HARMONY

TOON BOOM HARMONY 12.2.1
- Essentials Edition -
Gaming Animation Guide (Server)

Legal Notices

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Contents

Chapter 1: Introduction

Harmony is a great tool for creating character rigs and animation for games. Artists and programmers can work together to create content for many platforms, including Windows, Mac, Mobile, iOS, PS, XBOX, and so on.

The Toon Boom gaming pipeline is evolving constantly. For more information:

- Toon Boom Gaming: https://www.toonboom.com/games

- For information: sales@toonboom.com.

- Technical inquiries: store.toonboom.com/contact/support.

This guide is divided as follows:

Chapter 2: About Gaming in Harmony

As gaming pipelines are constantly evolving, Toon Boom is breaking the boundaries of how to create 2D animation for games.

There are two main pipelines for exporting data from Harmony to your game engine:

- *Raw Game Data Export* on page 10
- *Frame-by-Frame Export* on page 11

Creating Animation in Harmony

When creating character rigs and animation for games, there are a few things to think about before starting. Artists and programmers should work together to make sure their needs are met.

- What platform will your game be going on? Windows, Mac, Mobile, iOS, PS, XBOX, etc.
- What game engine will you be using?
- What is the style of the game? Hand drawn, cut-out, with textures, etc.

These are just a few of the questions to consider before getting started. They all have an impact on how you design, build, and animate characters.

For example, if you're planning a mobile game for smart phones, then you will most likely want to keep your game under 50 MB, so it can be downloaded without having to be on Wi-Fi. In that case, your most important consideration is to create efficient characters with very tight sprite sheets and reuse a lot of the animation to keep the file sizes small. During the process, you will need to:

- Rig and animate characters in Harmony.
- Extract out the Harmony data.
- Import the Harmony data into the game engine.

Keep in mind, if you're working with a custom engine, you can also process the Harmony data that's exported and use it in a custom game engine. If you need assistance with adapting data for your engine, contact store.toonboom.com/contact/support.

If you're making a game for consoles, like the PS or Xbox, then you have the freedom to create larger textures. You may want to animate frame-by-frame, or you may want to animate with a cut-out character.

If you're simply going to export on a frame-by-frame sequence, then you can use all tool in Harmony without limitations. You can then process an exported image sequence into a sprite sheet.

Raw Game Data Export

Raw game data export is appropriate when you want the file sizes to be as small as possible. Toon Boom lets you extract all the data from Harmony to incorporate into a game engine. You can extract the skeleton information, drawing information, and keyframe animation data, as well as deformations (bones and articulations only), cutter, transparency nodes, and timing columns.

- **Advantage**: This is the lightest export, and will keep file sizes small which is ideal for mobile applications.

- **Disadvantage**: You are somewhat limited in the tools you can use in Harmony. You can use tools like Morphing as well as Curve and Envelope deformers, but you'll need to bake it out to drawings so they're interpreted properly in the game engine. You can use Cutter effects (masking), but you cannot cascade them, meaning you cannot have more than one in a hierarchy chain. The Game Bone deformers can be used on your rig with having to bake it to drawings.

However, even with these limitations, you can create really great cut-out character animation in Harmony and extract all the data. By moving, rotating, scaling, and skewing the different drawing layers, you can create advanced looking animation.

When you extract the data, you'll have sprite sheets that contain only the drawings of the body parts used in your Harmony scene file. You can also support multiple animations, such as idle, run, and jump, and reuse the same skeleton and drawings when possible by simply exporting new animation data.

Toon Boom has fully integrated this solution with the Unity game development rendering engine. If you are creating your game in Unity, you have a seamless pipeline without the need to re-treat the data in your game engine.

Frame-by-Frame Export
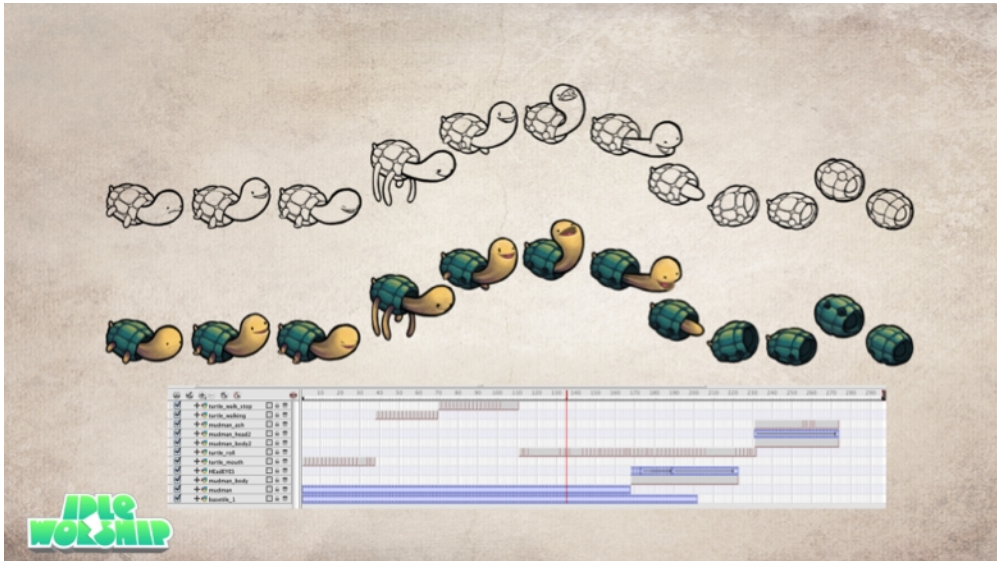
You can export from Harmony using an image sequence, which can be recompiled into a sprite sheet.

Advantage: You can use any of the tools in Harmony when you animate!

Disadvantage: These sprite sheets can become quite heavy and end up as large textures to process in the game. This may be fine for many games, like console games, but when you're doing game development for mobile devices, such as iOS or Android, you need to be very light on your texture space. Also, file sizes should be kept under 50 MB to facilitate downloading without needing to be connected to Wi-Fi.

There is a script available in Harmony that allows you to export your animation in frame-by-frame to the EaselJS game engine EaselJS is a javascript web compatible game engine. It uses a json data structure to map each frame to an entry in the sprite sheet. The data structure is easy to understand and can be adapted or converted to a different game engine if you need to.

To export to EaselJS, you need to add the script in the Scripting toolbar (TB_ExportToEaselJS). This script is included in Harmony. See *Export Animations to Unity* for more information on how to add the script to your Scripting toolbar and the interface parameters.

Chapter 3: Guidelines and Resources

In this chapter, you'll find guidelines for rigging, deformation, cutter and many useful animation tips.

This chapter contains the following topics:

- on page 14
- *Deformation Guidelines* on page 15
- *Cutter Guidelines* on page 15
- *Animation Tips* on page 16

Rigging Guidelines

The following is a list of general guidelines to keep in mind when rigging your character. As you're planning the character rig for your game, keep in mind the style of the character, and create your custom colour palette. However, there are some limitations to consider if you plan to extract the game data:

- Set your Harmony scene to be a square resolution (e.g. 1024 x 1024). You can do this in the Scene Setting dialog box.

- Draw the art on the Line Art and Colour Art layers only. The information contained in the Overlay and Underlay will not be exported to Unity. It is however safe for using as a reference layer, just not anything that will be exported.

- Create rigs in the Timeline view only. The Node view can have complex connections that are not always interpreted well by game engines.

- Nudge layers in Z space if you need to reorder layers. However, significant Z offsets are not supported within a character rig.

- Make every layer in your game engine a separate scene in Harmony. If you have two characters at different depths, put them in separate scene files.

- Character rigs in groups at the root level of your Harmony scene will render to a single plane in Unity, but use separate sprite sheet and animation data sets. Keep this in mind for scenes in which you may have more than one character interacting with each other.

- Don't use any effects. Effects like colour overrides are not interpreted by game engines. Use only direct hierarchy, drawing swaps, and keyframe animation.

- Don't use 3D space. If you want to set things up in 3D space, you can do this when you get to your game engine.

- Set your pivot points on Peg layers using the Rotate tool to set the pivot on the entire layer. Peg pivots are recommended over drawing pivots. You should also set the pivot points on your drawing layers, even if you don't animate on them, as this will allow you to retrieve the information later on in the game engine if you need to put a locator on a drawing layer.

- Don't use Morphing. This is not yet supported in game engines.

- Both Morphing and Deform can be used and then baked out to individual drawings. These drawings will then show up as new drawings in your sprite sheet. Be wary of doing this too often as it will increase your texture space!

- For your pegs, when you animate, use Bezier curves and set them to Separate. If you use 3D Path, it's heavier than Separate.

- Be mindful of where you put your character before exporting. The master pivot of your exported game object will be the center of your Harmony scene (0,0).

- Be sure to have a Display at the end of your hierarchy.

Keeping these tips in mind will allow you to create a tight, efficient 2D game character in Harmony while taking advantage of all the great tools.

Here are some things you should do:

- Create a simple parent-child relationship hierarchy in the Timeline view.

- Use peg layers to contain keyframe animation data, set to Separate Position.

- Use drawing layers to draw on, creating new drawings when needed.

- Use the Rotate tool to set the pivot points on the peg layers.

- Name your layers properly so if you need to fetch a specific layer's pivot point later on in the game engine, you can easily recognize the layer you need. If you have a top-level Group A, which has a child group inside it (Group B), and the drawing layer is a child of Group B, then the drawing layer is exported as A_B_ DrawingLayer.

You can use any of the drawing tools you want: Pencil and Brush tools, textured lines, solid areas, and gradients. Each individual drawing will be rendered out and assembled into a sprite sheet later.

NOTE: Because the Unity game engine does not support Unicode characters, it is recommended to avoid using it in scenes intended for games.

Deformation Guidelines

Harmony can export deformations to the game engine XML format. Only hierarchies made of Game Bones can be successfully exported. In addition, Kinematic Outputs were implemented to complement your game bones.

Although deformation comes equipped with a wide range of features, many were restrained to ensure that performance is on par with gaming industry standards. The following features are not compatible with the game engine SDK:

- Zones of influence

- Curve and Envelope deformations

- Only a single pose is allowed per deformation hierarchy

The deformation in the game engine SDK does not behave exactly as the deformation in Harmony.

To comply with most game engines and maintain fast calculations, the SDK implements a linear base skinning algorithm to linearly blend the bones at articulations. You may notice some differences depending on the curvature of the articulations used.

NOTE: * Not currently available in the Cocos2d-x implementation of the game engine SDK.

Cutter Guidelines

The cutter, or mask, operation in Harmony is used for cutting off drawings with custom shapes. The game engine SDK implements both cutters and inverted cutters with the following limitations:

- For a sprite, only a single cutter drawing can be applied when it is rendered. This also applies to a composite of multiple matte drawings. The game engine SDK will only use the first matte drawing during rendering and discard the others.

- A deformed drawing cannot be cut, but a cut drawing can be deformed.

NOTE: * Not currently available in the Cocos2d-x implementation of the game engine SDK.

Animation Tips

When animating for games, depending on the type of game you're creating, you may need to limit your animation. For example, if you're creating mobile games and you want to keep the file sizes small and playback fast on all devices, then limit yourself to simple keyframe animation with as few drawing swaps as possible. If you're creating console games, you have the freedom to create more drawings and have a higher complexity. You can explore with your programmer the limitations of the platforms you're exporting to, and what your game engine supports.

Here are some tips for efficient, lightweight animation:

- Use mainly transformations, such as move, rotate, scale, and skew.

- Create additional drawing swaps when needed.

- If you use Curve and Envelope deformers or Morphing, you'll need to bake out the drawings for export. Be careful when doing this, as you may want to keep the number of drawings small. Don't bake out an entire sequence, just selected drawings. You don't need to bake the Game Bone deformers.

- The bigger the drawings are in the Drawing view, the more pixels they will occupy in the texture size on the sprite sheet. When setting up your rig, make sure to not scale individual layers by using a keyframe with the Transform tool. If you want to scale things up or down, use the Select tool. This will keep things the same relative size on the sprite sheet. When you export the sprite sheets, in the script you can also set the resolution of the sprite sheet so the drawings can be scaled down for smaller devices.

- Only drawings which are exposed in the scene will be exported to the sprite sheet. For example, if you have 10 drawings in your Library view, but only two of them are showing in your scene, only those two will be exported. This keeps the sprite sheet as tight as possible.

Animating Multiple Sequences

You will always have multiple animations for your characters. For example, an idle sequence, a run sequence, an action sequence, and so on. You need to work in a specific structure so you can export all of these animations to a single sprite sheet.

First, create a scene file with the name of the character, such as `Space Duck`. This is the file where you can create or import your game rig. In the top menu, select **File > Save As New Version**, and give this new version the name of the animation. For example, `Idle`.

Every time you need to do a new animation using the same character, perform a Save As New Version. In the end, you may have something like this:

Scene: Space Duck

Versions:

- Run

- Idle

- Jump

- Shoot

When you run the export script, it will export the drawings from the current scene into the export folder. It will also let you know if there are any other scene versions that were already exported to that folder. If so, then it will recompile the sprite sheet to include all the drawings from all the animations. This allows the maximum possible reuse of drawings.

Chapter 4: Design and Drawing Tools

Another important step in the project creation is the character, prop and location design. This determines the style and models to follow for the entire project.

This is also the step where you will need to use most of Harmony's drawing tools.

The design can be created on paper and scanned in or it can be created digitally. You can draw and even create the colours entirely on paper, while others like to design on paper and scan the drawings to create the colour model in a software program. The most popular method is to design directly in Harmony.

To save paper and time and avoid having to recreate colour palettes, Harmony gives you the ability to design all elements directly in the application. This keeps all your work within the same software, avoids using a lot of paper and losing time scanning in elements and importing them.

The character and prop design process is divided in three steps:

- *Preparation* on page 19
- *Sketching the Model* on page 20
- *Cleaning and Inking the Model* on page 35

Harmony has an extensive set of drawing tools that can be used to design your characters. You can learn more about this in the following topic:

- *Drawing Tasks* on page 36

Each drawing tool has a series of options to customize its behaviour and drawing style. You can learn more about them in the following section:

- *Drawing Tool References* on page 72

Preparation

To prepare for the design task, you will need to go through a few steps:

- *Getting References* on page 20
- *Using the Workspace* on page 20

Getting References
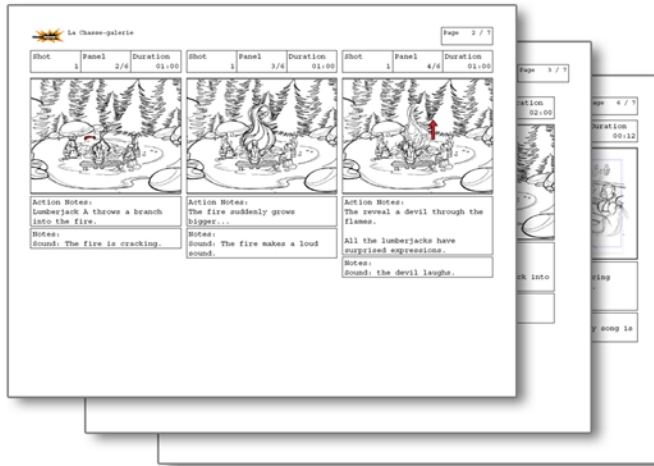
Creating models requires two main reference sources, the script and the storyboard. Once you have the script in hand, you can learn about the characters and their personalities, the props, the ambiances, and so on. This will be your main reference, so it is very important to read it carefully.

The storyboard is the second reference source and it can be quite useful as well. Although it will not yet be the final version of the storyboard, it will show you what the character is doing and what props need to be designed.

Using the Workspace

Once your scene is created, you can open it and set your workspace.

To sketch the characters, props or locations directly in Harmony, you will mostly use the Camera or Drawing views along with the Colour, Timeline and Tool Properties views.

Sketching the Model

Now that your references and scene are created, you can start designing. To draw your characters, props and key locations, you will need to learn the following:

Drawing with the Brush or Pencil Tool
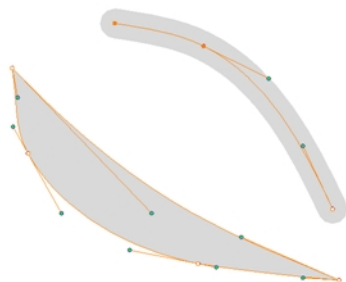
The Brush 🖌 tool takes account of pressure sensitivity, allowing you to create lines with variable thicknesses when using a pen tablet, creating a contour vector shape. You can set different parameters, such as the size and smoothness of the Brush tool in the Tool Properties view. If you draw with the Brush tool and want to modify the thickness variation, use the Contour Editor ⌕ tool.

