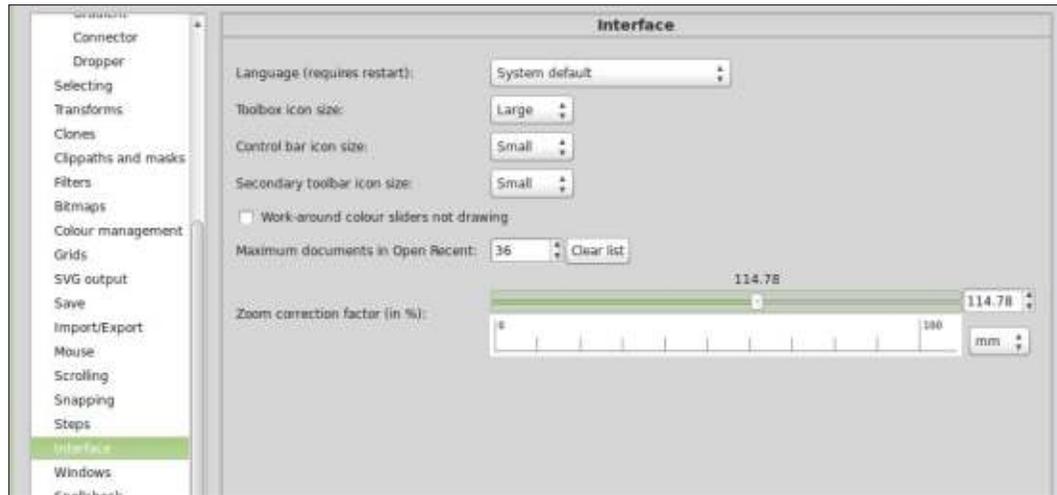
The Zoom In and Zoom Out options are fairly self-explanatory:

Title	Keyboard Shortcut	Description
Zoom In	+ or =	Zoom in by one step
Zoom Out	-	Zoom out by one step
Zoom 1:1	1	Zoom to 1:1
Zoom 1:2	2	Zoom to 1:2 (half the zoom level of 1:1)
Zoom 2:1	No Shortcut	Zoom to 2:1 (double the zoom level of 1:1)
Selection	3	Zoom to fit all the selected objects in the window
Drawing	4	Zoom to fit all the drawn objects in the window
Page	5	Zoom to fit the whole page in the window
Page Width	6	Zoom to fit the width of the page in the window
Previous Zoom	`	Change to the previous zoom in the history
Next Zoom	Shift-`	Change to the next zoom in the history



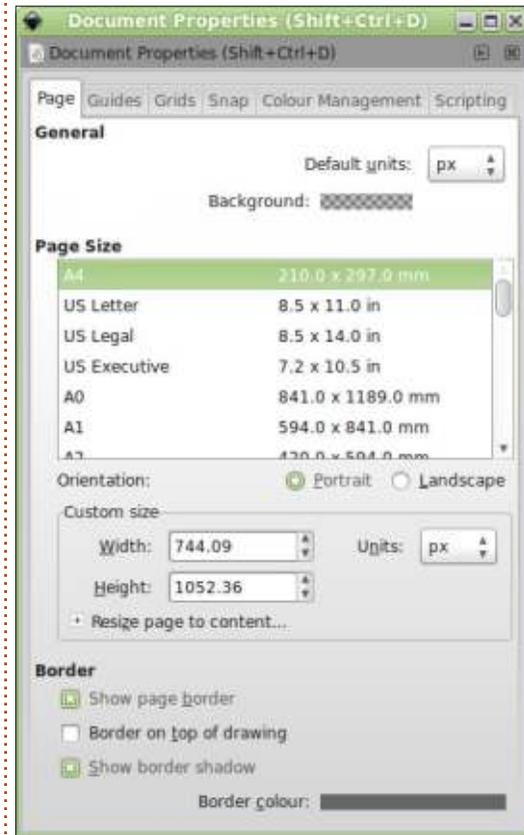
they're the same as clicking or Shift-clicking with the zoom tool, except that they are centered around the middle of the visible part of the canvas, rather than around the mouse pointer.

Zoom 1:1 might initially suggest zooming to 100%, but that's not the case. What it actually does is zoom so that Inkscape's internal pixel size is represented by a single pixel on the screen – so something drawn as 300px wide will actually take up 300 pixels on the monitor. This can be used so that objects drawn using real-world units, like millimetres and inches, will appear at the correct size on the screen. For it to work, however, you need to calibrate Inkscape to your screen using the File > Inkscape Preferences > Interface pane. Find a small ruler and set the units pop-up to match. Then hold the ruler to the screen and adjust the slider until the on-screen measurements match the graduations on the ruler. It's a fiddly process, but usually only needs to be done once. Be aware, though, that it just calibrates Inkscape to that one monitor – if you replace it, or have a multi-monitor setup you will need to go through the process again when you use Inkscape on a



different screen.

The Selection, Drawing and Page options are also permanent features of the “commands” toolbar, so, assuming you have that visible, there are three more reasons why you may not need the zoom tool. Zooming to the current selection is clear enough, but what's the difference between Drawing and Page? Drawing refers to the extent of all the objects you've drawn. It could be smaller than the page size, or bigger if you've created or dragged any shapes beyond the page's boundary. Page is the area that's defined in File > Document Properties, and is usually displayed as a rectangle with a drop shadow in the background of the canvas –



although both the rectangle and shadow can be turned off in the Border section of the Document Properties dialog, if you prefer.

Inkscape keeps track of each zoom level you change to, and the last two commands let you cycle back and forth through this history. The keyboard shortcuts use the backtick key, which isn't commonly used by most people – if you have trouble finding it, it's usually at the top left, just before the number keys.

It's worth noting that all these keyboard shortcuts are global: you don't have to use the zoom tool for them to work. So not only can you access all these zoom options from the View menu at any time, but also just by pressing a few keys.

But that's not all! There are yet more zooming shortcuts that really make the zoom tool redundant if you can remember them.

The tool lets you zoom in by clicking somewhere in your drawing, but you can achieve the same effect without switching tools just by clicking with the middle mouse button or scroll wheel. Zooming out, as you may

guess, is achieved by Shift-clicking the middle mouse button or wheel. And how about the zoom tool's one useful ability: dragging a rectangle to define a zoom area? Just hold shift and then click-drag with the middle mouse button instead.

As you can see, there's not a single function of the zoom tool that isn't also available globally when you're using other tools. Switching back and forth between tools slows down the drawing process, so by learning some of these shortcuts you'll change tools less, and speed up your work.

There are two more zoom shortcuts that are well worth remembering. I introduced the first one way back in part two of this series, but it bears repeating once more. It's the way that I usually zoom in and out, and I've always found it to be the fastest and most convenient option if you're using a mouse with a wheel. Just hold down the Ctrl key and roll the mouse wheel to make Inkscape zoom in and out, centered on the mouse position. When coupled with a click-drag of the wheel to pan the canvas you can move around your drawing extremely

quickly.

If you've come to Inkscape from some other vector graphics program, you may be used to the wheel controlling zoom without any additional keyboard modifiers. If you prefer this way of working, you can change Inkscape's behaviour via the Scrolling pane of the Inkscape Preferences dialog. Check the "Mouse wheel zooms by default" option to enable this mode, which also has the side effect of mapping Ctrl-wheel to panning the canvas up and down.

The last zoom shortcut is the Q key, which activates Quick Zoom mode. It's quick because the zooming is only temporary: when the key is released Inkscape will go back to the previous zoom level. It's particularly useful for making minor changes to an object, or having a close-up look at it without losing your current context. With no objects selected pressing Q will double the current zoom level, centered around the middle of the visible canvas area. Pressing and releasing this shortcut is like pressing the "+" key twice to double the zoom, followed by the backtick key twice to revert to the previous zoom level. With objects

selected, it behaves similarly to the Selection zoom described above, in that the canvas will be zoomed and panned to ensure that the selected objects fill the screen. Pressing, then releasing, the Q key is therefore similar to pressing "3" followed by the backtick.

A quirk of Inkscape's input focusing code affords the Quick Zoom shortcut another little feature. Press and hold Q to zoom in, then move the mouse outside the canvas area, onto a toolbar or even outside the window entirely. Releasing the Q key now will leave Inkscape "stuck" at that zoom level even when you move the mouse back in. Essentially the canvas is waiting to receive a message that the Q key has been released, but it's a message that's already been sent and lost to another part of the interface. You can now make your edits without the difficulty of holding the Q key down at the same time. And when you're done? Just press and release the Q key within the canvas area once again. It won't zoom in, as the program still thinks the key is already pressed, but it will finally receive the release message it's been waiting for, and put you back to your previous zoom level.

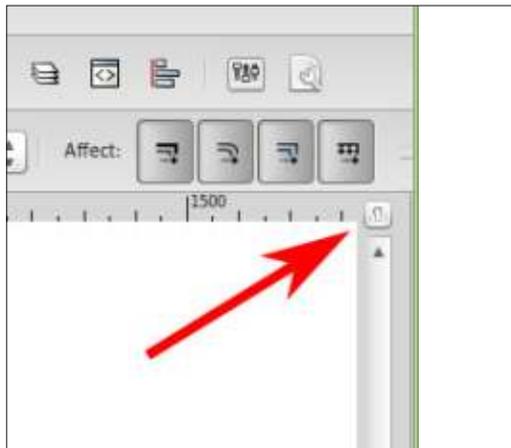
Keeping track of the specific zoom level isn't usually an issue, as you can orient yourself by the objects in your drawing. If you do want to see the value, though, the right hand side of the status bar holds a zoom spinbox (originally introduced in part three of this series). You can focus it by pressing Alt-Z, then type in a zoom level or use the context menu to choose a few sensible defaults – including yet another way to select Page, Drawing or Selection. I suppose that might be useful if you've hidden the "commands" toolbar, can't remember the keyboard shortcuts, don't want to switch to the zoom tool and can't find the View menu because your Ubuntu Unity or MacOS interface has moved it way up to the top left of the screen while your mouse is at the bottom right.



I'll round off this article with the last zoom related feature in Inkscape that I know of. By default, resizing the Inkscape window doesn't affect the zoom, it just reveals or hides more of the canvas area. But there's a small toggle

HOWTO - INKSCAPE

button just above the vertical scroll bar that can be used to change this behaviour. Toggling it on will cause a change of the zoom value when the window is resized, so that it still shows the same content but at a larger or smaller scale. It uses the same icon as the 1:1 zoom button, looking like this on my Mint system:



If you prefer the behaviour when it's on – the zoom changing as the window is resized – you can set it as the default in the Windows pane of the Inkscape Preferences dialog. The option is towards the bottom of the pane, and is labelled as “Zoom when window is resized”. Regardless of the default value, you can still use the toggle button to change it on a per-window basis if you want to.

Inkscape is so replete with shortcuts, icons and menus for zooming that you may never need the Zoom Tool again. But if you struggle to remember keyboard shortcuts or menu locations, then it does at least provide a visual grouping of most of the main zoom options, so go ahead and use it if you prefer. If there's one thing the Inkscape developers offer in abundance it's choice, so go ahead and choose the approach that's best for you.



Mark's Inkscape created webcomic, 'Monsters, Inked' is now available to buy as a book from <http://www.peppertop.com/shop/>

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HOW-TO

Written by Mark Crutch

Inkscape - Part 24

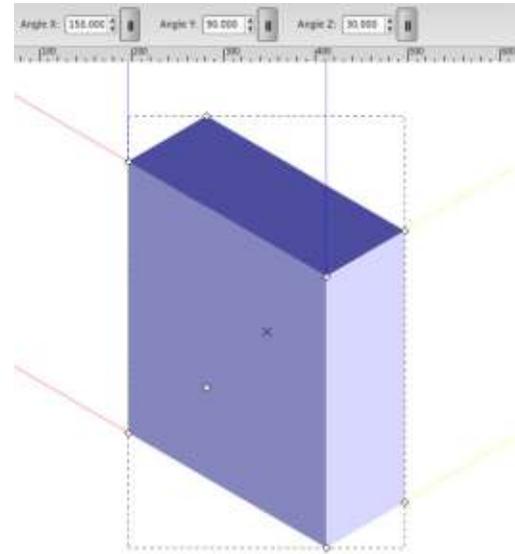
In this article I'll be looking at Inkscape's 3D Box tool. The first thing to note about the 3D Box tool is that it doesn't create 3D boxes. What it actually does is draw and manipulate six closed paths to produce a 2D representation of a 3D box – Inkscape is, after all, only a 2D drawing program, not a 3D solid CAD application. This is also the only fake-3D drawing primitive that Inkscape offers, so, if you want 3D shapes other than boxes, you're on your own. With those limitations in mind, let's take a closer look to see how the 3D box tool works, and how you can use it as the basis for more complex representations of 3D objects.



You can activate the 3D Box tool using the icon on the toolbar, or by pressing X or Shift-F4. The normal 2D rectangle tool can be activated by pressing F4, so you might like to think of this tool as drawing a rectangle that's been shifted into the third dimension. Depending on where you draw, and how much you've tinkered with the 3D Box

tool before, it's easy to create a box that's too big or too distorted, making it hard to understand the tool. So before you start to draw, let's set some sensible defaults on the tool control bar.

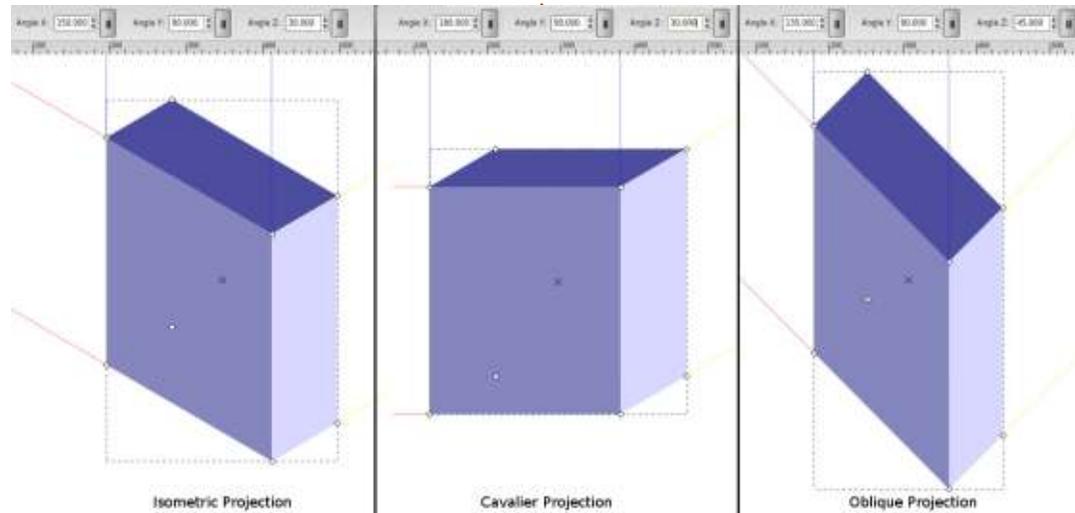
The options for this tool are deceptively simple – but that's only because a lot of the complexity takes place via handles on the canvas instead. There are three pairs of controls, consisting of a spinbox and a button for each of the X, Y and Z axes of the pseudo-3D world that your box will live in. Start by clicking all three buttons into their “on” state. This sets an infinite vanishing point for each axis, ensuring that the edges of your box are all parallel. Enter values of 150, 90 and 30 into the spinboxes – as usual there are context menus with some sensible options, though 150 isn't one of the defaults. Now click and drag on the canvas to draw your first 3D box. Make it fairly large so that it's easy to distinguish the small handles on the box when you release the mouse button.



There are a few things to note about the box you've drawn: there are red, blue and yellow

construction lines which project from the edges along the X, Y and Z axes of the 3D world; there are eight small handles, one at each corner of the cuboid (one will appear to be in the middle of the box – it's just the handle for the obscured corner showing through); there's a small X-shaped handle at the center; finally, the box is probably made up of shades of blue.

Because we've set the axes to have an infinite vanishing point, the projection lines form parallel pairs. The angle of each axis is measured in degrees, in an anti-clockwise direction where 0° points



to the right. Compare the angles you typed in earlier with the projection lines – by using 30° for the Y-axis, and 150° for the X-axis (calculated as 180° minus 30°), your boxes form a classic isometric projection. Try setting the X angle to 180° for a Cavalier projection, or set $X=135^\circ$ and $Y=45^\circ$ for an Oblique projection.

The square handles are used to adjust the size of your box. Four of them can be used to modify two dimensions (X and Z) at once, whilst the other four let you change only the third dimension (the depth along the Y-axis). Holding Shift will toggle the handles, so that a handle which usually controls the Y dimension instead lets you change X and Z – and vice versa. When moving an X/Z handle, try dragging it a little way along one of the projection lines, then holding Ctrl. This constrains the movement to one direction only, should you wish to change the X dimension without altering the height, for example.

The X-shaped handle can be used to move the whole box, and once again Ctrl can be pressed to constrain the movement to one axis. Usually it's best to move 3D boxes using this handle, rather

than using the Selector tool – it doesn't make a lot of difference for these projections, because all the axes have infinite vanishing points, but once we turn off one of those toggle buttons the behaviour of the two methods diverges significantly.