The Pencil ✏ , Polyline and Shape tools let you create a central vector line of uniform thickness. Pressure sensitivity is not supported with pencil lines. You can set different parameters, such as the size and smoothness of the Pencil tool in the Tool Properties view.

Override Tool

The Override tool lets you increase productivity by rapidly switching between tools used for short tasks and your previous tool. Most drawing tool shortcuts are accessed using the Alt key followed by another key, such as the Eraser tool which is accessed by pressing Alt + E.

If you are drawing with the Brush tool and need to briefly switch to the Eraser before continuing, hold down the E key while you are erasing. Once you are done, release the E key to return to the previous tool; in this case, the Brush tool. You can do the same for most drawing tools that have a shortcut composed of Alt followed by another key.
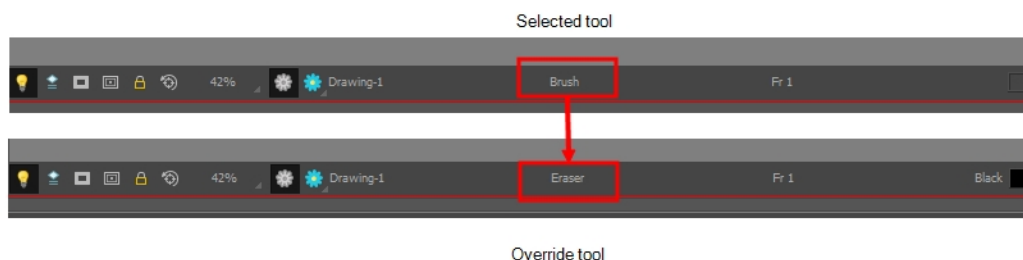
Relative Size
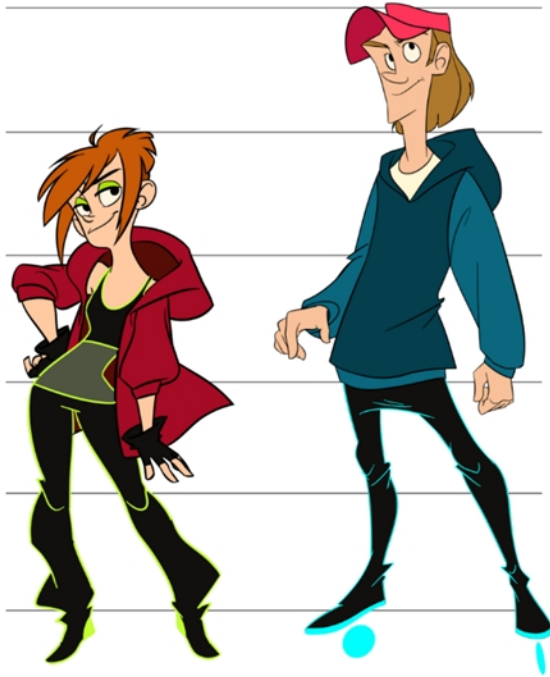
The size relation between the props, characters and backgrounds is very important in maintaining consistency and structure throughout the project.

A production can contain many characters and props. It is not unusual for these to be created by different people. If there is no size control implemented, the characters and elements created by different artists can vary greatly. When this occurs, the characters that are placed together in a scene will be out of proportion. The animator or person doing the scene setup will then have to scale them to the correct size.

When a character or prop is scaled down, the outline will become increasingly thinner. By the time the element is scaled to its proper size, the outline may be so thin that a difference between one character's outline and the one beside it will not look very good.

Here are a few tips you can use to create a suitable size relation.

Line Up

A line up consists of copying and pasting all your character designs into the same drawing and then scaling them to the correct proportion in relation to the other characters. This line up is very important and should be handed to any animator, layout and posing artist or scene setup person working on the project.

For the prop design, it is recommended that you paste one of the main character's hands or even the full body beside the prop. This enables the animator to know what size to draw the prop.

In your character design scene, it is a good idea to create a column for the character line up. The line up is usually done during the character design step. When the character builder imports the model to the breakdown scene, the size relation should be correct.
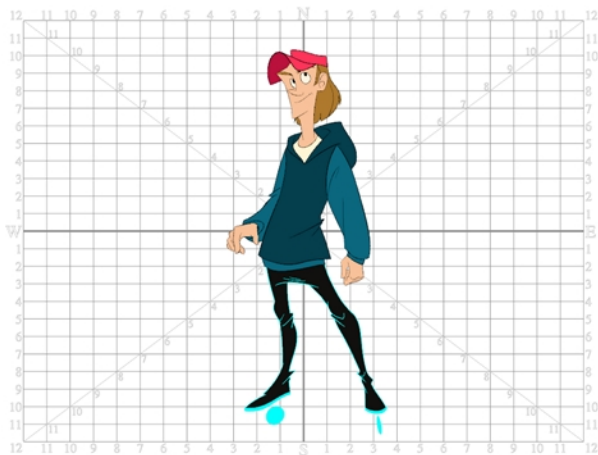
Field Chart

Harmony includes a field chart in its Drawing and Camera views. This tool is very useful in setting the characters' and props' heights.

It is recommended that you keep the character design and breakdown inside the 12 field size. This ensures that it fits the default camera size and the template thumbnails. If some parts were drawn too big or too far apart, you can

use the Reposition All Drawings tool and reposition, scale or rotate multiple drawings from different layers all at once.

Use the Show Grid option to display a grid in the Drawing or Camera views.

Name	Button	Description	Keyboard Shortcut
Show Grid	⊞	Displays the grid.	**View > Grid > Show Grid** Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
Grid Outline Only		Displays the outline of the grid only.	**View > Grid > Grid Outline Only**
Square	⊞	Displays a standard square grid.	**View > Grid > Square**
12 Field Grid	12	Displays a 12-field size grid.	**View > Grid > 12 Field Grid**
16 Field Grid	16	Displays a 16-field size grid.	**View > Grid > 16 Field Grid**
Underlay	⍉	Displays the grid under the drawing elements.	**View > Grid > Underlay**
Overlay	⍉	Displays the grid over the drawing elements.	**View > Grid > Overlay**

How to reposition all drawings

1. In the Tools toolbar from the Select drop-down menu, select the Reposition All Drawings 🔻 tool. This also automatically selects every stroke in your drawing in the Drawing and Camera views.

2. To deform or reposition a selection:

   ▸ To reposition, click and drag your selection to a new area.
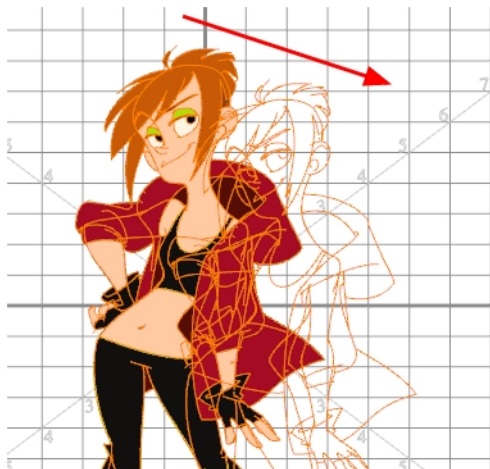
   ▸ To scale, pull or push on the top, side, bottom or corner control points. Hold down Shift to lock the selection's ratio.
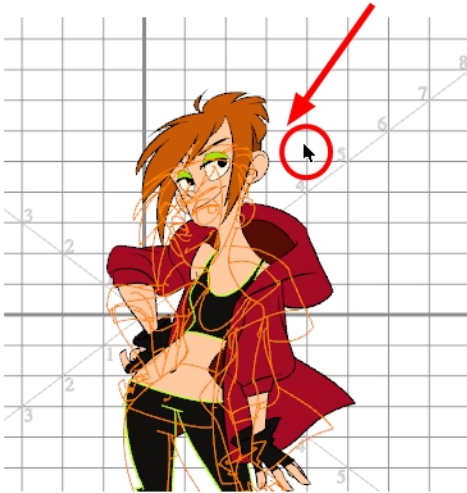
3. When you release your cursor, every drawing contained in the drawing layer you repositioned, scaled, rotated or skewed will follow the same transformation.

Brush Size

Harmony provides a variety of pens and brushes and also allows you to create and save your own through creating a tool preset.

It is a good idea to create and save pens with precise sizes and parameters to trace and design your models and breakdowns.

Palettes and Colours

Harmony has an integrated palette system. Each character, prop or background can have its own set of colours and each colour in the palette can be associated to colour fill zones on a drawing. You can create as many palettes and colours as you need.
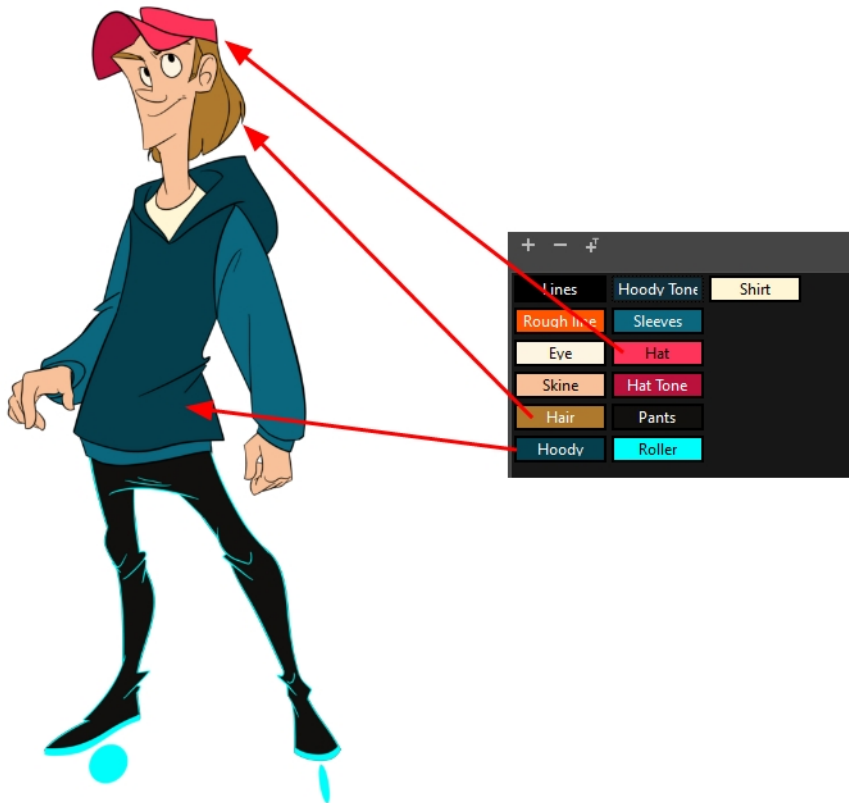
Each scene created in Harmony includes a default colour palette which contains a standard set of colours for sketching and painting.

You can sketch and design using the default palette without any problem. However, it is not recommended that you use the default palette for the colour models. A different colour palette should be created for each colour model.

To sketch and design with a different colour swatch or create a palette for each character, prop or key location, you will need to learn how to manage the Harmony palettes.

How to create a new palette (Basic Palette Lists mode)

1. From the Colour view menu, select **Palettes** > **New** or click the New Palette ➕ button.

   ‣ Make sure you have the rights to modify the palette list. If not, select **Edit > Edit Palette List Mode.**
   The Create Palette dialog box opens.

2. Enter the palette name according to the model.

3. Click **OK**.

The palette appears in the drawing element's palette list.

How to create a palette from the Advanced Palette Lists mode

1. In the Timeline or Xsheet view, select the drawing that requires a palette.

2. Make sure that you have the necessary rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode.**

3. In the Colour view, click the **Show Palette List View** button to display the palette list.

4. Do one of the following:

   ‣ From the Colour view menu, select **Palettes > New.**

   ‣ Click the Create Palette ➕ button.

   The Palette Browser: Create Palette dialog box opens.

5. Select the level to store the palette file.

   ‣ **Environment**: The palette-library folder is stored in the scene's parent environment folder.
   ‣ **Job**: The palette-library folder is stored in the scene's parent job folder.
   ‣ **Scene**: The palette-library folder is stored directly in the scene folder.
   ‣ **Element**: The palette-library folder is stored directly in the drawing element folder.

   When you select a level that has a palette stored in it, the palette names are displayed in the Palette field.

6. Name the palette. There is no need to add the suffix "palette" to the name as it is always recognized as a palette file.

7. Select a Palette List option.

The Scene Palette List is mainly used with cut-out animation. A cut-out character will often be divided in twenty to thirty different drawing elements that use the character's master palette.

The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.

The Element Palette List is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds and effects. The Element Palette List is used because you do not necessarily want all of the palettes for all of your elements linked in every column.

The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette List.

8. Click **OK**.

   The new palette appears in the palette list.

How to lock or unlock the palette list

‣ In the Colour view, click the Edit Palette Mode button.

A grey pencil icon appears in the top-right corner of the Palette list.

How to add or modify a solid colour swatch

1. In the Colour view, click the Add Colour button.

2. From the Colour view menu, select **Colours** > **Edit** or double-click on the colour swatch.

   The Colour Picker window opens.
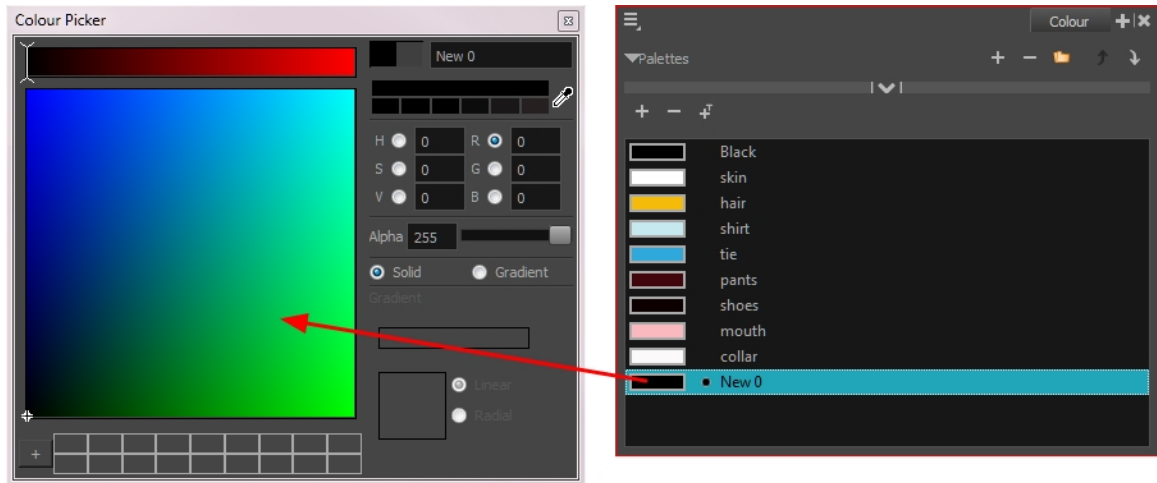
3. To set your colour, do one of the following:

   ‣ In the colour wheel, select a colour.

   ‣ Enter the HSV or RGB values in the corresponding fields. Select the **R,G,B,H,S** or **V** options to change the look of the colour picking area.

   ‣ Hold down the Dropper 🖉 button as you move along the desktop to preview colours, then release to select the colour. It can be from the Toon Boom Harmony interface, your operating system or any other open application.

NOTE: If the Sticky Eye Dropper option in the Preferences dialog box (Drawing tab > Options section) is selected, the dropper will not have this behaviour.

NOTE: The Dropper does not work on Macs with Retina display.