With the projection lines and handles dealt with, it's time to talk about color. The default behaviour for the 3D Box tool is to draw your boxes in shades of blue. You can try setting the fill color before you draw, but you'll still get shades of blue. And if you set the fill color afterwards – well, you'll get the color you chose, but not as shades. Rather, all six faces of your box will be set to the same fill color and you'll end up with something that looks more like a flat, distorted hexagon than a 3D box.

The secret to coloring your box is to understand what it's made of. The SVG format doesn't allow for 3D primitives, and certainly doesn't know anything about 3D boxes. What Inkscape creates is actually an illusion, made up of six paths that are grouped together. These paths carry some Inkscape-specific attributes so that the program knows to treat them differently to

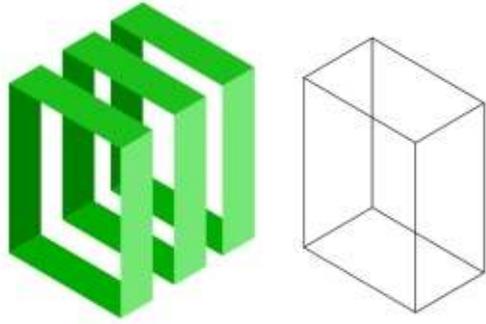
a normal group of paths, but they're just a group of paths nevertheless. That's why all six sides take on the same fill when you click on a color swatch – they're just behaving the same way that any group of paths does in that situation.

The key to changing the color is therefore to enter the group and modify each path individually. Whilst double-clicking with the Select tool usually enters a group, in this case it just switches to the 3D Box tool, so instead you need to right-click and select "Enter Group #g3116" from the bottom of the context menu (the exact title will vary based on the ID of the group). Alternatively you can click on the box using the Selector tool, then press Ctrl-Enter, or Ctrl-Click to select one of the visible faces without actually entering the group.

Once you've entered the group, I suggest starting by moving the faces apart from each other. This will give you a better idea of how the box is constructed. Use Shift with the arrow keys to move by a precise amount, if you want to be able to move the faces back to reconstruct the box later.



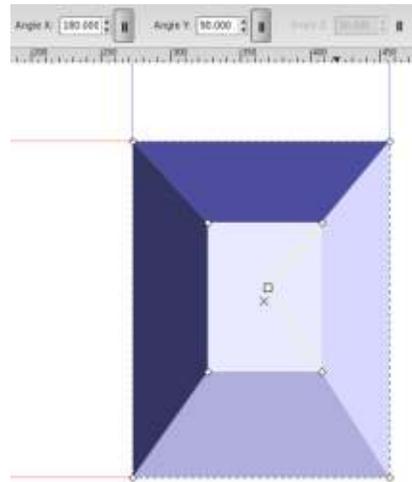
While inside the group you can also change the color of each face individually – or even delete some of the faces entirely. Once you're done, exit the group by double-clicking on the canvas background with the Selector tool, picking "Go to parent" from the context menu, or using the Layers pop-up in the status bar. You may be surprised to find that Inkscape still considers your object to be a 3D box even if it's exploded, a different color, or with faces missing. This can be useful when you want a box with no lid, or you just want to give each face a stroke but no fill to create a simple wireframe.



The projections we've used so far are okay for certain types of technical drawings or 3D pixel art, but the 3D Box tool can also create images with perspective. Let's start with a simple 1-point perspective.

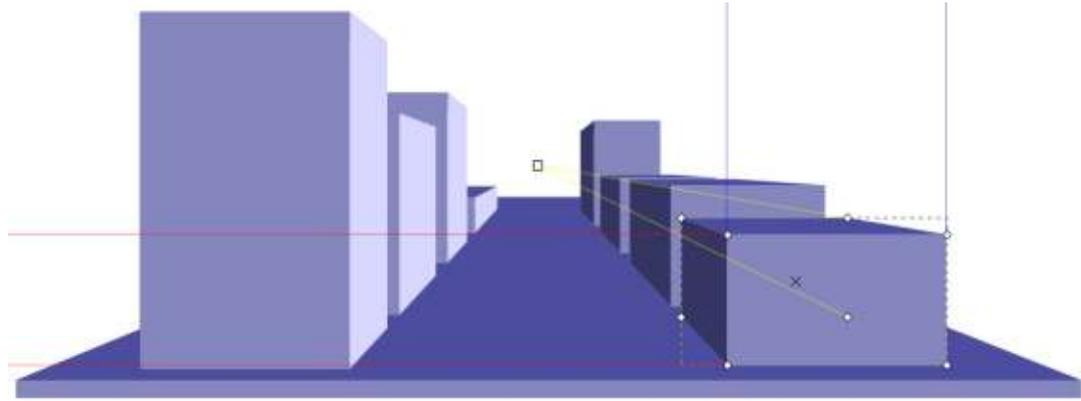
We'll begin by removing the front left face of our box (medium blue, with the default colors). You should now be able to see into the box to the pale back wall. Set your X-axis angle to 180° , as we did for the Cavalier projection, but this time click on the parallel lines button for the Z-axis so it's deactivated, to give the Z-axis a vanishing point. You'll notice that the Z-axis angle is no longer editable, and instead the two yellow projection lines now converge to a square handle on the canvas. That's the vanishing point (VP) – try dragging it around to see the effect. Put it somewhere near the center of your box to give the

appearance of looking down a corridor. You may need to adjust the corner handles for the best effect.



With the 3D Box tool still selected try drawing some more boxes. Notice that they all share the same VP. By moving them using the X-shaped handle they will continue to share their VP, but if you move a box using the Selector tool, the VP will also be moved, breaking the link between that box and any others.

Using this shared VP behaviour, it's easy to create a few boxes with 1-point perspective to form the basis of a street view. You'll need to adjust the corner handles for each box, but remember to hold Shift if they won't move in the right direction.



Returning to a single box, let's try some 2-point perspective. Draw a new box if you need to, but this time, toggle the parallel lines buttons for both the X-axis and the Z-axis. Leave the Y-axis with an infinite VP at an angle of 90° .

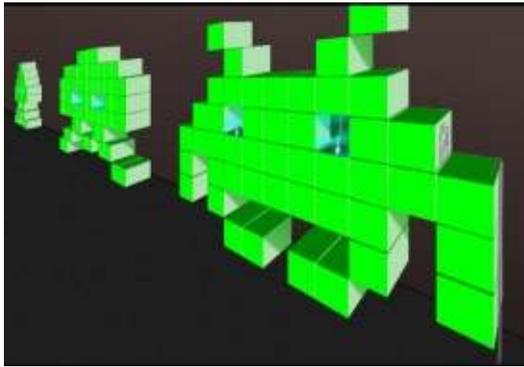
Now both the red and yellow projection lines converge into square handles at the VPs. Drag the handles around – for a good effect put the red one a little above the box and far to the left, and the yellow one at a similar height, but far to the right. Now drag the box around by the X-handle, and note what happens as it moves above the VPs, or close to either of them (hold Shift to move it along the Z-axis).

Once again, any other boxes you draw will share the same vanishing points. Try starting with a small box near the red VP, then repeatedly

duplicate it (Ctrl-D) and move the duplicates to the right along the projection lines (hold Ctrl while dragging the X-handle). Duplicate again and move up, along the Y-axis (start moving up, then press and hold Ctrl). Very quickly you can build up a wall of boxes in this way or, as I did in a recent comic strip, leave a few gaps to create a 3D "pixel" image.

As you may have guessed, you can also turn off the parallel button on the Y-axis to give you 3-point perspective. This is not as frequently used as the previous options, but can be great if you want to draw huge, imposing towers and monoliths.

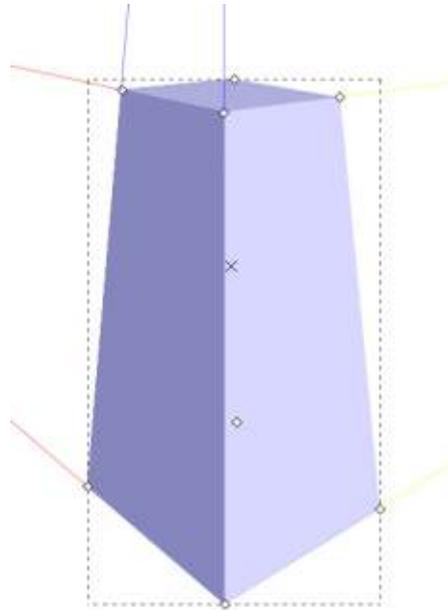
If you do move a box using the Selector tool, you may wish to reconnect it to the VPs of your other boxes. Simply Shift-click on



multiple boxes when the 3D Box tool is active and you'll be able to see all the VP handles at once. Drag the handle from one box onto the handle of another to snap them together. Be warned, this operation pays no heed to the color of the handles you're connecting, so you can easily end up joining the X-axis of one box to the Z-axis of another. Quite what the result will be in any artistic or mathematical sense, I don't know – but feel free to experiment if you really want to. If you decide that you need to separate any joined VPs, then ensure that only one box is selected and hold Shift as you drag the VPs around. Alternatively, use the Selector tool to move the whole box.

The 3D Box tool may seem quite specific and even restricted in what it can do, and if you take it on face value then that's probably true.

But by setting a stroke with no fill (and you don't even need to enter the group to do that), you can create a wireframe box that makes it much easier to draw in perspective. So don't think of it as a tool for drawing boxes, think of it as a tool for drawing construction lines. Once you've got the basic frames for your street, wall or tower, the rest is down to your imagination.



Mark's Inkscape created webcomic, 'Monsters, Inked' is now available to buy as a book from <http://www.peppertop.com/shop/>

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HOW-TO

Written by Mark Crutch

Inkscape - Part 24

Inkscape's Spray tool is the vector graphics equivalent of similar tools from the bitmap world. It's used to create semi-random arrangements of objects but unlike the bitmap version, each object can then be manipulated individually like any other vector element. This makes it particularly good for quickly filling large areas with similar items – think of a snow flurry, or a path covered in autumn leaves – but it can also be invaluable on a smaller scale for textured outlines and shapes.



The Spray tool is activated by clicking on the toolbox icon or by pressing either the "A" key or SHIFT-F3. As usual, the tool control bar lets you modify the behaviour of the tool using buttons and sliders, the latter with right-click context menus that expose a sensible range of values and, perhaps more importantly, label the default values so you can quickly get back to something sensible.

To use the spray tool you first



need an object to spray. I've used a simple leaf design for this example, made up of some paths grouped together. Next, you need to select your object using the select tool before switching to the Spray tool. With the first "Mode" button selected, and all the sliders at their default values, move the cursor into the canvas area, press and hold the left mouse button, and move the mouse around. Copies of your object should be sprayed onto the screen with random scale and rotation, which in my case produces a pile of leaves (with the original leaf on the left).

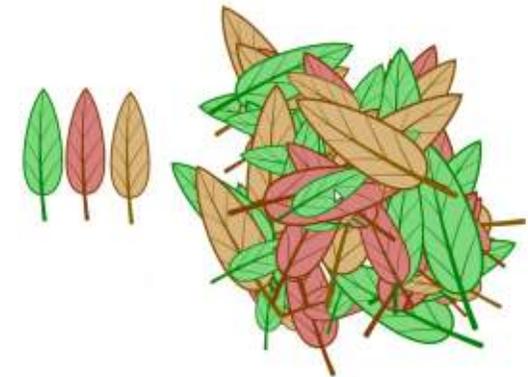


The important thing to note is

that each leaf created by the Spray tool is an independent object that can be further manipulated. Don't like the position of one of the leaves? Move or delete it. If the size is wrong, scale it using the Select tool. Rotate it, change the fill and stroke colors, move it up or down in the Z-index, or group it with a few neighbours. All the Spray tool has done is the same job you could have completed by copying the original object then pasting it multiple times, with some simple adjustments to each one.

If the Spray tool is just a fancy way of doing a quick copy and paste job, what happens when you have more than one object selected? In this example I've manually made two copies of the leaf design and changed the colors. Then I've selected all three and switched to the Spray tool, using the same parameters as before.

You could probably have



guessed that I would get all three leaves sprayed onto the canvas, but look at their relative positions and rotations: each of them is sprayed independently of the others. The original trilogy forms a line with all the stalks pointing in the same direction, but the sprayed result doesn't preserve that relationship between the items. In this case that's exactly what I want – my leafy background wouldn't look quite the same if it was made up entirely of regimented triplets – but if you do want that effect you have only to group your original objects first. That way the Spray tool is dealing with only a single



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(compound) object, rather than three separate ones.

Now that you've got the basics of the tool, let's look at the controls that are available and the effect that each of them has. Starting at the left, the Mode buttons are arguably the most important as they dictate the way in which your final result is actually structured – whether you'll end up with real objects, clones, or a single complex path.

One of those words, “Clones”, is a new one in this series, and it's a subject that I'll be covering in a lot more depth in future articles. For now it's sufficient to know that a clone is like a duplicate of an object that retains a live link to the original: any changes made to the original are immediately reflected in the clones. Consider trying to change the colors of the leaves in our pile. With each sprayed leaf as a copy of the original you would need to dissect the pile and re-color each leaf individually. If, however, you select the second Mode button in order to create clones instead, then changing the color requires you to modify only the original. Any changes to the original are propagated, so you can

even enter the group and tweak the paths to change the leaf shape, with all your modifications immediately reflected in the sprayed versions.

When to create clones and when to create copies is sometimes hard to judge. As a general rule of thumb, though, it's usually safer to create clones as they can subsequently be converted into real copies by selecting them and then using the Edit > Clone > Unlink Clone menu entry, whereas you can't convert in the opposite direction. In that same menu, the Select Original item will select the original “parent” object for the currently active clone – a trick that

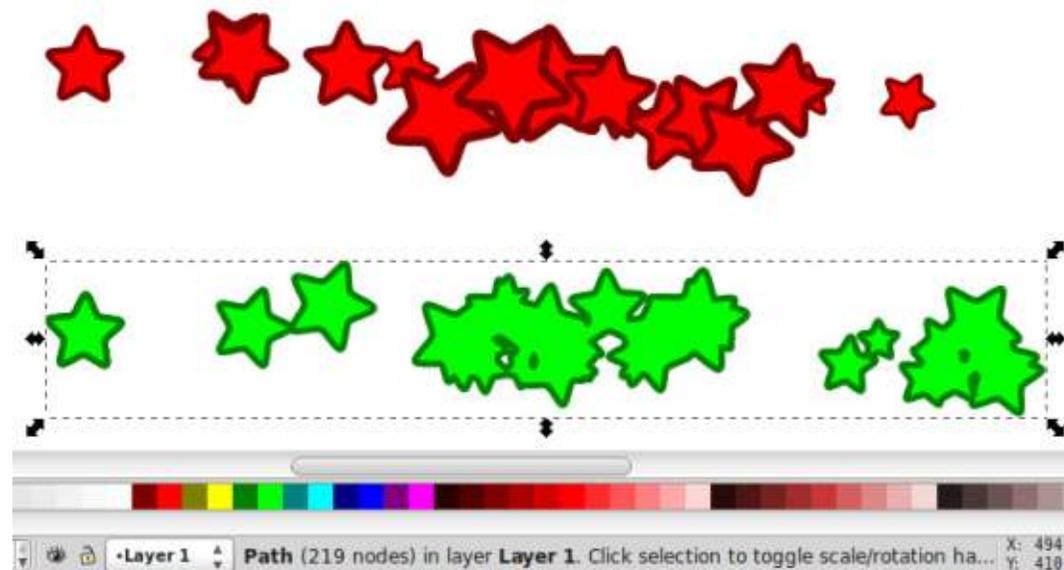
can be invaluable when your pile of leaves grows large enough to obscure the originals.

The third Mode button works only when the object you're spraying is a single path. Instead of creating separate objects or clones, it adds each sprayed item as part of a single complex path. In this image, the red stars have been created as clones of the original, whereas the green stars have been created using this “Path” mode. As you can see, the areas where sprayed objects overlap differs considerably, and in Path mode the end result is a single path which includes even those stars that appear to be separate.

Having discussed the Mode buttons, it's time to move on to the remaining controls on the tool control bar. With the exception of one misplaced button, these are all sliders which run up to 100 and down to 1 or 0, depending on the control.

The first slider, Width, simply alters the size of the spray area. This value is reflected in the size of the orange circle that surrounds the cursor when it's in the canvas area. You can think of this circle as containing all the possible locations that could be used to place the center of the sprayed shape. Keeping it small lets you constrain the spray close to the cursor, whereas a large value places the objects over a wider area that is just centered on the cursor.