You can also click **Multi Wheel Mode** to open the Multiwheel Colour dialog box. This displays all the picking area styles together and also contains a picking undo list. To return to the regular Colour Picker window, click **Single Wheel Mode**.
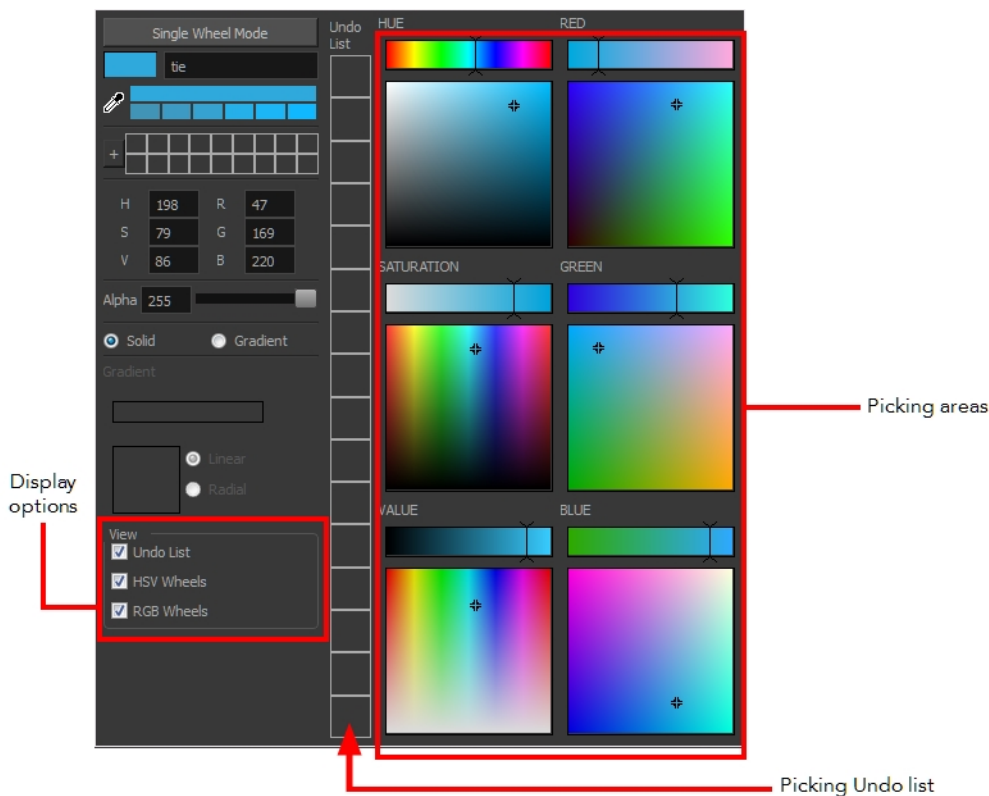
4. Click on the Shade Scale swatches to modify the shade of the selected colour.

5. Adjust the desired level of transparency with the Alpha slider, or type the value directly in the Alpha field.

6. Click the **Add** button to add the current selected colour to the Colour Storage Library, so you can quickly access it later.

7. You can rename the colour swatch in the Colour Picker window or directly in the colour list by double-clicking on its name.

Colour Picker window   Colour list

Sketching the Character

You are now ready to sketch your models. There are two tasks to perform in order to draw your characters:

- Add a drawing layer
- Sketch the model

You have the choice to sketch your model as a bitmap or vector drawing. If you like the feel of drawing with bitmap lines, you can set your layer as bitmap. If you like drawing with vectors, you can set your layer as vector. If you use vector, you will be able to enlarge your drawing and zoom into it without losing quality or resolution. You can also use the Contour Editor and Select tools to resize and modify lines. If you draw with bitmap, you will not be able to scale the drawing beyond 100% of its resolution without encountering pixelization issues.

How to add a drawing layer

1. In the Timeline view, click the Add Drawing Layer 🐝 button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

   The Add Drawing Layer window opens.
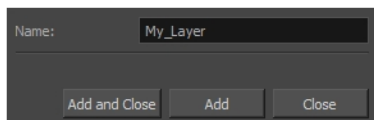
2. In the Name field, name your new layer.

3. Do one of the following:

   ‣ Click **Add** to add a first layer and keep the window open to add more layers.

   ‣ Click **Add and Close** to add a new layer and close the window.

   A new drawing layer is added to the Timeline view.

How to sketch a model

1. In the Tools toolbar, select the Brush 🖌 tool or press Alt + B.

2. In the Tool Properties view, select a brush preset and adjust its parameters.
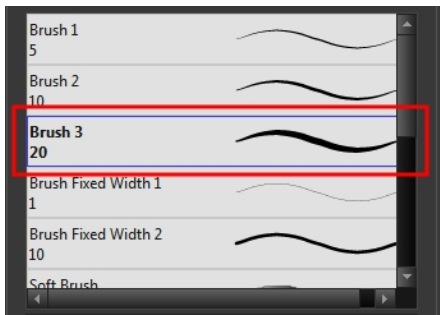
3. In the Timeline or Xsheet view, click in the first cell of the drawing layer.

4. In the Drawing or Camera view, enable the Grid (Field Chart). You can press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).

   ‣ Make sure the Drawing or Camera view is the active view while using the keyboard shortcut.

5. In the Drawing or Camera view, start drawing.
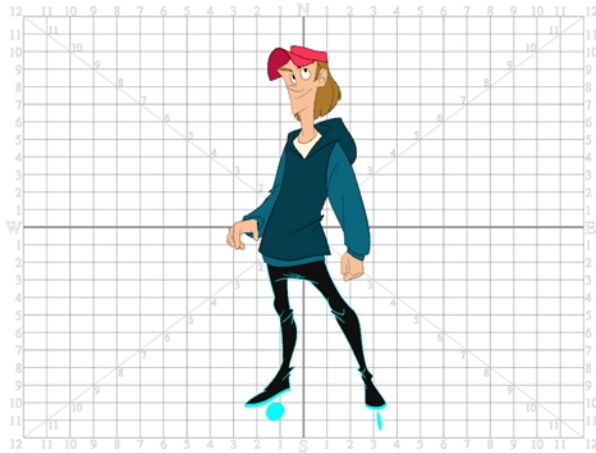
6. To select a different colour, in the Colour view, select a different colour swatch. Double-click on the colour swatch to open the Colour Picker window and modify the colour. Remember that anything already painted with that colour swatch will update to the new colour.
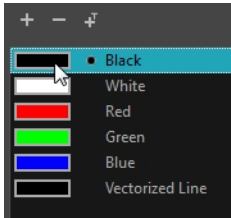
7. In the Camera or Drawing view, use the Rotary Table ⊙ to rotate your workspace. You can press Ctrl+Alt (Windows/Linux) or Ctrl+⌘ (Mac OS X).

   ‣ The default keyboard shortcut to reset the workspace rotation is Shift + X.

8. If you decide to draw in the next cell and need to see your previous drawing, enable the Onion Skin by pressing Alt + O.

Cleaning and Inking the Model

When your rough models are ready, it is time to clean and ink them. You can still use the default palette and colours to do so, especially if you are not the one doing the colour styling. If you have already created a palette for your model, you can add new colours for tracing.

If you want to keep your roughs and sketches, add a new drawing layer and trace in it using the Light Table. This is the equivalent of adding a sheet of paper and tracing over the rough using the animation disk light table. You only need to disable the rough layer to prevent it from appearing in the final scene render.

How to trace your character in a new layer

1. In the Timeline view, add a new drawing layer and name it: `clean`.

2. If you work in the Drawing view, enable the Light Table 💡 or press Shift + L.

3. Do one of the following:

   ‣ In the Tools toolbar, select a drawing tool.
   ‣ From the top menu, select **Drawing > Drawing Tools > *desired tool*.**

4. In the Timeline or Xsheet view, select the cell in which you want to draw.

5. Trace the model.

6. To make perfect points and corners, you can intersect the two strokes to create a point. Using the Cutter ✏ tool, you can automatically trim the excess portion. In the Tool Properties view, enable the Lasso

selection type. Make sure the Use Mouse Gesture ✶ button is enabled. In this mode, you can automatically delete any extra sections of line in your artwork by simply clicking, holding and dragging your mouse over it. The intersection will not work well with the Pencil tool. It is recommended to use the Brush tool.

Drawing Tasks

Harmony has a wide variety of drawing tools for all kinds of drawing tasks. This section covers how to use these tools. For the complete details on their options in the Tool Properties view, see *Drawing Tool References* on page 72.

In this topic, you will learn about:

- *Current Drawing on Top* on page 37
- *Drawing with the Pencil Tool* on page 38
- *Drawing with the Brush Tool* on page 43
- *Viewing the Final Lines as You Draw* on page 47
- *Selecting Drawing Objects* on page 49
- *Erasing Parts of a Drawing* on page 53
- *Reshaping a Drawing Using the Contour Editor Tool* on page 55
- *Drawing Shapes* on page 57
- *Drawing with the Polyline Tool* on page 59
- *Drawing with Invisible Lines* on page 60
- *Deforming a Drawing with the Perspective Tool* on page 62
- *Warping a Drawing with the Envelope Tool* on page 63

Current Drawing on Top

In Harmony, when you draw on a layer, the artwork is displayed in the correct order. For example, if the layer on which you are drawing is located behind an object on another layer, the lines you are drawing will be hidden behind that object.
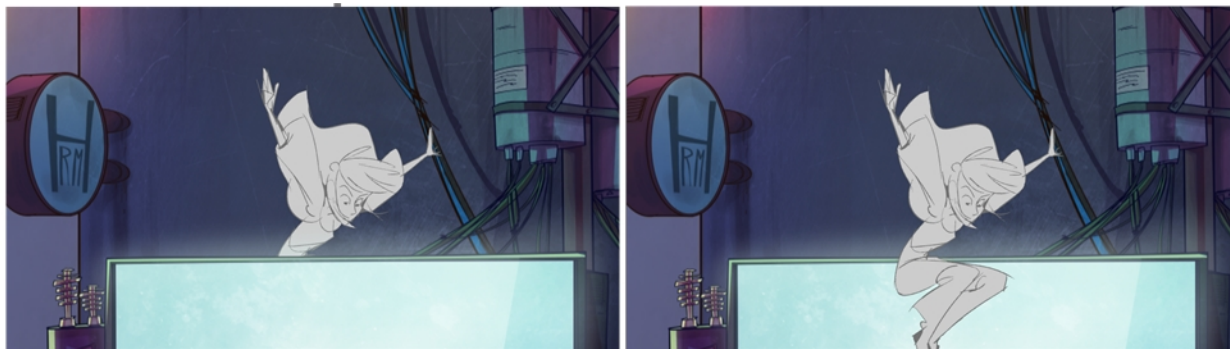
This lets you display the selected drawing on top of everything while you draw. By enabling this option, each time you select a drawing tool, the selected drawing is displayed in front of everything in the Camera view. The Timeline view ordering remain unchanged.

The Current Drawing on Top status (enabled or disabled) is remembered when you exit Harmony. When you restart the application, the last status will be used.

You only need to enable this option once, it is not necessary to do it each time you select a drawing tool.

How to display the drawing on top

1. Do one of the following:

   ‣ From the top menu, select **View > Show > Current Drawing on Top**.

   ‣ In the Camera bottom toolbar, click the Current Drawing on Top button.

2. In the Tools toolbar, select a drawing tool.

3. In the Camera view, start drawing.

Drawing with the Pencil Tool
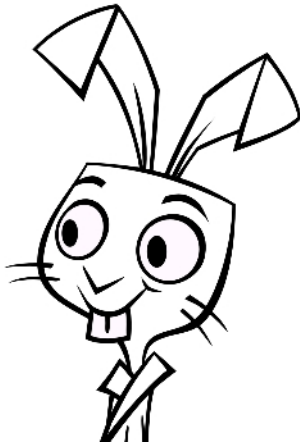
The Pencil tool is for drawing the final images, such as character nodes, cut-out puppet and clean animation. The pencil creates a central vector shape.

How to draw with the Pencil tool

1. In the Timeline view, select the cell on which you want to draw.

2. In the Tools toolbar, select the Pencil ✏ tool or press Alt + /.

3. In the Colour view, click a colour swatch to select a colour.
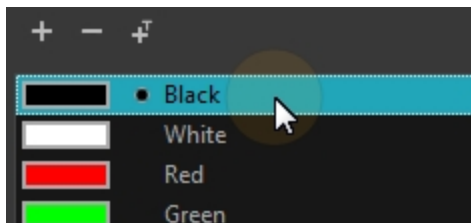
4. In the Drawing or Camera view, start drawing.

   ‣ When you get close to an existing pencil line, hold Alt to draw and connect your stroke to the existing one. Pencil lines are central vector lines and you might think your line is connected, but in fact, only the contour is touching the other one. Also, make sure the central vector crosses the other one.
   To connect the start or end of your stroke, hold Alt when you start or finish drawing a line.

   ‣ To draw a straight line, press Shift + Alt as you draw.
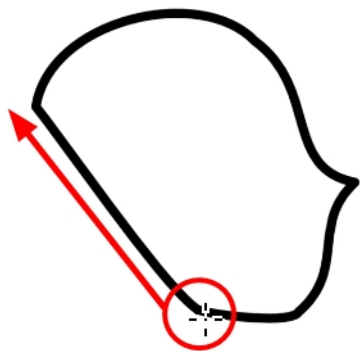
Working with Pencil Presets

A pencil preset is a pencil with specific properties.

Regular pencil presets allow you to set the size and smoothing of a pencil line, or the size of a shape.

How to select a pencil preset

1. In the Tools toolbar, select the Pencil ✐ , Line ╱ , Ellipse ◯ , or Rectangle ▭ tool.

2. In the Tool Properties view, use the Presets menu to select a pencil preset.

3. In the Drawing or Camera view, draw your pencil line or shape.
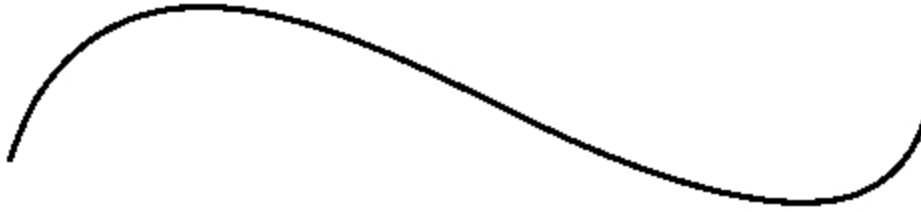
How to create a pencil preset

1. In the Tools toolbar, select the Pencil ✐ , Line ╱ , Ellipse ○ , or Rectangle ▭ tool.

2. In the Tool Properties view, adjust your pencil settings.

3. In the Tool Properties view, click the New Brush ✚ button.

   The New Preset dialog box opens.

   Name
   My_Preset

   OK   Cancel
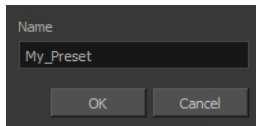
4. Type in a name for your new pencil thickness stencil and click **OK**.

5. Start drawing in the Drawing or Camera view.

How to rename a pencil preset

1. In the Tools toolbar, select the Pencil ✐ , Line ╱ , Ellipse ○ , or Rectangle ▭ tool.

2. In the Presets menu, select the preset you want to rename.

3. From the Brush menu ▤ , select **Rename Brush**.

   The Rename Preset dialog box opens.

   Name
   Pencil 1

   OK   Cancel
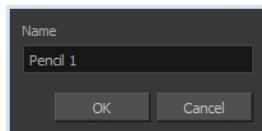
4. In the Name field, type in the new name.

5. Click **OK**.

How to delete a thickness stencil or pencil preset

1. In the Tools toolbar, select the Pencil ✐ tool.

2. In the Presets menu, select the thickness stencil or preset to delete.

3. Click the Delete Preset button.

How to import pencils, brushes and erasers

1. From the Brush menu , select **Import Brushes**.

2. In the browser window that appears, navigate to and select the **.xml** file.

3. Click **Open.**

4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.
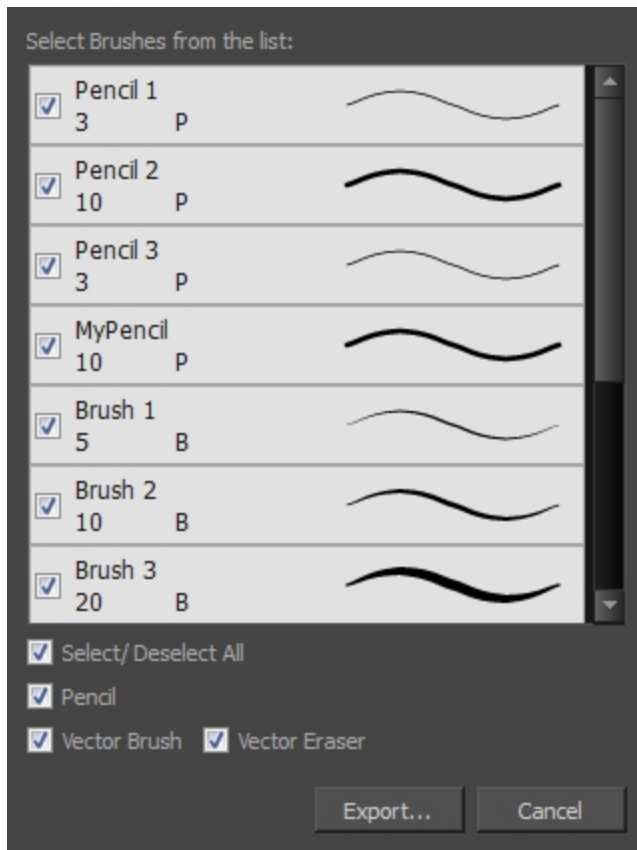

5. Click **Import**.

    The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.

2. In the Export Brushes dialog box, select the vector brushes and erasers to export, as well as any pencils.

3. Click **Export**.

4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.

5. Click **Save**.

How to change the Presets Library thumbnail display

1. From the Brush menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Displays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.

Drawing with the Brush Tool

The Brush tool is pressure sensitive and lets you create a contour shape with a thick and thin line effect, as if it was created with a paint brush.

With the Brush tool, you can draw as vector or bitmap, depending on your preference. When you add a drawing layer, you can simply select the vector or bitmap option. If you draw with vector, you can enlarge your drawing and zoom into it without losing quality or resolution. You can also use the Contour Editor and Select tools to resize and modify lines. If you draw with bitmap, you will not be able to scale your drawing beyond 100% of its resolution without encountering pixelization issues.

You can create your own brush styles. A variety of brush styles are provided allowing you to create and save your own.This way you can create brushes with precise sizes and parameters and save them so you can draw and design with them. Renaming a brush can make it easier to identify and access the brushes you use most frequently.

A dynamic brush can be created for drawing using patterns created from your artwork. Create a new dynamic brush to copy a pattern you have drawn to reproduce it quickly. You can create dynamic brushes using a single or multiple patterns that automatically switch through the patterns as you draw.

How to draw with the Brush tool

1. In the Timeline view, click the Add Drawing Layer 🐾 button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

   The Add Drawing Layer window opens.
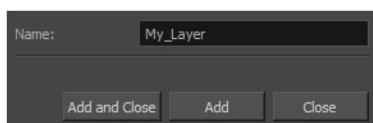
2. In the Name field, name your new layer.

3. Do one of the following:

   ‣ Click **Add** to add a first layer and keep the window open to add more layers.
   ‣ Click **Add and Close** to add a new layer and close the window.

   A new drawing layer is added to the Timeline view.

4. In the Timeline view, select the cell on which you want to draw.

5. In the Tools toolbar, select the Brush ✐ tool or press Alt + B.

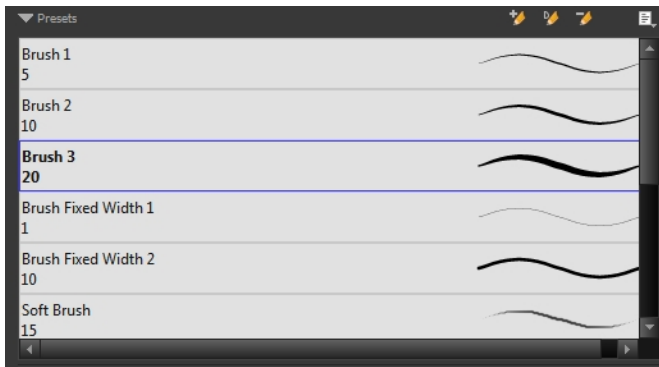6. In the Colour view, click a colour swatch to select a colour.
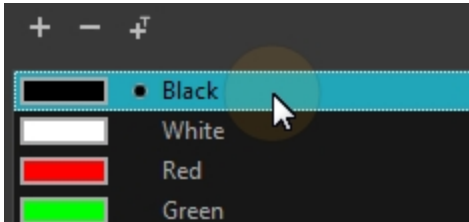
7. In the Drawing or Camera view, start drawing.

   ‣ Hold Ctrl (Windows/Linux) or ⌘ (Mac OS X) to force a line to join the start and end of the shape while drawing.
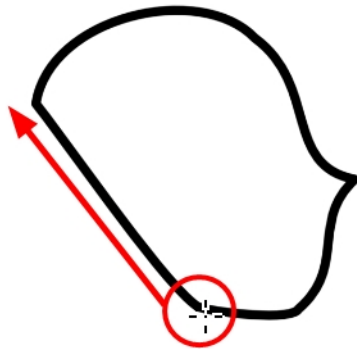
How to select a brush style

1. In the Tools toolbar, select the Brush ✐ tool or press Alt + B.

2. In the Tool Properties view, select a brush style from the Presets section.

How to modify the brush settings
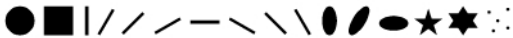
1. In the Tools toolbar, select the Brush ✎ tool or press Alt + B.

2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters. Click the arrow button.
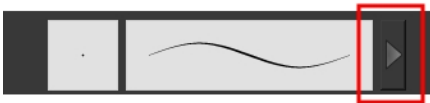

The Brush Properties window opens.

This is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.

| Parameter	Description
Size and Smoothness	
Maximum Size	Sets the maximum width of the line.
Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter smooths the contour of the line once it has been traced. The higher the value, the fewer control points will compose your line.
Tip Shape	Lets you select a tip shape—from round and square ones to star shaped. This option is disabled when using a textured brush. ●■❘❘∕∕∕─╲╲╲❶❶●★✦⠿

How to create a brush preset

1. Make sure your current brush has the settings you want in the preset you will create.

2. In the Tool Properties view, do one of the following:

   ‣ Click the arrow button to display the Brush Properties window and click the New Brush ✎ button in the upper-right corner.
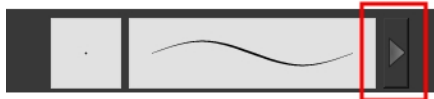
   ‣ Click the New Brush ✎ button.
   ‣ From the Brush ☰ menu, select **New Brush Preset**.

3. In the New Preset window, type a name for your new brush preset.

   The new brush is added to the end of the list of brush presets.

How to update a brush preset

1. Select the brush preset to update and click the arrow button to display the Brush Properties window.
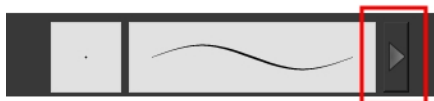
2. Change the brush settings and click the Update Brush Preset ✎ button in the upper-right corner.

How to rename a brush

1. In the Tool Properties view, select a brush to rename.

2. From the Brush ▤ menu, select **Rename Brush**.

3. Type in a new name for the brush and click **OK**.

How to delete a brush preset

1. In the Tool Properties view, select the brush preset you want to delete.

2. Do one of the following:

   ‣ Click the Delete Brush ✎ button.

   ‣ From the Brush ▤ menu , select **Delete Brush**.

Viewing the Final Lines as You Draw

Everything you draw in Harmony is vector-based, unless you purposely elected to draw as bitmap. Although, when you draw in the Drawing or Camera view, notice that your lines may appear jagged. This is caused by the fast real-time display called OpenGL. If you prefer to see smooth lines as you draw, you can enable the antialiasing preference.

Full Scene Antialiasing

Full scene antialiasing is generated by your computer's graphics card. This antialiasing will not only antialias your drawings, but all your different views in the interface. Full scene antialiasing is an option you can turn on and off; by default, it is disabled.

There is no need to modify your graphic card settings.

NOTE: Full Scene Antialiasing parameters are only valid while you work in your scene. The scene will be rendered to 100% of its resolution regardless of your preference settings or graphic card panel.
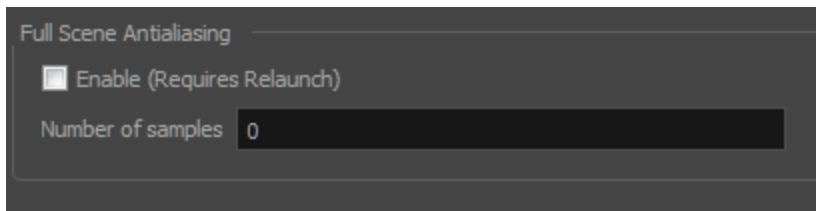
How to customize the full scene antialiasing parameters

NOTE: You must restart Harmony after you change the parameters.

1. Do one of the following:

   ‣ From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage Essentials > Preferences** (Mac OS X).

   ‣ Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

   The Preferences dialog box opens.

2. In the OpenGL tab, go to the Full Scene Antialiasing section.

   ‣ **Enable:** Select this option to enable/disable the Full Scene Antialiasing.

3. **Number or samples**: Enter the number of samples you want to be used for the antialiasing process. The number of samples is basically equivalent to the amount of times a pixel will be enlarged to calculate the antialiasing. This technique is called *supersampling*. The higher the number of samples, the better the anti-aliasing quality will be, but the longer it will take to calculate.

4. Restart Harmony.

Selecting Drawing Objects
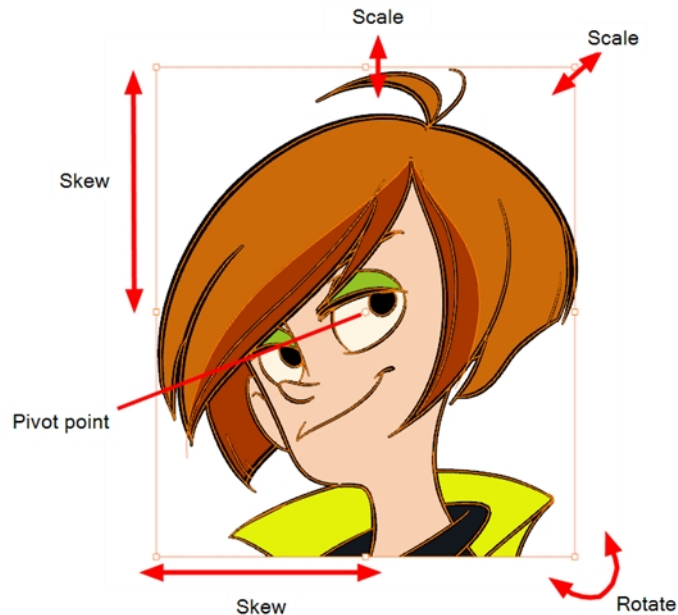
The Select tool is used to select strokes in both the Drawing and Camera views, and apply basic transformations, such as repositioning, rotating, scaling or skewing using the different handles of the bounding box.

Sometimes, when you want to select multiple objects while leaving one unselected, it can be handy to select only the stroke or line that you do not want included in your selection. Then, you can invert the selection so that everything else becomes selected. This can be quite a time saver.

By default, when you draw a selection box, the Select tool will select only the drawing strokes of the current drawing. If you prefer the Select tool to select all the strokes on all layers, you can disable the Works on Single Drawing option in the Tool Properties view or the Select Tool Works on Single Drawing option in the Preferences dialog box.

Some of the transformations, such as rotation, scale, skew, and flip are done relative to the position of the pivot point. You can temporarily reposition this pivot point for a transformation using the Select tool.

How to select with the Select tool

1. In the Timeline view, select the cell on which you want to select drawing objects.

2. In the Tools toolbar, select the Select ⬉ tool or press Alt + S.

3. In the Camera view, select the drawing objects.

   ‣ You can select all the drawing objects in a drawing by using **Edit > Select All** or by pressing Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).

4. To deform or reposition a selection:

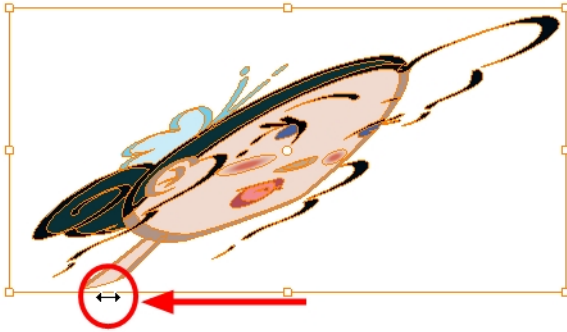   ‣ To reposition, click the selected drawing object and drag the selection to a new area.
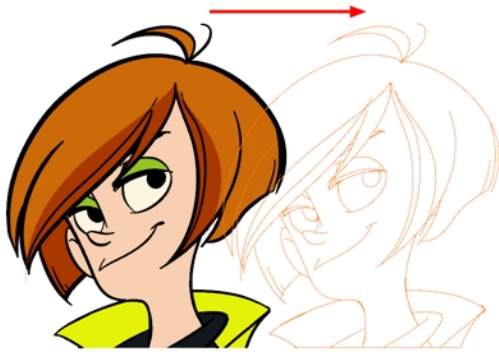
▸ To rotate, grab the selection box handle and rotate it.
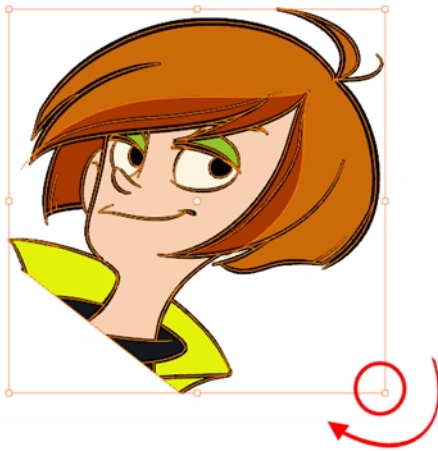
▸ To scale, pull or push on the top, side, bottom or corner control point. Hold down Shift to lock the selection's ratio.

▸ To skew, drag sideways or up and down the sides or top and bottom segments, between the control points.

How to invert a selection

1. From the top menu, select **Edit > Invert Selection** or press Ctrl + Shift + I.

How to enable and disable the Select Tool Works on Single Drawing preference

1. In the Tools toolbar, select the Select ▶ tool or press Alt + S.

2. Do one of the followings:

   - From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage Essentials > Preferences** (Mac OS X). In the Camera tab, go to the Tools section and select or deselect the **Select Tool Works on Single Drawing** option and click **OK**.

   - In the Tool Properties view, disable the Works on Single Drawing 🖉 option.

3. In the Camera view, make your selection. It is possible that you will have to restart Harmony depending on your system.

How to temporarily reposition the pivot point

1. In the Camera or Drawing view, select the drawing object you want to transform.

   The pivot point appears in the middle of your selection.

2. Click the pivot point and drag it to a new position.

   This becomes the new position of the pivot point for the current transformation and will remain there until you make a new selection.
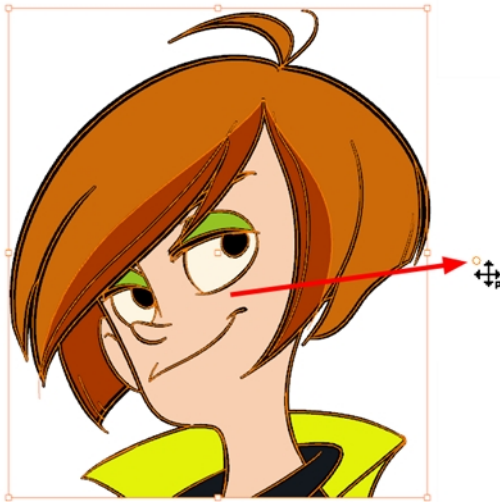
Erasing Parts of a Drawing

The Eraser tool is pressure sensitive, like the Brush tool, giving you more precision when erasing parts of a drawing. You can also use the Select tool to select drawing objects and delete them instead of erasing.

It is a good idea to create and save erasers with precise sizes and parameters in order to save time when drawing and designing. There are two icons located at the top, right corner of the Eraser Properties window. One is to create a new preset, while the other is to update the currently selected preset. Use them after you have set all the parameters for the new eraser preset.
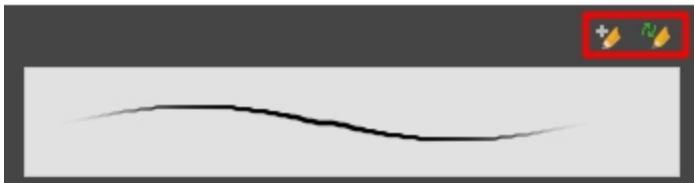
- ▸ **New Brush Preset**: Click on this button to create a new eraser brush style. The new eraser style will appear at the bottom of the list in the Presets section of the Tool Properties window. All the values and selected options in the Eraser Properties window will be attributed to this new style.
- ▸ **Update Preset:** Click on this button to update the selected eraser preset with any changes made in the Eraser Properties window. If you make changes and do not click on the Update Preset button, then all the changes made will only be applied to the selected eraser preset temporarily. The moment you switch to another eraser preset or to another drawing tool, these modifications to the eraser preset will disappear.