The next slider, Amount, is used to adjust the “speed” of your spray can, or the number of objects that are created over a particular period. The button to the left can be used to set whether or not the Amount value is affected by the pressure of the stylus on a pressure-sensitive graphics tablet. You may recall similar buttons from

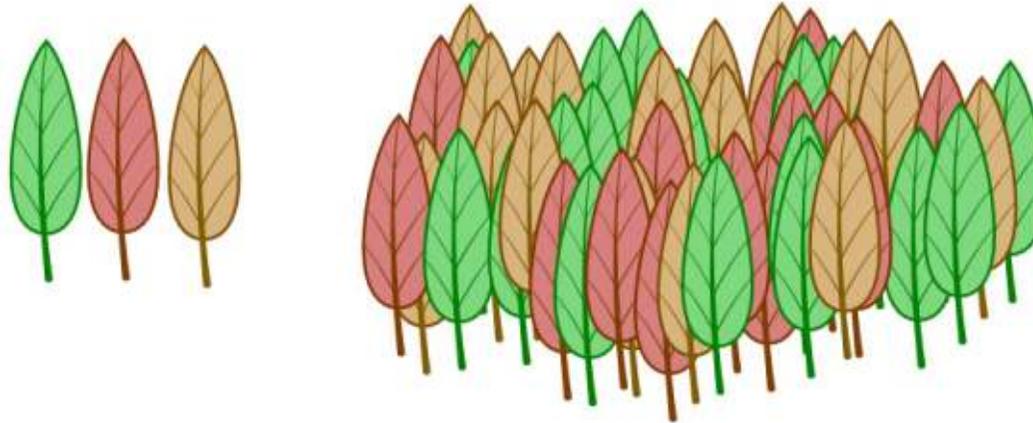


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the Calligraphy tool (see Part 18 of this series) and Tweak tool (Part 23), but in both those cases the button is positioned to the right of the slider it controls, rather than the left. This inconsistency in UI is likely just an oversight, but if you do use a graphics tablet, it's worth checking the tooltips for these buttons to confirm exactly which controls they affect.

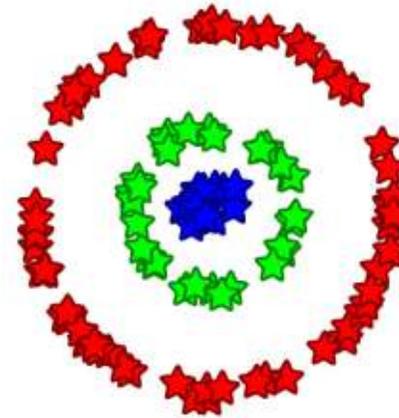
The Rotation and Scale controls are pretty obvious. Just be aware that the values of the sliders use an arbitrary scale running from 0 to 100, rather than just showing the real numbers they represent: for Rotation, the slider sets the maximum amount that each copy can be rotated from the original, with 100 meaning plus or minus 180°; for Scale, a value of 100 means that the sprayed copies can be up to twice the size of the original. By setting both these to zero your copies will all be identical to one another – and to the original object, too. It's a quick and easy way to turn our simple leaves into a cartoon forest.

The final two sliders affect how the sprayed objects are distributed over the available area. Their effects are most visible when the



Width slider is quite large. Think of the Spray tool as placing copies of your object onto a circle: the Focus slider determines the size of the circle, and the Scatter slider determines how close to the circle each copy is placed.

Keeping the Scatter value low, it's easy to see the effect of the Focus slider. Setting it to 0 will keep all the copies in a tight circle under the cursor, regardless of the Width value. Putting it all the way to 100 will draw the objects around the periphery of the spray area, creating a ring of copies whose size is determined by the Width parameter. In this example, I've sprayed the same spot, with Scatter=0 but with different Focus values: the blue stars with Focus=0, green with Focus=20 and red with Focus=100.



With the Scatter control set to zero, the copies are placed very near to the circle that the Width and Focus controls define. Increasing the Scatter allows the copies to be placed further away from that ring – although they're still randomly positioned, so some will inevitably fall close to it. Putting it all the way to 100 gives Inkscape free rein to place objects anywhere within the spray area, at which point the Focus value ceases

to have any real effect.

The Spray tool can be very useful for creating a random distribution of objects or, by constraining some of the values, a decorative path or outline. It's a shame that it's not possible to control more of the parameters using pressure or tilt on a graphics tablet. It's also unfortunate that the tool doesn't care about the direction of movement – it would be great to easily draw a line of footprints or arrows that twist and turn to follow your path as you move the mouse around. Despite those shortcomings, for certain effects the Spray tool is invaluable, and if you want to introduce some randomness into your drawings it's well worth exploring further.



Mark uses Inkscape to create three webcomics, 'The Greys', 'Monsters, Inked' and 'Elvie', which can all be found at

<http://www.peppertop.com/>



HOW-TO

Written by Mark Crutch

Inkscape - Part 27

Before I dive headlong into the last couple of items in Inkscape's tool palette, I have a quick update on the previous article. Last time I drew attention to the misleading placement of the tablet pressure button on the Tweak tool's control bar; but as well as mentioning it in the article, I did my duty as a user and filed a bug report. I'm pleased to say that the bug was quickly triaged, then fixed in just a couple of days, so the next major release of Inkscape should no longer suffer from this minor anomaly.

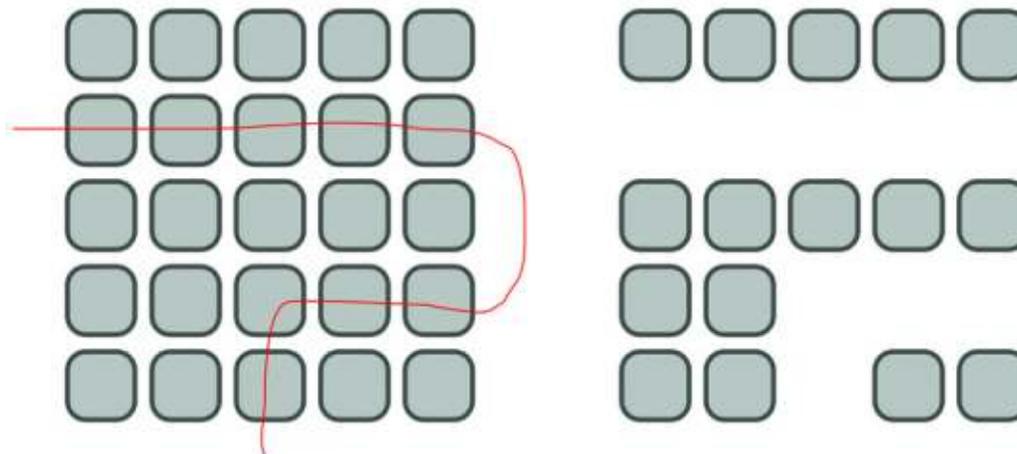


Now, onto those last two tools – the ones I use least in my work with Inkscape – starting with the Eraser. You can switch to this tool using either the tool palette icon, or by pressing Shift-E. There are barely any options available via the tool control bar, and the reason I rarely use this tool is that its features are all available via other tools anyway, albeit a little less directly. Let's take a look at that minimal tool control bar.



Once again the widgets are not very intuitively positioned – the two buttons on the right switch between two different eraser modes, but the Width slider on the left actually applies only if the second mode is selected. Time to file another bug report...

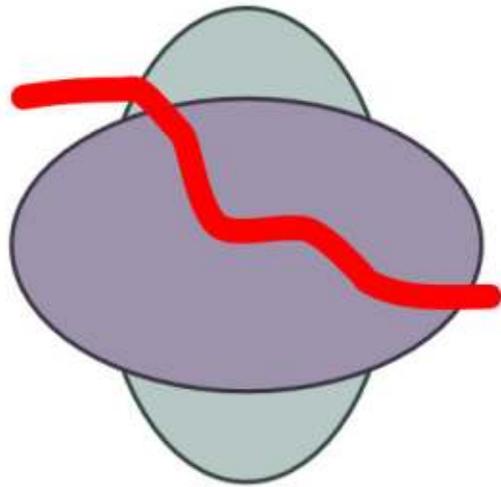
The first mode is used to delete entire objects from your drawing. With this button selected, drawing on the canvas produces a red line. On releasing the mouse button, any objects that the red line touches will be removed.



If this sounds slightly familiar, it's because similar functionality is available using the Select tool. By holding the Alt key whilst drawing on the canvas with the Select tool active, you can draw a thin red line, with any objects the line touches being selected when the mouse button is released. From there, it's just a quick tap of the Delete key to remove them. Although the Eraser tool is slightly more direct, in that there is no need to press the Delete key, performing this task using the Select tool instead offers you the opportunity to add more objects to your selection – or remove some from it – before finally committing your deletion.