How to erase with the Eraser tool

1. In the Timeline or Xsheet view, select the cell that contains objects you want to erase.

2. In the Tools toolbar, select the Eraser ✎ tool or press Alt + E.

3. In the Camera or Drawing view, start erasing.

How to modify the eraser settings

1. In the Tools toolbar, select the Eraser ✏ tool .

2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters in the Eraser Properties view. Click the arrow button.
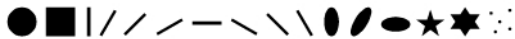
The Eraser Properties window opens.
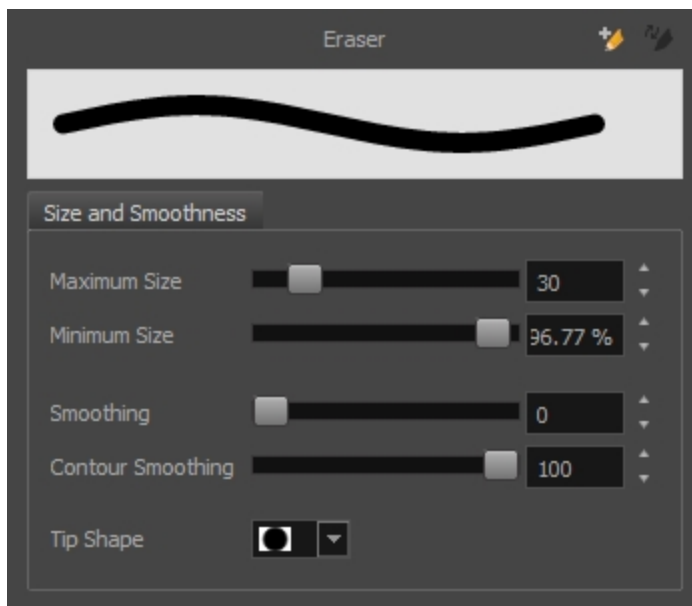
The Size and Smoothness tab is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke.

The Soft Eraser tab needs to be enable for its parameters to become active. This feature only works on soft or textured brush strokes. Both tabs works with the pressure sensitivity of a pen tablet.

Parameter	Description
Size and Smoothness	
Maximum Size	Sets the maximum width of the line.
Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter smooths the contour of the line once it has been traced. The higher the value, the fewer con-

	trol points will compose your line.
Tip Shape	Lets you select a tip shape–from round and square ones to star shaped. This option is disabled when using a textured brush.
	●■│/⁄⁄—◟◟◟❶◗●★✦⁚

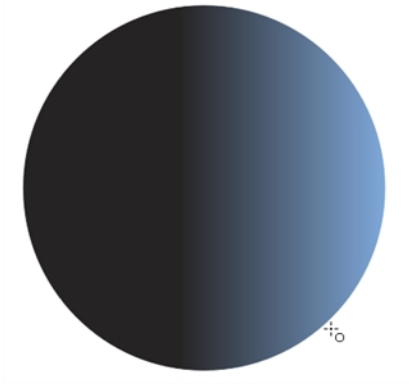# Reshaping a Drawing Using the Contour Editor Tool

The Contour Editor tool is a powerful tool that allows you to add, remove or modify points on a vector line and control them with Bezier handles. It is used to correct line shapes and modify a single part of a colour zone. If a line is too thin or has a gap in it, you can modify and correct it with the Contour Editor tool. You can also use this tool to create elaborate shapes.

The Contour Editor displays vector points around a shape and the central vector points in a pencil line. Pulling or pushing on these points adjusts the brush's line thickness. Points can be selected and deleted. Each point has two Bezier handles for correcting the curves between two points. Shapes can be modified by pulling and pushing directly on the segment between the points. You can use it to perfect a central shape pencil line, a contour shape brush line, or even create an elaborate shape from a basic ellipse or square.

### How to reshape with the Contour Editor tool

1. In the Timeline or Xsheet view, select the cell in which you want to draw.

2. In the Tools toolbar, select a shape tool: ⁄ ○ ▢ .

3. In the Tool Properties view, click the Ellipse ○ button, click the Auto Fill 🔴 button and set the pencil size to **0**.

4. In the Drawing or Camera view, draw a circle.

5. In the Tools toolbar, select the Contour Editor ⟂ tool.

6. In the Drawing or Camera view, click the line to reshape it.
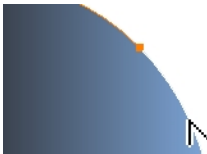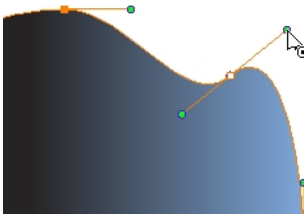
7. Select one or several points by clicking on them or circling around.
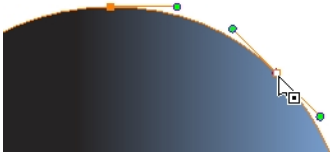
8. Press Delete to delete a selected point.

   Press Ctrl (Windows/Linux) or ⌘ (Mac OS X)and click on the contour to add a new point to adjust the contour.
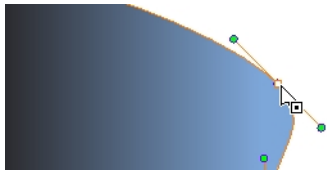
9. To modify the shape, you can:

   ▸ Pull on the Bezier handle. Both point's handles will move as one.

   ▸ Hold down Alt and pull on one of the Bezier handles. The point's handle will move independently from the other one.
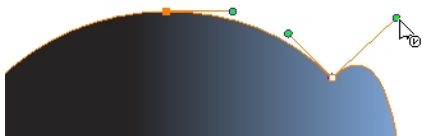
‣ Move the selected points to a new area.

‣ Pull directly on the line between two points. No selection is necessary. Holding down Shift will limit the contour modification to the curve between the two first points.
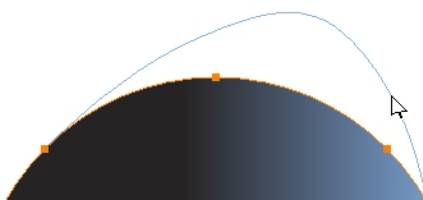
‣ If an anchor point has no visible Bezier handles, hold down the Alt key to display them.

‣ To add control points, press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click the line.

‣ To remove control points, select the control point and press Delete.
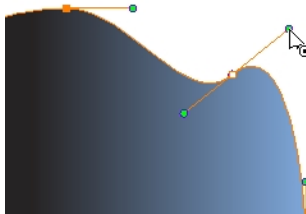
Drawing Shapes
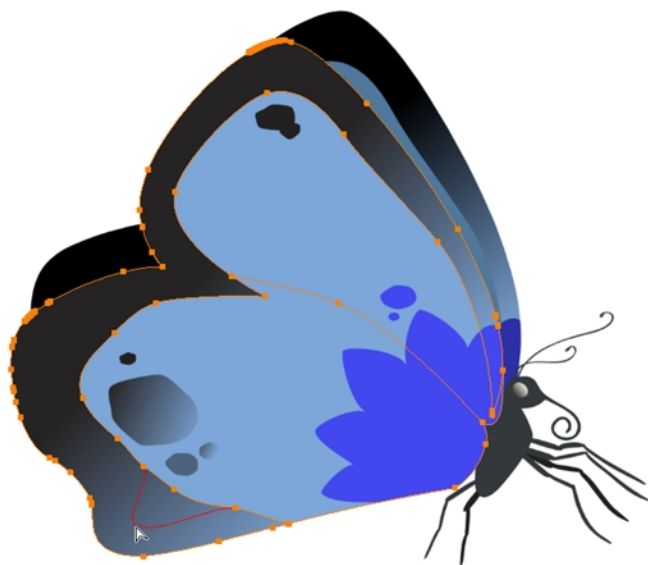
In Harmony, you can use the shape tools to draw circles, lines and squares. You can also easily reshape a square or circle into a much more complex drawing such as these butterfly wings—see *Reshaping a Drawing Using the Contour Editor Tool* on page 55 .

How to draw with a Shape tool

1. In the Timeline or Xsheet view, select the cell on which you want to draw.

2. In the Tools toolbar, select a shape tool: ╱ ○ ▢ .

3. To automatically fill the shape, in the Tool Properties view, select the Auto Fill ● option.

4. In the Camera view, click and drag to draw the shape.
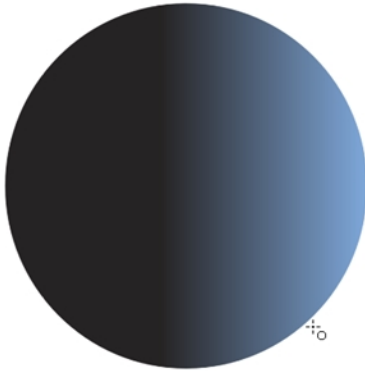
   ‣ Hold down Shift to lock the rectangle or the ellipse ratio to 1:1.
   ‣ Hold down Alt to draw the rectangle or ellipse from its centre.
   ‣ Hold down Shift to snap the line every 15 degrees.
   ‣ Hold down Alt to snap the start or end of the line to a nearby stroke.

5. Use the Contour Editor ▷ tool to deform the shape and create your drawing.

Drawing with the Polyline Tool

The Polyline tool is used to draw shapes with a central vector type of line. To form a shape, you click to add a point and then, without releasing the mouse, pull the handle in the desired direction before adding the next point and repeat the operation. To edit the shape, you can use the Contour Editor tool.

How to draw with the Polyline tool

1. In the Timeline view, select the cell on which you want to draw.

2. In the Tools toolbar, select the Polyline ⊊ tool or press Alt + _.

3. In the Camera or Drawing view, click and drag to create a point and a Bezier handle to shape your line.

   ‣ Press Alt to pull only one handle, instead of two.
   ‣ Press Shift to snap the handles to 45, 90, or 180 degrees.

4. Click a new area and drag to create a second point and Bezier handle.
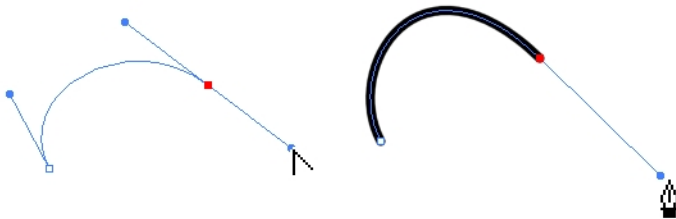
5. Repeat the previous step until your shape is completed.

6. Press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click to release the Polyline tool from the current path or shape that it is creating. Continue to use the tool to make multiple, independent paths or shapes.

7. If necessary, reshape the lines using the Contour Editor ▷ tool—see *Reshaping a Drawing Using the Contour Editor Tool* on page 55.

Drawing with Invisible Lines

There are two different ways to draw invisible lines.

Using the Pencil tool, you can draw as strokes only, meaning that the line will be invisible. This can be useful for drawing tones and highlights directly on the character.

The Stroke tool draws invisible lines only. You cannot add thickness to the line. Unlike the Close Gap tool that creates a short, straight line between two points, the stroke line will stay exactly where you draw it. This tool can be useful for closing a zone in a particular way or creating some hard shadows or highlight areas.

Sometimes, it may be difficult to see your strokes, especially if your colours are similar to the blue stroke colour. In Harmony, you can display the strokes in washed-out colours so that the invisible lines stand out.

How to draw invisible lines with the Pencil tool

1. In the Timeline or Xsheet view, select the cell on which you want to draw.

2. In the Tools toolbar, select the Pencil ✏ tool or press Alt + /.

3. From the top menu, select **View > Drawing > Show Strokes** ✏ or press K.

4. In the Tool Properties view, set the Pen Style size to **0**. You can also adjust the smoothness.

5. In the Camera or Drawing view, start drawing.

   If you forgot to enable the Show Strokes option before drawing, as soon as you draw a first stroke, a Message dialog box opens.
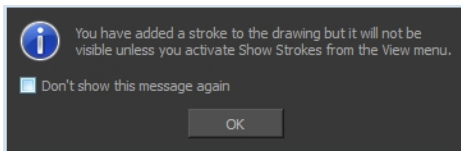
   Select the **Don't Show This Message Again** option if you do not want the dialog box to notify you about the Show Strokes option.

6. Click **OK**.

7. You can modify the stroke shape with the Contour Editor ⬚ tool.

How to draw invisible lines with the Stroke tool

1. In the Timeline or Xsheet view, select the cell on which you want to draw.

2. In the Tools toolbar from the Paint drop-down menu, select the Stroke ⬚ tool or press Alt + V.

3. From the top menu, select **View > Show Drawing > Show Strokes** ⬚ or press K.

4. In the Tool Properties view, you can adjust the smoothness.

5. In the Camera or Drawing view, start drawing.

   If you forgot to enable the Show Strokes option before drawing, as soon as you draw a first stroke, a Message dialog box opens.
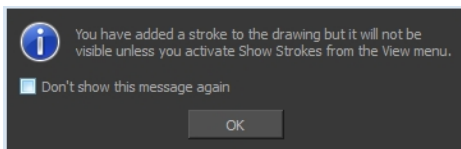
   Select the **Don't Show This Message Again** option if you do not want the dialog box to notify you about the Show Strokes option.

6. Click **OK**.

7. You can modify the stroke shape with the Contour Editor ⬚ tool.

Deforming a Drawing with the Perspective Tool

The Perspective tool lets you deform a drawing selection and alter its perspective.

How to deform a drawing with the Perspective tool

1. In the Tools toolbar, select the Perspective △ tool from the Contour Editor drop-down menu or press Alt + 0.

2. In the Camera or Drawing view, select a drawing to deform.

3. Click and drag the different anchor points to deform the shape.

Warping a Drawing with the Envelope Tool

The Envelope tool lets you deform and warp part of a drawing using a grid envelope and Bezier handles.

How to warp a drawing with the Envelope tool

1. In the Tools toolbar, select the Envelope ⊞ tool from the Contour Editor drop-down menu.

2. In the Timeline view, select a drawing to deform.

3. In the Camera or Drawing view, select the region you want to deform
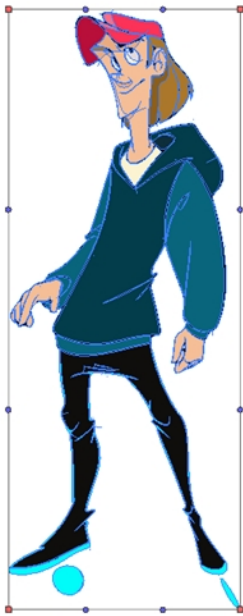
4. Click and drag the different anchor points and handles to deform the image.
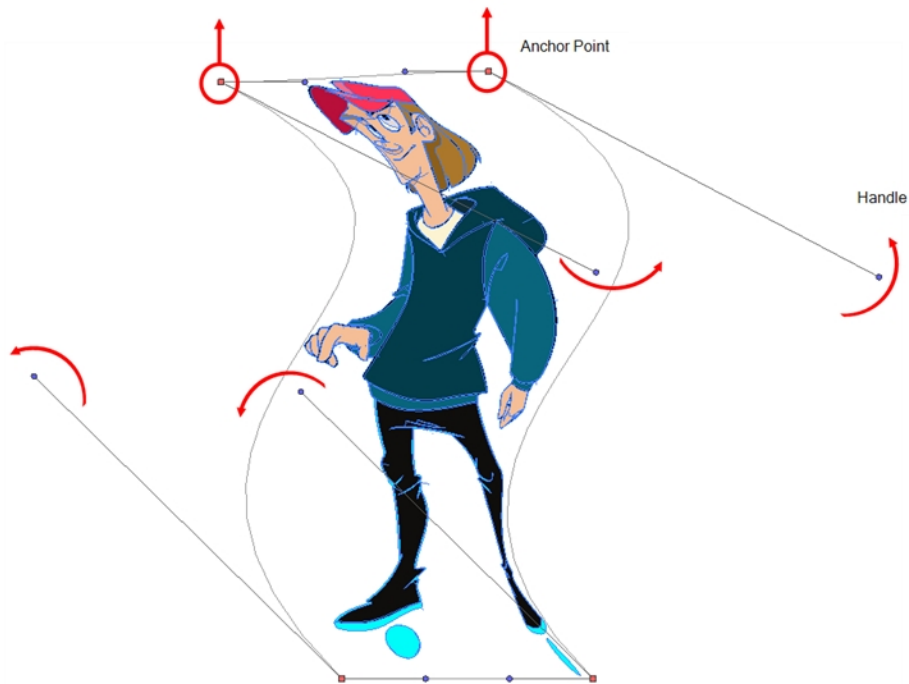
5. To display more controls, in the Tool Properties view, click the Show Advanced Controls button.
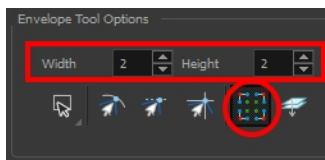
6. Increase the height and width of the grid to get more control points to deform your image.
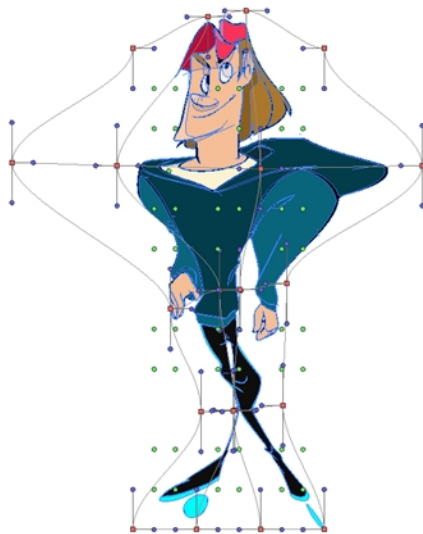
Cutting Drawing Parts

The Cutter tool lets you cut a drawing area to move, copy, cut or delete it.

How to cut with the Cutter tool

1. In the Tools toolbar, select the Cutter ✎ tool or press Alt + T.

2. In the Camera or Drawing view, make a selection around an area to cut away.

‣ To delete the selected zone, press Delete.
‣ To move the selection, click the selection and drag it to a new area.

▸ Use the bounding box controls to scale, skew, or rotate the cut piece.
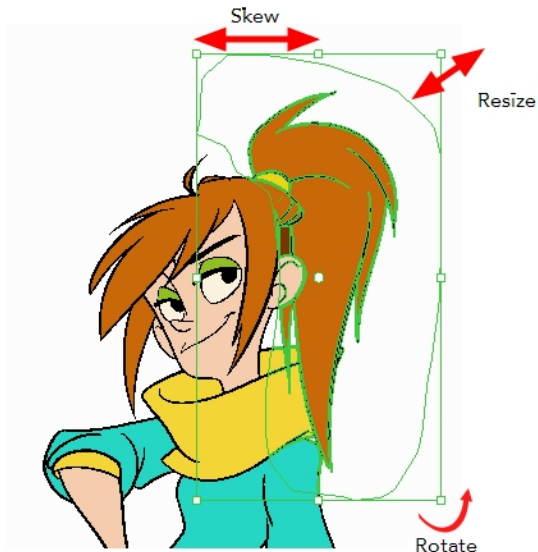
Smoothing Lines

When drawing in a digital application, it is not like drawing on a sheet of paper. Sometimes the lines you draw may look as if they were drawn with an unsteady hand. When this occurs, you may need to correct the look of your lines.

Harmony has a very powerful tool you can use to optimize contours and reduce the number of points on the lines, the Smooth Editor tool.
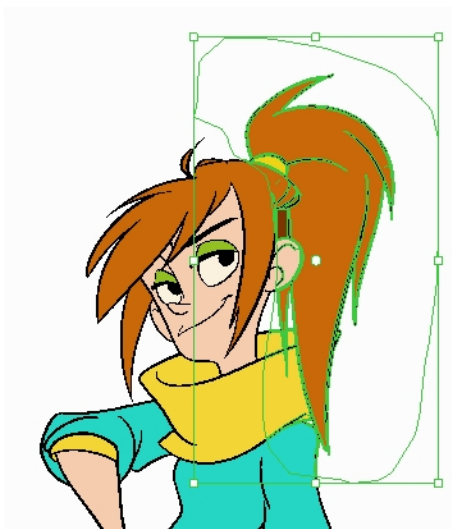
How to optimize lines with the Smooth Editor tool

1. In the Tools toolbar, select the Smooth Editor ⬚ tool or select **Drawing > Tools > Smooth Editor**.

2. In the Camera or Drawing view, place your pointer over the lines to smooth. You may need to pass over the same line several times to remove more points and make the line smoother. Note that by default, the Smooth Editor tool colour is yellow, it was changed to orange for screen grab clarity—see *Smooth Editor Tool Options* on page 101 to learn about the various settings available.
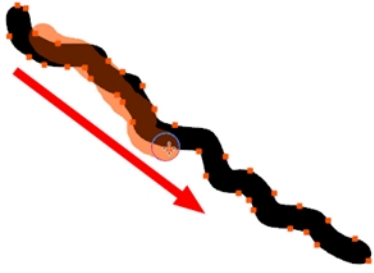
Working With Text
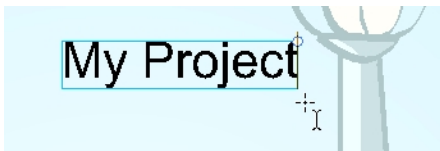
With the Text tool, you can type text in your project using various fonts and texts attributes. Text objects are part of a drawing, so you can manipulate them in the same way. OTF fonts are also supported.

How to add text to drawings

1. Do one of the following:

   ‣ In the Tools toolbar, select the Text ⊤ tool.

   ‣ From the top menu, select **Drawing > Tools > Text**.

   ‣ Press Alt + 9.

2. In the Timeline view, select the cell containing the drawing on which you want to add text.

3. In the Drawing or Camera view, click on the location you want the text to begin.

4. You can use the Tool Properties view to select the font, font size and format of the text you will type—see *Text Tool* on page 103.

5. Type in the desired text.

6. Click outside the text box to exit the typing mode.

If you want to create another text object, click outside the currently active text box. You can always return to edit the text by selecting the Text T tool and clicking in the text.

More Drawing Tools

Harmony offers a wide variety of useful tools to optimize your drawings and work more efficiently; tools such as Group, Arrange, and the animation disk to rotate your workspace.

Arrange

The different Arrange options let you reorder drawing objects inside a single layer in the Drawing or Camera view.

Name	Button	Description	Access Method
Bring to Front		Moves the selected art to the front (on top).	From the top menu, select **Drawing > Arrange > Bring to Front.** Press Ctrl + Shift + PgUp (Windows/Linux) or ⌘ + Shift + PgUp (Mac OS X).
Bring Forward		Moves the selected art one level forward (closer to the front).	From the top menu, select **Drawing > Arrange > Bring Forward**. Press Ctrl + PgUp (Windows/Linux) or ⌘ + PgUp (Mac OS X).
Send Backward		Moves the selected art one level lower (behind).	From the top menu, select **Drawing > Arrange > Send Backward**. Press Ctrl + PgDown (Windows/Linux) or ⌘ + PgDown (Mac OS X).
Send to Back		Moves the selected art behind everything (bottom / back).	From the top menu, select **Drawing > Arrange > Send to Back**. Press Ctrl + Shift + PgDown (Windows/Linux) or ⌘ + Shift + PgDown (Mac OS X).

Convert Brush Strokes to Pencil Lines

The Brushes Strokes to Pencil Lines operation converts selected contour strokes into centreline pencil strokes. The brush stroke thickness will be lost.

How to convert brush strokes to pencil lines

- ‣ From the top menu, select **Drawing > Convert > Brush Strokes to Pencil Lines** or press ^.
- ‣ Right-click on the selection, select **Convert > Brush Strokes to Pencil Lines** or press ^

Pencil Lines to Brush Strokes

The Pencil Lines to Brush Strokes operation converts the selected centreline pencil strokes into contour strokes brush lines.

How to convert pencil lines to brush strokes

- ‣ From the top menu, select **Drawing > Convert > Pencil Lines to Brush Strokes** or press &.
- ‣ Right-click on the selection, select **Convert > Pencil Lines to Brush Strokes** or press &

Strokes to Pencil Lines

The Strokes to Pencil Lines operation converts the selected invisible line to a pencil line.

How to convert strokes to pencil lines

- ‣ From the top menu, select **Drawing > Convert > Strokes to Pencil Lines** or press Shift + F12

(Windows/Linux only).

▸ Right-click on the selection, select **Convert > Strokes to Pencil Lines** or press Shift + F12 (Windows/Linux only)

Optimize
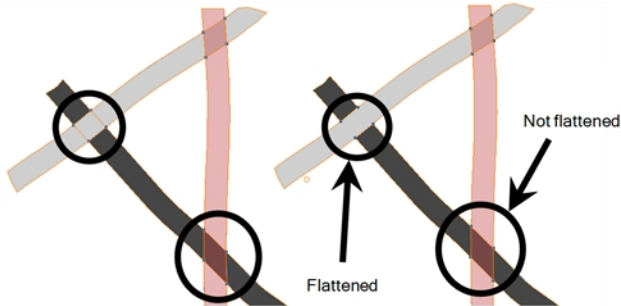
The Optimize command reduces the number of layers, such as overlapping brush strokes, in the selected drawing objects. Drawing objects will only be flattened and optimized if the selected objects do not change the appearance of the final image when they are merged.

For example, if you have selected a number of partially transparent objects, which you layered to create an additive colour effect, the selected transparent drawing objects will not be merged. This is because merging the transparent drawing objects will cause them to lose the effect of the layered transparent colours.

How to optimize

▸ Use the Select tool to select the drawing objects you want to optimize.

▸ From the top menu, select **Drawing > Optimize > Optimize**.

▸ From the Camera or Drawing view menu, select **Drawing > Optimize > Optimize**.

Grid

Use the Show Grid option to display a grid in the Drawing or Camera views.

Name	Button	Description	Keyboard Shortcut
Show Grid	⊞	Displays the grid.	**View > Grid > Show Grid** Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
Grid Outline Only		Displays the outline of the grid only.	**View > Grid > Grid Outline Only**
Square	⊞	Displays a standard square grid.	**View > Grid > Square**
12 Field Grid	12	Displays a 12-field size grid.	**View > Grid > 12 Field Grid**
16 Field Grid	16	Displays a 16-field size grid.	**View > Grid > 16 Field Grid**
Underlay		Displays the grid under the drawing elements.	**View > Grid > Underlay**
Overlay		Displays the grid over the drawing elements.	**View > Grid > Overlay**

Group/Ungroup

Use the Group option to group selected drawing objects. This can help in the selection, repositioning, re-scaling and other transformations to be applied to multiple objects of a drawing.

- From the top menu, select **Edit > Group > Group** or **Edit > Group > Ungroup**.

- From the Camera or Drawing view menu, select **Edit > Group > Group** or **Edit > Group > Ungroup**.

- Press Ctrl + G and Ctrl + Shift + G (Windows/Linux) or ⌘ + G and ⌘ + Shift + G (Mac OS X).

Hand

Use the Hand tool to pan through the Drawing or Camera view.

- In the Tools toolbar, select the Hand ✋ tool, click in the Drawing or Camera view and drag.

- You can also Hold down the Spacebar, click in the Drawing or Camera view and move your mouse in the direction you want to pan the view.

Rotate View

The Rotate View ⬤ tool lets you rotate the Drawing or Camera view, the same way as you would do with a real animation disc. This tool can also be used in the Perspective view.

How to use the Rotate View tool

1. Do one of the following:

   ‣ From the top menu, select **Drawing > Tools > Rotate View**.

   ‣ Press Ctrl + Alt (Windows/Linux) or ⌘ + Alt (Mac OS X).

   ‣ In the Tools toolbar, select the Rotate View 🔴 tool.

   ‣ In the Drawing or Camera view, right-click and select **Drawing Tools > Rotate View**.

2. In the Drawing or Camera view, click and drag to rotate the space.

Drawing Tool References

Harmony has a wide variety of drawing tools and each one of them has a series of options and modes available. This section covers these options. For details on how to use these tools, see _Drawing Tasks_ on page 36.

- _Pencil Tool Options_ on page 73

- _Vector Brush Tool Options_ on page 75

- _Select Tool Options_ on page 78

- _Eraser Tool Options_ on page 84

- _Contour Editor Options_ on page 88

- _Shape Tool Options_ on page 90

- _Polyline Tool Options_ on page 93

- _Stroke Tool Options_ on page 94

- _Perspective Tool Options_ on page 95

- _Envelope Tool Options_ on page 96

- _Cutter Tool Options_ on page 99

- _Smooth Editor Tool Options_ on page 101

-

Pencil Tool Options

When you select the Pencil ✎ tool, its properties and options appears in the Tool Properties view.
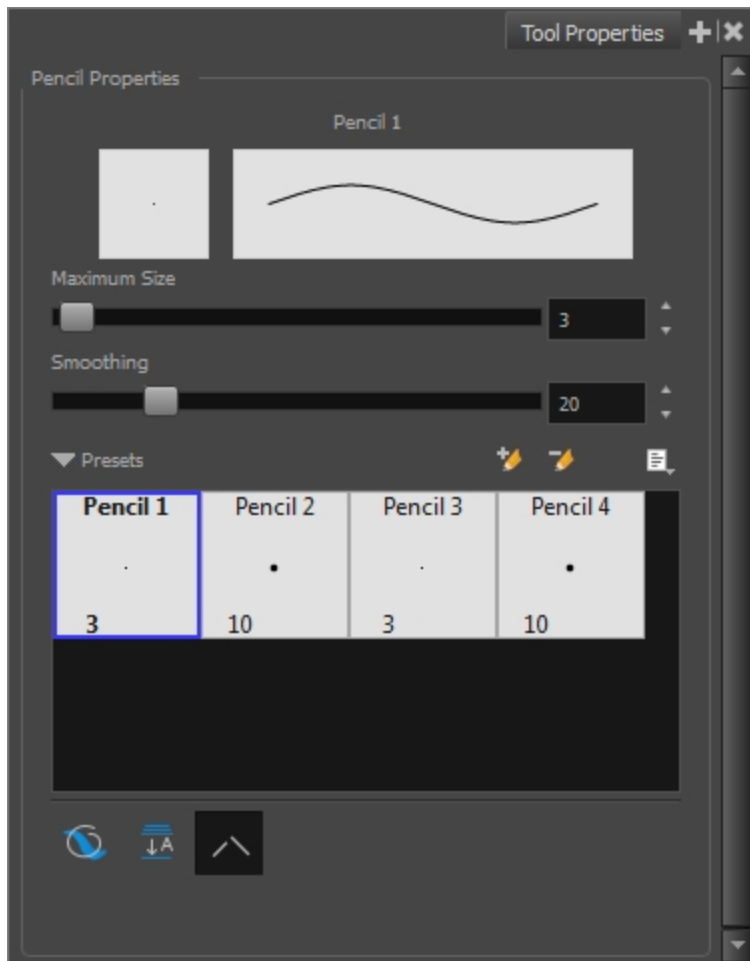
Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

- ▸ **MaximumSize:** Defines the width of the stroke.
- ▸ **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

Pencil Presets

Harmony provides a variety of pencil presets and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.

You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project—see *Working with Pencil Presets* on page 39

Draw Behind

When drawing on vector layers, the Draw Behind 🖌 mode lets you paint behind existing art. By default, strokes appear over your work until you release the tool.

Auto-Flatten Mode

When drawing on vector layers, lines do not usually become one object. The Auto-Flatten ☰ mode automatically merges lines created with the existing ones into one single object as you draw.

NOTE:
Using the Select tool, you can use select and remove a segment of flattened pencil lines. Overlapping pencil lines drawn with the Auto-Flatten mode enabled are essentially cut into segments by the overlap and can therefore be treated as individual lines.

Middle mouse
button drag

Auto-Close Gap

Auto Close Gap off   Auto Close Gap on
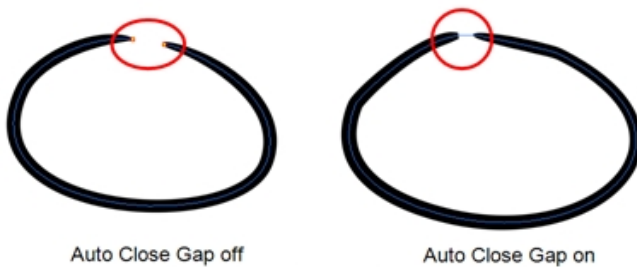
When using the pencil tool, you can automatically close strokes with an invisible stroke.

It is recommended to keep this option enabled when drawing with the Pencil tool.

Vector Brush Tool Options

When you're drawing on a vector layer and select the Brush ✎ tool, its properties and options appear in the Tool Properties view.

Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.

1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.

2. Click on the Show Extended Properties arrow to display advanced customization parameters.

Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

▸ **MaximumSize:** Defines the width of the stroke.