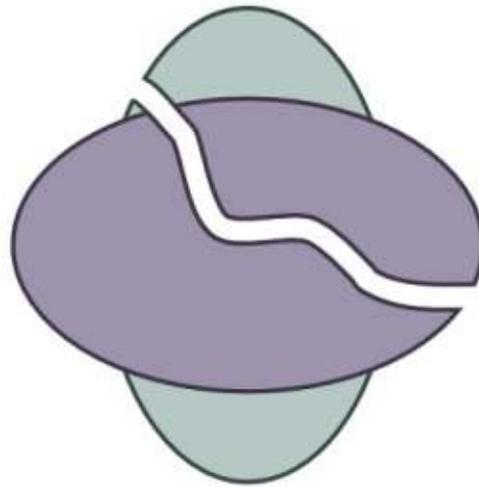
Another reason to be wary of this mode is that it's easy to accidentally delete too many objects. You might think that, if you pre-select some objects before enabling the tool, you would be able to selectively remove only those that the line touches and which were also selected. In practice all of the selected items will be removed as soon as you use the tool – even if you don't touch any of them! You can imagine how disruptive this could be if you still have objects selected that are outside of the visible canvas area. Ideally you should de-select everything (Edit > Deselect) before using this mode in order to prevent such unexpected behaviour.

The second mode of the Eraser tool is perhaps more useful: it lets you remove parts of paths and objects by drawing over them. The Width slider determines the size of the swathe that will be cut through your path, and objects will be automatically converted to paths as required. Unlike the other mode, pre-selecting objects can be useful here as only those in the selection



will be converted and carved. Alternatively, ensure that nothing is selected in order to cut through all the visible objects.

Although this mode is handy for quickly hacking an object into several paths, or just carving a little slice off the edge, the fixed width and profile of the cutting line limits its potential. A more flexible approach is to use the Calligraphy tool to create a path, then the Boolean Difference operation to remove it from your object. For cutting through several objects the Calligraphy tool can also be used whilst holding the Alt key to switch it to "subtract mode", which has a similar effect to the Eraser tool. The only caveat is that the Calligraphy tool doesn't always



seem to convert primitive objects to paths when it should, so you may have to manually convert them first.

That's all there is to the Eraser tool: a "touch" mode that saves a single keypress compared with the Selector tool approach, and a "path" mode that is far less functional than the Calligraphy tool equivalent.

On to the last of the main Inkscape tools – one which I rarely use simply because I don't need it for the comics I create: the Connector tool.



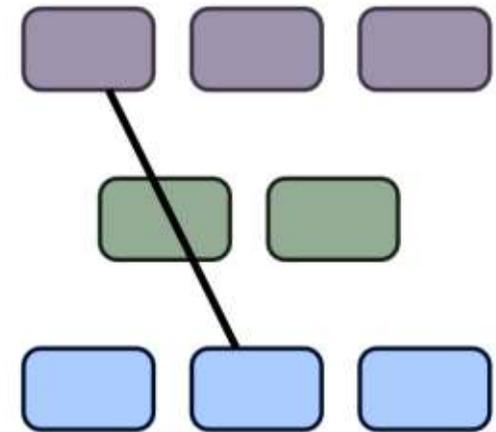
The Connector tool is used to draw lines between objects, with

the lines being "connected" to those objects, at least in the sense that moving the object also moves the end of the connector line. This makes it a useful tool for creating flowcharts, diagrams and annotations, although its capabilities are somewhat limited when compared with dedicated applications such as Dia, Calligra Flow (formerly Kivio) and yEd.

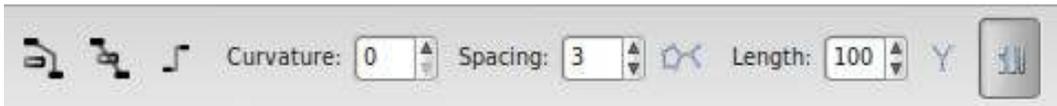
To get started with the Connector tool, it helps to have a few objects already created. Activate the tool via the icon or using the "o" or Ctrl-F2 shortcuts. As you move the mouse over objects, you'll notice that they gain a square handle in the center; click and drag a line between the handle in one object and the handle in another to create a connector. You can also click, then move the mouse, then click again, but dragging the line tends to be more reliable. You've now connected two objects and if you press the Spacebar to switch back to the Selector tool, you should be able to move the objects around and see that the connector line remains attached.

The first thing to notice is that the connector appears to emanate

from the edge of your object, even though the connection was made to the center. Unlike other charting tools, Inkscape doesn't give you any option about where on an object the connector links to – you always create connections using the handle at the center, and they visibly connect to a point on the edge that you have no control over. The next thing to note is that, by default, your connector line will happily trample right across any objects that might lie in its path.

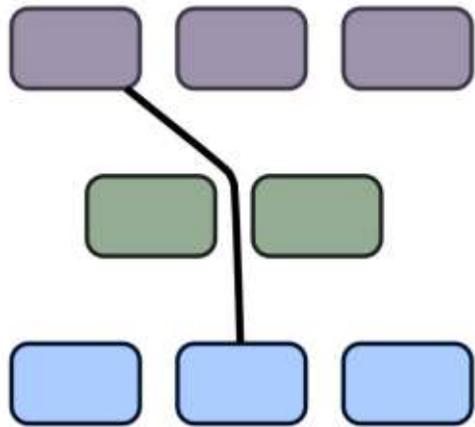


Inkscape offers a solution to this by allowing you to selectively choose objects that the connector should avoid. First you need to select the connector itself (you can select more than one), then select the objects to avoid. Now switch to the Connector tool and click the



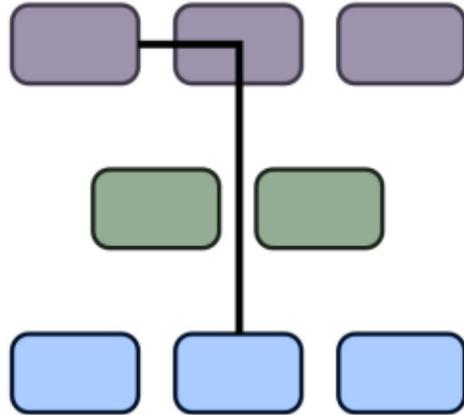
first button on the tool control bar.

You should find that the connector is now re-routed to avoid your selected objects, and you can use the Spacing control to adjust the amount of clearance that's added. If you change your mind, you can use the second button on the bar to specifically allow the connector to pass through the selected objects. With some avoidance in place, my sample connector now looks like this.



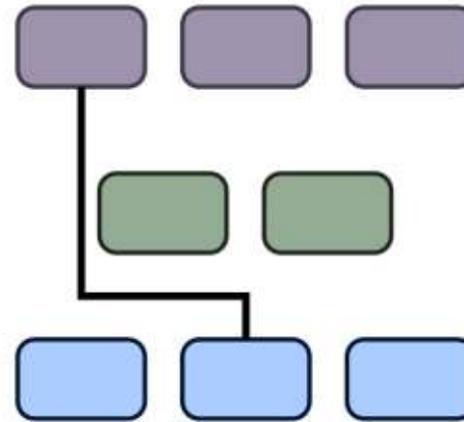
It's an improvement, but it doesn't look all that tidy. Perhaps restricting it to only perpendicular angles would help. With the

connector selected, the third button – which is actually a toggle – switches that connector between “orthogonal” (allowing only horizontal and vertical lines) and “polyline” (any angle is allowed). Enabling the toggle certainly makes things neater, but now there's another problem.



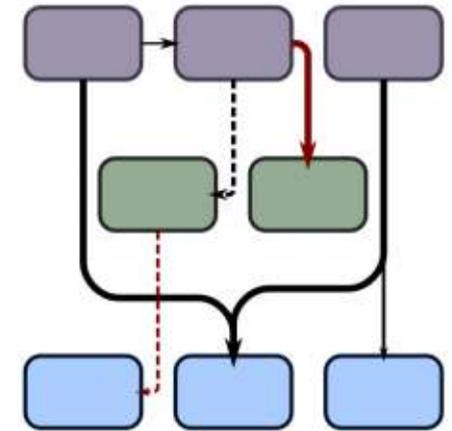
Because I'd only told the connector to avoid the green box, it's now passing right through one of the others. I could select the connector and this other box, then click the “avoid” button again, but I usually find that a better solution is actually to select all the connectors and all the nearby objects, so that you are pre-emptively telling

Inkscape to avoid them even if you move the objects around later. This makes it easier to draw your diagram without constantly having to adjust the avoidance rules. You may need to tweak the Spacing value to get a reasonable layout. With an orthogonal connector and Spacing set to zero, my chart is starting to look more acceptable.