‣ **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

Brush Presets

Brush presets are created by saving the properties of the current brush to a new preset, which you can reuse for repeated tasks. You can create as many brush presets as you need—see *Drawing with the Brush Tool* on page 43.

How to import pencils, brushes and erasers

1. From the Brush menu ▤ , select **Import Brushes**.

2. In the browser window that appears, navigate to and select the `.xml` file.

3. Click **Open.**

4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.

5. Click **Import**.

   The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.

2. In the Export Brushes dialog box, select the vector brushes and erasers to export, as well as any pencils.

3. Click **Export**.

4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.

5. Click **Save**.

How to change the Presets Library thumbnail display

1. From the Brush menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Displays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.

Draw Behind

When the Draw Behind 🖊 mode is enabled, the lines you draw will appear behind the art that already exists.

Repaint Brush Mode

The Repaint Brush 🖌 is used to repaint zones that have already been painted, it will not affect empty zones or pencil lines. It also automatically flattens each of its brush lines so it does not add new brush lines on top of existing ones. You can use this mode to paint tones or highlights onto your character.

Auto-Flatten Mode

When enabled, the Auto-Flatten 🖩 mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

Select Tool Options

When you use the Select ▶ tool, its properties and options appear in the Tool Properties view.
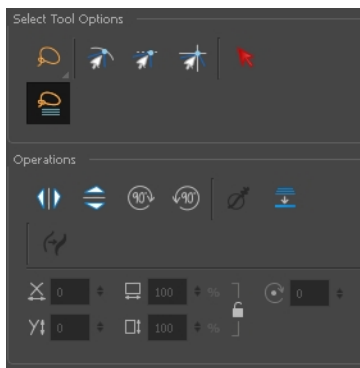
Lasso and Marquee

Choose between the Lasso ⬭ and Marquee ▢ options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

Snap Options

You can enable different snapping modes to help you when repositioning drawings using the Select tool.

- **Snap to Contour:** Snaps your selection or point to any line you position it on. As soon as you move it close enough to another line, your point or selection will snap to it.

- **Snap and Align:** Snaps the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to.

- **Snap to Grid:** Snaps your selection following the currently enabled grid.
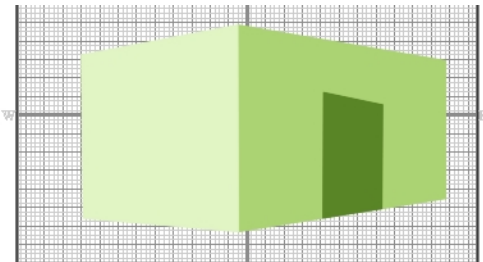
How to snap to the grid

1. Do one of the following:

   ‣ Select **View > Grid > Show Grid** to display the grid in the Camera or Drawing view or press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).

   ‣ Select **View > Grid > Square Grid**, **12 Field Grid** or **16 Field Grid** for your current needs.

2. In the Tools toolbar, select the Contour Editor ▷ tool or press Alt + Q.

3. In the Tool Properties view, click the Snap to Grid ✦ button.

4. In the Camera or Drawing view, click on the anchor point you want to snap to the grid, drag it to the desired position and release.
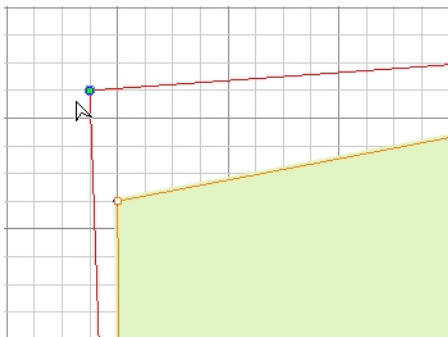
Selecting by Colour

The Select by Colour mode lets you select all the zones and lines in your drawing painted with the same colour swatch.

> **NOTE:** Only the zones painted with the **SAME** colour swatch will be selected. If another zone is coloured with the exact same RGB value (same colour), but not painted with the same colour swatch, it will not be selected.

How to select areas by colour

1. In the Tools toolbar, select the **Select** ![cursor] tool or press Alt + S.

2. In the Tool Properties view, click the Select by Colour ![cursor] button.

3. In the Camera or Drawing view, click on any zone or line in your drawing.

   All zones and lines of the same colour are selected.

4. Click the Select tool again to return to the regular Select mode.

Single Mode

By default, when you draw a selection box in the Camera view, the Select tool will select only the drawing strokes of the current drawing. If you prefer the Select tool to select all the strokes on all layers, you can disable the Works on Single Drawing ⌂ option in the Tool Properties view or disable the Select tool Works on Single Drawing preference. To do this, go to the top menu, select **Edit > Preferences > Camera** (Windows/Linux) or **Stage Essentials > Preferences > Camera** (Mac OS X) and uncheck the Select tool Works on Single Drawing option.

Flip Horizontal and Vertical

The Flip Horizontal ◁|▷ and Flip Vertical ⬃ operations flip the current selection horizontally or vertically.

‣ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

Rotate 90 Degrees CW and CCW

The Rotate 90 Degrees CW 🔄 and Rotate 90 Degrees CCW 🔄 operations rotate the current selection 90 degrees clockwise or counter-clockwise.

‣ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.

‣ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

Smooth

The Smooth 🖊 operation lets you smooth out selected drawing strokes and remove extra points.

‣ From the top menu, select **Drawing> Optimize > Smooth** or press Alt + Shift + S.

Flatten
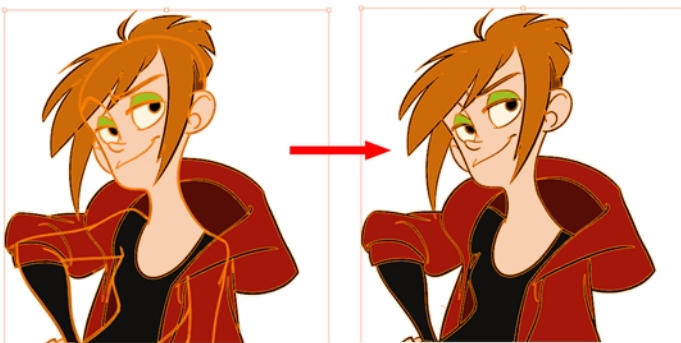
The Flatten ⬇ operation is used to merge drawing objects and brush strokes into a single layer. If you draw new lines to fix a drawing or line with many brush strokes, it can be useful to flatten them all into a single shape. By default, lines are drawn one on top of each other. If you intend to repaint the lines or modify their shape, it will be easier if they are flattened.

‣ From the top menu, select **Drawing > Optimize > Flatten** or pres Alt + Shift + F.

Distribute to Layers

The Distribute to Layers   option is used to separate the selected art strokes and send them to new drawing layers. In the Camera view, once you have drawn your artwork, you can select the strokes you want to distribute using the Select   tool and click on the Distribute to Layers   button; you can also select **Drawing > Distribute to Layers**. It will automatically take every stroke from the drawing selection made in the Camera view and separate them into a different layer for each. If an artwork is composed of several strokes, you must group them using **Edit > Group > Group** before using the Distribute to Layers option. This option cannot be done from the Drawing view.

Pencil to Brush
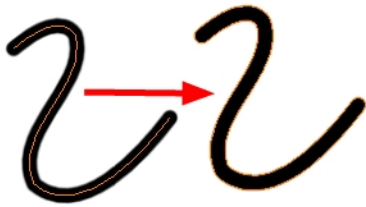
The Pencil to Brush   operation converts the selected centre line pencil strokes into contour strokes brush lines.

From the top menu, select **Drawing > Convert > Pencil Lines to Brush** or press &.

Offset X and Y

Use the Offset X and Offset Y operation fields to enter specific values and precisely reposition the selected shape.

1.   **X**: Type a value in this field to reposition your selection along the X-axis.
2.   **Y**: Type a value in this field to reposition your selection along the Y-axis.
3.   **Up/Down arrows:** Use the up and down arrows to modify the value in the X or Y value field.

Width and Height

Use the Width and Height operation fields to enter specific values to resize the selected shape with precision.
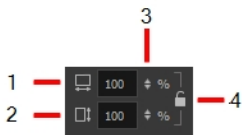
1.   **Width**: Type a value in this field to resize the width of your selection.
2.   **Height**: Type a value in this field to resize the height of your selection.
3.   **Up/Down arrows:** Use the up and down arrows to modify the value in the Width or Height fields.
4.   **Lock icon**: Click the lock icon to lock or unlock the ratio between the Width and Height values.

Angle

The Angle operation lets you to enter specific values and accurately rotate the selected shape.
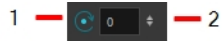
1. **Angle**: Type a degree value in this field to rotate your selection.
2. **Up/Down arrows:** Use the up and down arrows to modify the value in the Angle value field.

When you select a pencil line with the Select tool, additional options appear in the Tool Properties view.

Adjusting the Pencil Line Thickness

Use the Adjusting the Pencil Line Thickness operation field to resize the selected centreline strokes. This operation is not permitted on contour line shapes, such as brush strokes or shape fills.
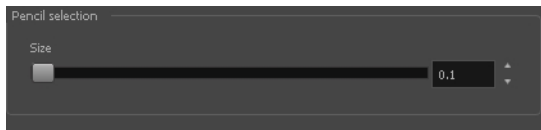
Adjusting the Text Selection

When you select text with the Select tool, the tool properties will display the Text tool options on the bottom of the view. You can also press Alt + 9 to display only the Text properties in the Tool Properties view—see *Text Tool* on page 103.
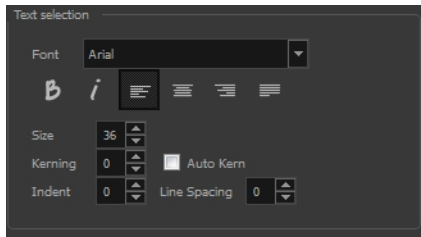
Eraser Tool Options

When you're drawing on vector layer and you select the Eraser 🖌 tool, its properties and options appear in the Tool Properties view.
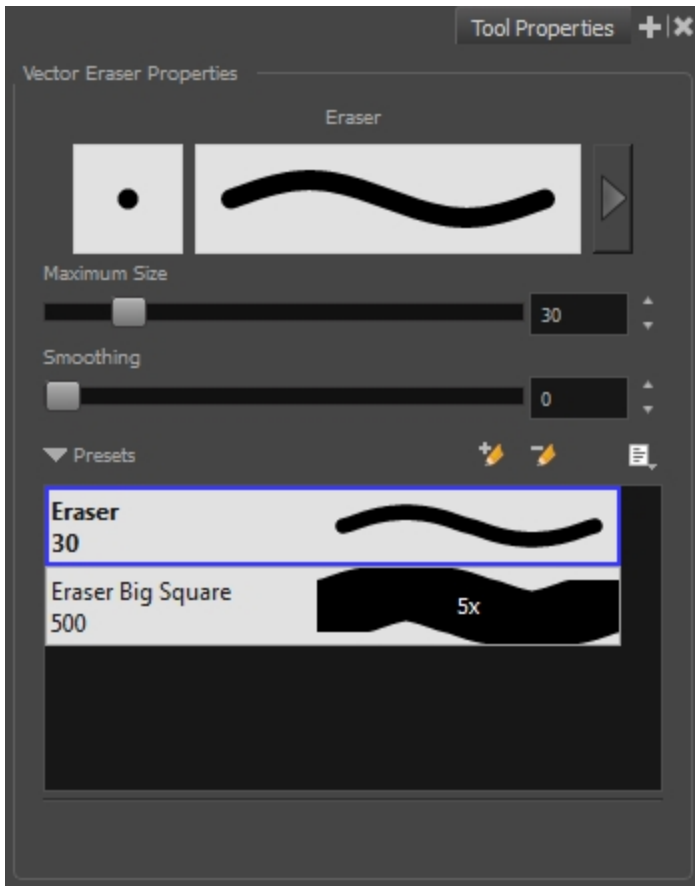
Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view. Click on the Show Extended Properties arrow to display advanced customization parameters,

Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

- ‣ **MaximumSize:** Defines the width of the stroke.
- ‣ **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

Eraser Presets

It is a good idea to create and save erasers with precise sizes and parameters in order to save time when drawing

and designing. Toon Boom Harmony provides you with a variety of default eraser styles and allows you to create and save your own.

Eraser presets are created by saving the properties of the current eraser as a preset, in order to reuse it again and again. You can create a new preset from the Eraser Tool Properties view, but it is better to do it from the Eraser Properties—see *Erasing Parts of a Drawing* on page 53.

The Eraser tool uses its own preset list, separated from the Brush tool.

How to import pencils, brushes and erasers

1. From the Brush menu 📄 , select **Import Brushes**.

2. In the browser window that appears, navigate to and select the `.xml` file.

3. Click **Open.**

4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.

5. Click **Import**.

   The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.

2. In the Export Brushes dialog box, select the vector brushes and erasers to export, as well as any pencils.

3. Click **Export**.

4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.

5. Click **Save**.

How to change the Presets Library thumbnail display

1. From the Brush menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Displays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.

Contour Editor Options

When you select the Contour Editor ⬚ tool, its properties and options appear in the Tool Properties view.
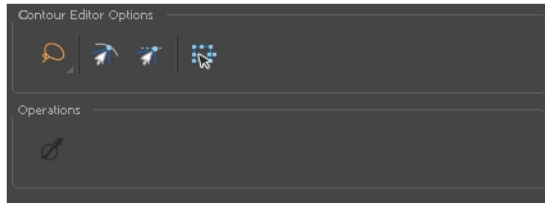
Lasso and Marquee

Choose between the Lasso ⬭ and Marquee ⬚ options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

Snap to Contour

The Snap to Contour ⬚ option will snap the selected anchor point to any line you position it on.

How to snap two shapes together

1. In the Tools toolbar, select the Contour Editor ⬚ tool or press Alt + Q.

2. In the Tool Properties view, click the Snap to Contour ⬚ button.

3. In the Camera or Drawing view, click on an anchor point you want to snap to the other shape, drag it on top of the contour line area and release it.
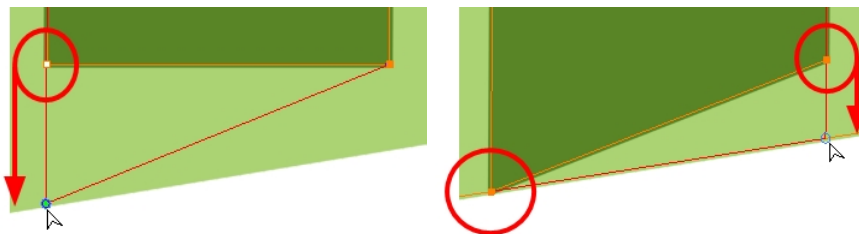
Snap and Align
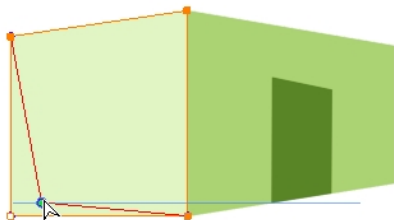
The Snap and Align ⤢ option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to.

How to snap and align

1. In the Tools toolbar, select the Contour Editor ▷ tool or press Alt + Q.

2. In the Tool Properties view, click the Snap and Align ⤢ button.

3. In the Camera view, click on an anchor point you want to snap, drag it until a ruler is displayed, position it on the ruler or on the contour line and release.

Show Contour Editor Controls
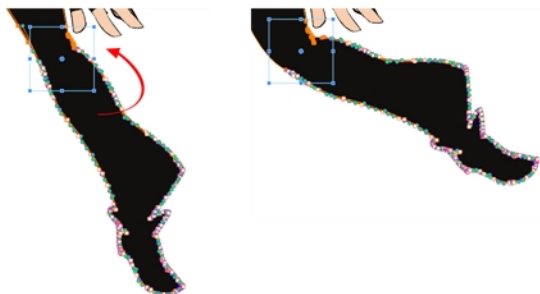
Use the Show Contour Editor Controls 🔲 option to show the contour editor controls. You can use these controls to scale, reposition and rotate the selected anchor points.

Smooth Selection

The Smooth ✐ operation lets you smooth out selected drawing strokes and remove extra points.

▸ From the top menu, select **Drawing> Optimize > Smooth** or press Alt + Shift + S.