It's still not much of a chart though, so I'll add a few more random connections. Connectors can be styled in the same way as any other path in Inkscape, so I've changed line colors, widths and dashes as well as adding some End markers to provide arrow-heads. To get the arrow-heads to match the colors of the lines, I've used Extensions > Modify Path > Color Markers to Match Stroke, and added some shape to the lines

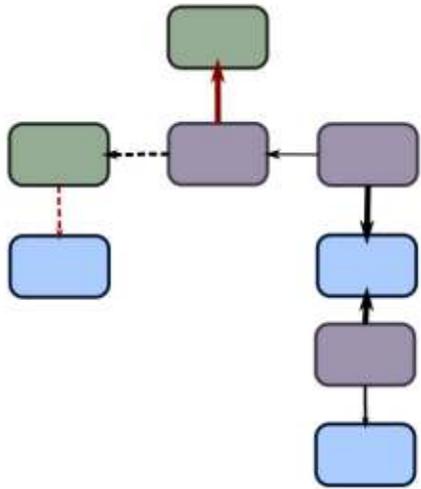
using the Curvature setting in the Connector's tool control bar. Now that's what I call a chart!



Once you've used the Connectors tool to forge links between objects in your chart or diagram you can also let Inkscape have a try at arranging it for you. The button on the control bar between Spacing and Length triggers this layout algorithm, with the Length value and the two remaining buttons affecting the final result. These latter controls aren't interactive, so you need to re-trigger the layout algorithm by pressing the button each time you change any of them. The layout algorithm only on only selected connectors and objects, which can be handy if you just want to tidy up part of a complex diagram, but can also result in a complete mess so

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make sure you save first. By selecting all of my chart and pressing the trigger button you can see that it's not really as complex as it initially appears.



Don't be too impressed by that result: I had to cheat to get the chart looking that neat. Inkscape's algorithm spread the three arms of the diagram out quite widely, creating an unnecessarily sprawling image. Nevertheless it provided a clearer view of the relationships I had randomly drawn, making it easy to move the boxes around to give this more professional looking result.

The three controls that you have over Inkscape's own algorithm don't really amount to much. The Length parameter lets

you adjust the preferred length of the connectors in the rearranged drawing. Unfortunately it's easy to go too low with this value, as it doesn't seem to follow a very linear scale, which results in boxes nestled far too close to each other. Just increase the value and hit the trigger button again if that happens to you.

The first of the control buttons tries to adjust the algorithm so that lines with end markers will always tend downwards. This doesn't work for start markers, so make sure you draw from source to destination if you want to use this mode. Enabling this and pressing the trigger results in this layout for my

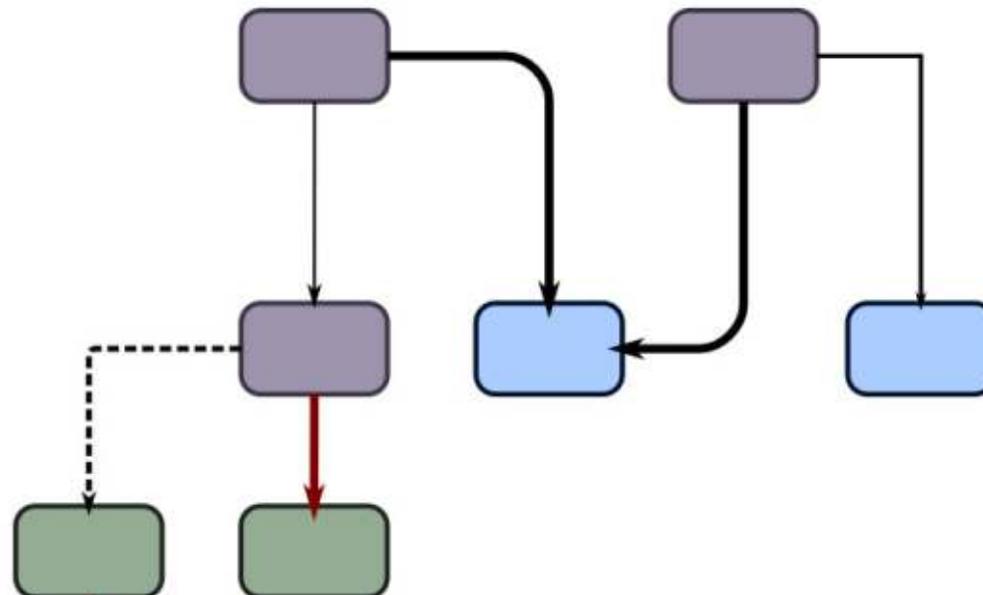


chart... after a little manual adjustment, once again.

The final button tells the algorithm that shapes aren't allowed to overlap. This didn't prove to be a problem with my test chart, but if you prefer to not have the shapes in your diagram overlapping one another, it's probably best to enable this option anyway.

There are a couple of final things to note about the Connector tool: first, it's one of the more unstable parts of Inkscape. It can cause crashes, mess up the undo buffer, and produce results that are quite removed from your

intentions! Make sure you save frequently if you use it. Secondly, you can't convert the connectors into "normal" paths using Edit > Object to Path, as you might expect. You can still manipulate the path's nodes manually by selecting a connector then switching to the Node tool, but any changes can be lost if you move the linked object or click the trigger button.

You may find the Connector tool useful for simple diagrams, but I usually find that such simple connections are just as easy to draw and modify manually, with no need for automatic layout algorithms. Once you reach a level of complexity where such facilities are useful, it's probably time to switch to a dedicated application instead.



Mark uses Inkscape to create three webcomics, 'The Greys', 'Monsters, Inked' and 'Elvie', which can all be found at <http://www.peppertop.com/>



HOW-TO

Written by Mark Crutch

Inkscape - Part 28

In this article, I'm going to start looking at clones in Inkscape. Clones can easily be dismissed as a minor feature, but, with a few tricks, you can use them to perform marvellous feats that make them worthy of several articles just to cover the basics.

At the simplest level, a clone is nothing more than a duplicate of an Inkscape object that maintains a link to the original. Changes to the original are automatically propagated to the clone, making them ideal when you need several identical objects in an image. Creating a clone is as simple as selecting the object and using the Edit > Clone > Create Clone menu entry, or just pressing the Alt-D keyboard shortcut. The new clone will be created directly on top of the original object, and will be selected automatically so that you can immediately move it to somewhere else.

With a clone selected, the Edit > Clone > Select Original menu item (or Shift-D shortcut) will select the original object with which the clone

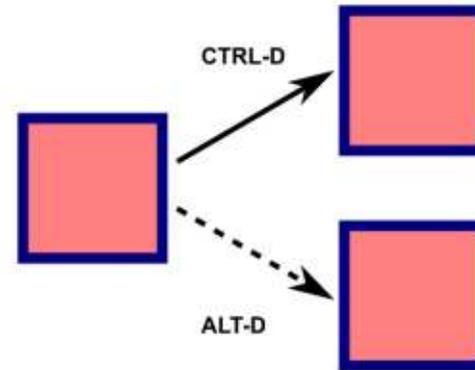
is linked – its “parent” if you like. This now gives us a collection of related keyboard shortcuts that are well worth memorising to speed up your work with Inkscape:

Ctrl-X - Cut to clipboard
Ctrl-C - Copy to clipboard
Ctrl-V - Paste from clipboard (at the mouse position)
Ctrl-Alt-V - Paste In Place (at the object's position)
Ctrl-D - Duplicate (copy then paste in place)
Alt-D - Clone (a linked duplicate)
Shift-D - Select Original

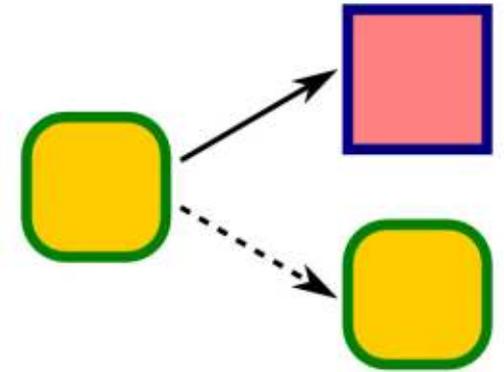
Initially the Paste In Place option seems a little redundant, given that the Duplicate command appears to achieve the same result. The difference is that Paste In Place also works between layers, and even between Inkscape documents, so you can copy or cut from one drawing's layer, then paste into the same location in a different layer or a different drawing.

So much for the theory, let's create a duplicate and a clone and see the difference between them. For notational purposes, I'm going

to use a solid arrow pointing from the parent object to the duplicate, and a dashed arrow pointing from the parent object to the clone. With this notation the “Select Original” command always follows back from the tip of a dashed arrow to its source. Here's a simple parent object with a single duplicate and a single clone.



As you might expect, all three objects look the same. The difference only becomes apparent when the parent object is modified in some way – such as changing its fill and stroke, or altering the roundedness of the corners.

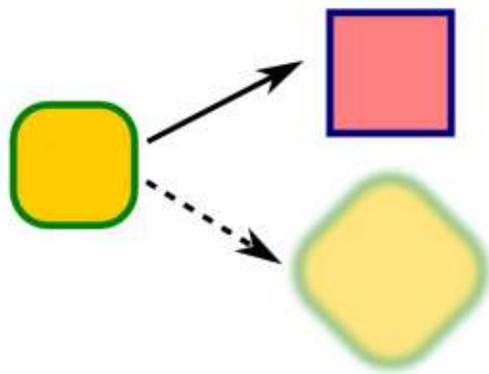


Our duplicated object, which maintains no link to the parent, remains unaffected. The clone, however, is immediately updated to reflect the changes to its parent object. That makes it useful for creating absolutely identical objects – hence the term “clones” – but, as in real life, it's possible for Inkscape's clones to develop slight differences to their parents. A clone, as well as maintaining a link to its parent, is also an object in its own right, and is subject to the same transformations as any other object. Clones can be rotated, scaled and skewed, have their opacity reduced, or have filters applied, independently of the parent. With some rotation, scaling and opacity changes applied to the



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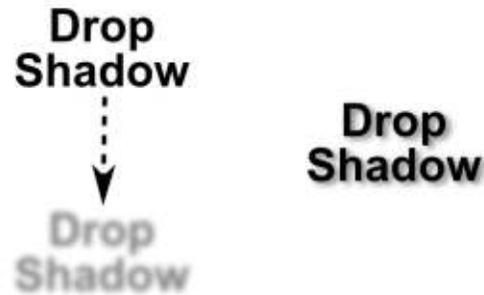
clone, our previous image looks like this.



It's important to note that these changes are applied after the clone has been synchronised with its parent – you can think of them as being added on to the base attributes of the parent. So the clone's fill and stroke colors will still change if the parent's are modified, and any rotation, blur and opacity changes to the parent have a cumulative effect with those that are applied to the clone. For example, this clone has a 45° rotation applied; if I were to rotate the parent by 15° then the clone would also rotate by an additional 15° bringing its total rotation to 60° compared to its original position.

One simple but effective use of this feature is to create drop

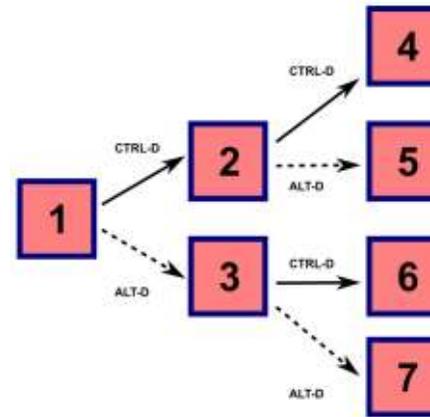
shadows by blurring a clone and reducing its opacity. This is especially beneficial when dealing with text objects as the shadow will automatically adjust to any edits you may make to the text content.



If a clone is just another type of object, then surely it must be possible to copy and paste it. If that's possible, then what about duplicating it, or even cloning it? The simple answer is that you can do all these things with clones, but the results might not always be what you expect. You can create long chains of relationships – clones of clones of clones... of clones of objects – but the cumulative nature of any applied transformations can result in a small tweak to one item having a knock-on effect all the way down the chain.

To keep things simple, I'll just

look at a basic three object chain where a grandparent is duplicated or cloned to form a parent which is, in turn, duplicated or cloned to create a child. I've drawn all the possible combinations, and given each object or clone a number so that it's easier to track what's happening. Starting with the basic arrangement of objects, as with the earlier two-object example, all the elements look the same, whether they've been duplicated or cloned.

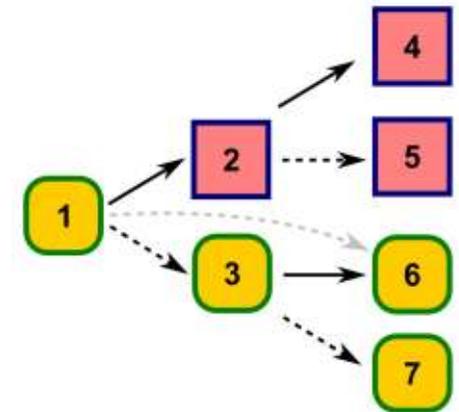


(1) is the starting point, our grandparent object. This is duplicated to create (2), and cloned to create (3). Each of those objects is duplicated and cloned to produce the remaining items. The provenance of each object is therefore:

(1) The original grandparent object.

- (2) A duplicate of (1). Parent to (4) and (5)
- (3) A clone of (1). Parent to (6) and (7)
- (4) A dupe of a dupe of (1)
- (5) A clone of a dupe of (1)
- (6) A dupe of a clone of (1)
- (7) A clone of a clone of (1)

What happens when we modify the attributes of (1)? As before, our duplicated object (2) remains unaffected, so (4) and (5) also appear untouched. The first-level clone (3) changes, as does its clone (7). But what about (6)? That was made as a duplicate, so you might expect it not to change, yet you can



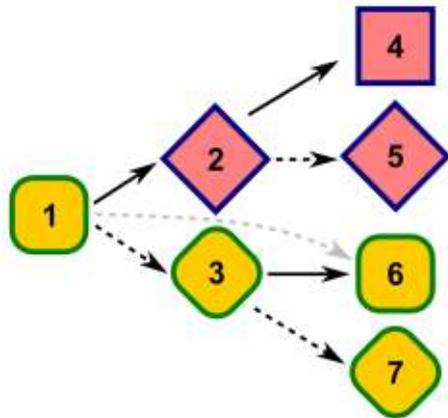
clearly see that it does.

The thing to bear in mind is that (6) is an exact duplicate of (3) – even down to its linkage to the grandparent object (1), represented by the gray line on the image. You can see, therefore, that a second clone of an object can be

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created either by cloning the object a second time, or by duplicating an existing clone. The difference is that duplicating a clone will also duplicate any other attributes associated with it, so if you've rotated the clone or added a blur, those effects will be present on the new clone, even though its linkage goes back to the grandparent object.

Now let's look at what happens if we modify (2) and (3). For this example I've rotated them through



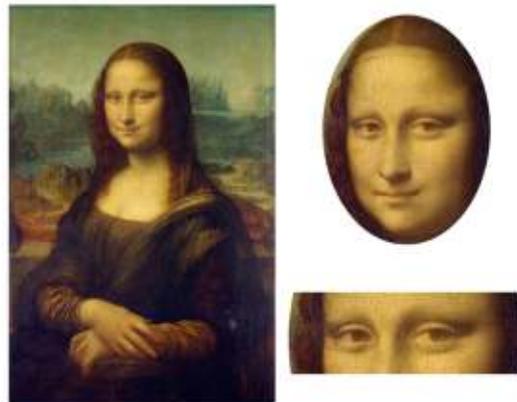
45°.

(4) remains the same, because it has no linkage to any of the other objects. (5) rotates because it's a clone of (2). The linkage between (6) and (1) means that it's not affected by the rotation of (3) – although it would be affected if (1)

were to be modified. Finally (7) does rotate because, as a clone of a clone, it's made up of the cumulative effects of all the changes made to both (1) and (3).

If that's not enough to make your head spin, I'll leave it as an exercise for the reader to consider chains of four or more objects!

One good reason for using clones is that they tend to be less resource hungry than the equivalent separate objects. In terms of storage space, a clone is little more than a reference to another part of the SVG content, helping to keep the file size down. This can be particularly useful when you're dealing with complex paths, groups or embedded images. Consider this example that uses a single image and some cloning, rather than embedding three



separate images.

The left hand image is the parent in this case. The top right image is the result of cloning the parent, then scaling the clone before applying a clipping path. The bottom right image is the result of cloning the clipped clone and applying a second clipping path to that. The same effect could also have been achieved by clipping a second clone of the parent, but I also wanted to demonstrate that a clone of a clipped or masked object still retains the clipped appearance – note the curved sides of the bottom right image that result from the elliptical clipping path used on the top image.

Although clones can result in substantial space savings, chaining them too deeply can slow Inkscape's rendering of your image. In the case of the Mona Lisa example, it's clear that the bottom right image can't be processed until after the top one – including its clipping path – has been calculated. Extending the chain further to create clones of clones of clones just exacerbates the problem. Unless your design really does require the sort of attribute inheritance that such chains

enable, you're better to create clones that link directly back to a common parent.

Remember, either clone from the original parent each time (Alt-D), or clone once then duplicate the clone (Ctrl-D). If you're not sure whether you're cloning the original object or an existing clone of it, check the status bar. If it reads "Clone of Clone of Clone..." then you might want to re-think your approach.



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