Shape Tool Options

When you select a shape tool (Rectangle, Ellipse, Line), its properties and options appear in the Tool Properties view.
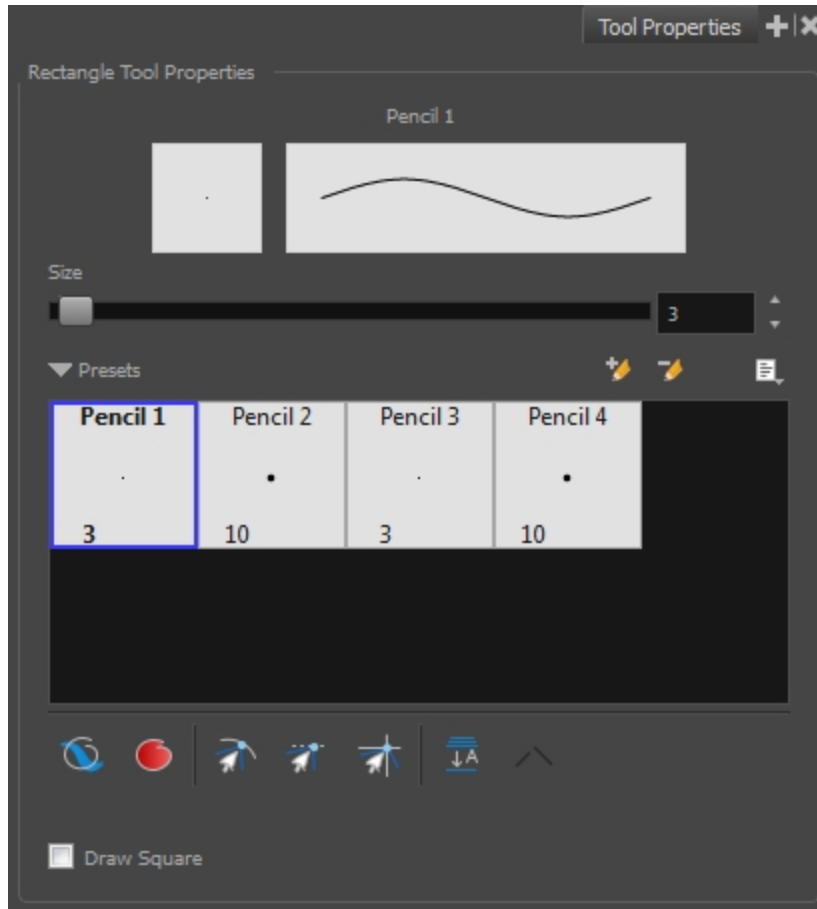
Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.

1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.

2. Click on the Show Extended Properties arrow to display advanced customization parameters.
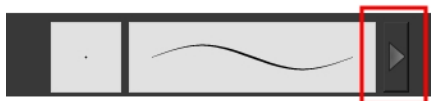
Size

Move the Size slider left to reduce the line thickness and to the right to increase its width.

Adjusting the Pencil Line Style
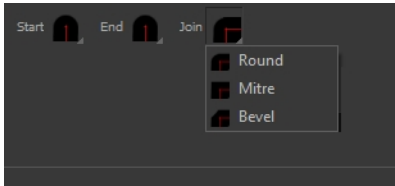
You can adjust the start, end, and joint style of a selected pencil line.

- **Start**: Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.

- **End**: Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.

- **Join:** Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.

Pencil Presets

Harmony provides a variety of pencil presets and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.

You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project–see *Working with Pencil Presets* on page 39

Draw Behind

When the Draw Behind mode is enabled, the lines you draw will appear behind the art that already exists.

Automatic Filling
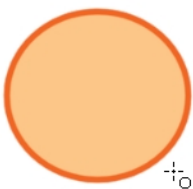
Use the Automatic Filling 🔴 option to automatically fill your shape with the selected colour as you draw. By default, the Shape tool creates the outline of an empty shape that you can later fill using the Paint tool. This option is unavailable for the line tool.

Snap Options

When drawing a shape, you can enable different snap modes to help you create your shape.

- The Snap to Contour 🔷 option snaps your shape to any line you position it on.

- The Snap and Align 🔷 option snaps the selected anchor point to any existing line, while displaying temporary rulers as a guide that you can also snap your anchor point to.

- The Snap to Grid 🔷 snaps your shape to the currently enabled grid.

Auto-Flatten Mode

When enabled, the Auto-Flatten 🔷 mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

Using the Select tool, you can use the middle mouse button to select a segment of flattened pencil line. This creates a nice finish on the lines and corners of your artwork.

Middle mouse button drag

Auto-Close Gap

Auto-Close Gap disabled   Auto-Close Gap enabled
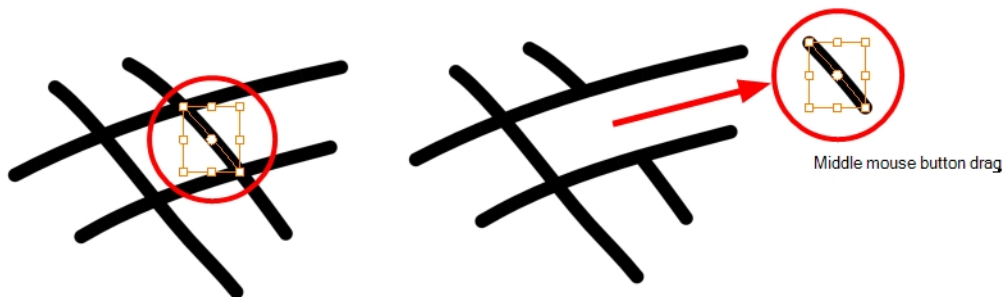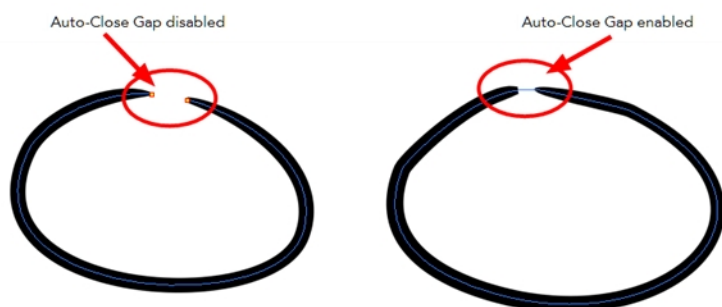
When enabled, the Auto-Close Gap ⌃ mode automatically connects, with an invisible stroke, the pencil lines you draw close to each other in the Camera view.

NOTE: It is recommended to leave this option enabled when drawing with the Pencil tool.

Keep Proportion

☐ Draw Square

☐ Draw Circle

When the Ellipse or Rectangle mode is enabled in the Tool Properties view, the Draw Circle or Draw Square option appears. When selecting these options, the shape produced will be a perfect circle or square (as opposed to an oval or rectangle).

Enabling this option is a good idea if you plan to create many squares or circles. However, if you only need to create one, holding down the Shift key as you create your shape will maintain the proportion in the same way.

Polyline Tool Options

When you select the Polyline ⊊ tool, its properties and options appear in the Tool Properties view.
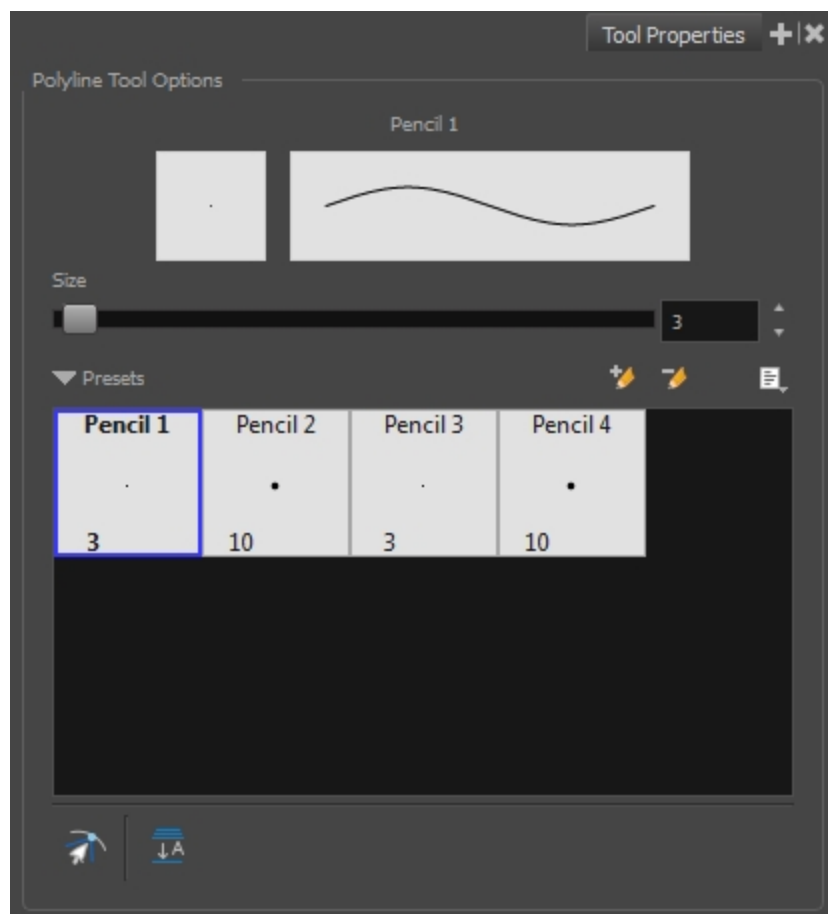
Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different

parameters in the Tool Properties view.

1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.

2. Click on the Show Extended Properties arrow to display advanced customization parameters.
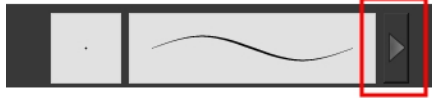
Size

The Size parameter lets you set the size of the polyline that you will draw.

Pencil Presets

Harmony provides a variety of pencil presets and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.

You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project—see *Working with Pencil Presets on page 39*

Snap to Contour

The Snap to Contour 🖉 option will snap your selection to any line you position it on.

Auto-Flatten Mode

When enabled, the Auto-Flatten 🗐 mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

Stroke Tool Options

When you select the Stroke tool, its properties and options appears in the Tool Properties view.
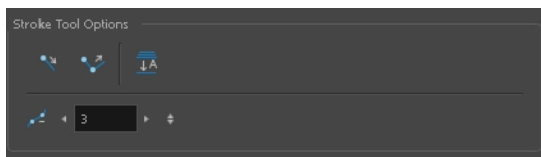
Draw Stroke as Straight Lines

Enable the Draw Stroke as Straight Lines ✎ option if you want the new strokes you draw to be a perfect straight line. Disable the option if you want the stroke to follow the mouse gesture.

Connect Line Ends

Enable the Connect Line Ends ✎ option if you want the start or end point of your new stroke to connect to your existing strokes to make sure no gaps are left in your drawing.

Auto-Flatten Mode

When enabled, the Auto-Flatten ▤ mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

Smoothness

You can modify the central line smoothness of your line using this option. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points. Use the left and right arrows to increment the value by one full unit. Use the Up - Down slider to quickly increment the value.

Perspective Tool Options

Selecting the Perspective tool displays its properties and options in the Tool Properties view.
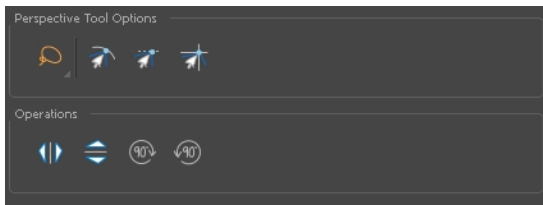
Lasso and Marquee

Choose between the Lasso ◯ and Marquee ▢ options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

Snap Options

- The Snap to Contour ⤢ option will snap the selected anchor point to any line you position it on—see *Contour Editor Options* on page 88.

- The Snap and Align ⤢ option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to—see *Contour Editor Options* on page 88.

- The Snap to Grid ⤢ option snaps your selection according to the currently enabled grid.

Flip Horizontal and Vertical

The Flip Horizontal ⫷⫸ and Flip Vertical ⇕ operations flip the current selection horizontally or vertically.

▸ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

Rotate 90 Degrees CW and CCW

The Rotate 90 Degrees CW 🔄 and Rotate 90 Degrees CCW 🔄 operations rotate the current selection 90 degrees clockwise or counter-clockwise.

▸ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.
▸ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

Envelope Tool Options

Selecting the Envelope tool displays its properties and options in the Tool Properties view.
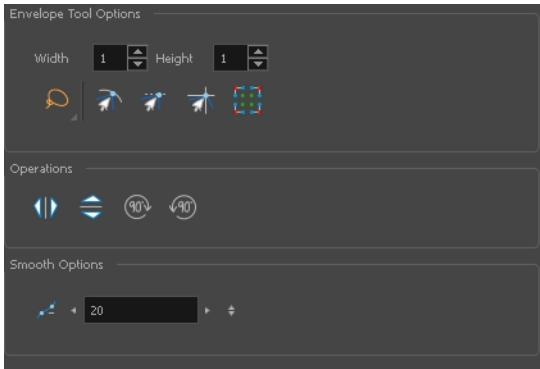
Width and Height

Increase the width and height values to add more columns and rows to the deformation grids.
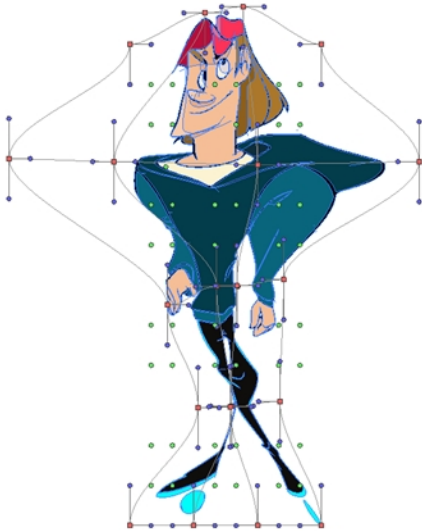
Lasso and Marquee

Choose between the Lasso 🔾 and Marquee 🔲 options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

Snap Options

- The Snap to Contour ✈ option will snap the selected anchor point to any line you position it on—see *Contour Editor Options* on page 88.

- The Snap and Align ✈ option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to—see *Contour Editor Options* on page 88.

- The Snap to Grid ✈ option snaps your selection according to the currently enabled grid.

Show Advanced Controls

To display more controls,you can click on the Show Advanced Controls ⠿ button.

Flip Horizontal and Vertical

The Flip Horizontal ◁▷ and Flip Vertical ⇕ operations flip the current selection horizontally or vertically.

‣   From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

Rotate 90 Degrees CW and CCW

The Rotate 90 Degrees CW ⊙ and Rotate 90 Degrees CCW ⊙ operations rotate the current selection 90 degrees clockwise or counter-clockwise.

‣ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.

‣ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

Smoothness

You can modify the central line smoothness of your line using this option. This parameter smooths the deformed lines. Increasing the value will result in a smoother line with fewer control points. The more you increase the value, the less details and curves you will get. Use the left and right arrows to increment the value by one full unit. Use the Up - Down slider to quickly increment the value.

Cutter Tool Options

When you select the Cutter ✎ tool, its properties and options appear in the Tool Properties view.
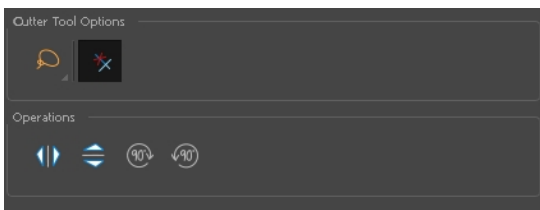
Lasso and Marquee

Choose between the Lasso ⊙ and Marquee ▭ options to change the selection style of the tool.

• Click and hold Alt to temporarily switch from the current mode to the other.

Use Mouse Gesture

When using the Lasso ⊙ selection type, the Use Mouse Gesture ✳ option lets you automatically delete any extra sections of line in your artwork by simply dragging your mouse over it.

> **NOTE:** For this operation to work, you lines **CANNOT** be flattened.
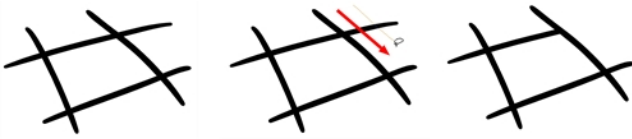
Use Mouse Gesture Breaker Mode

When using the Lasso 🔵 selection type, the Use Mouse Gesture Breaker Mode ⟨ option lets you draw an invisible stroke on a pencil line to cut it in two individual objects. Once a pencil line is cut with this option, you will be able to select the two portions independently with either the Cutter tool, Pencil Editor tool or Select tool.

Single pencil line   Use Mouse Gesture Breaker mode   Two pencil lines
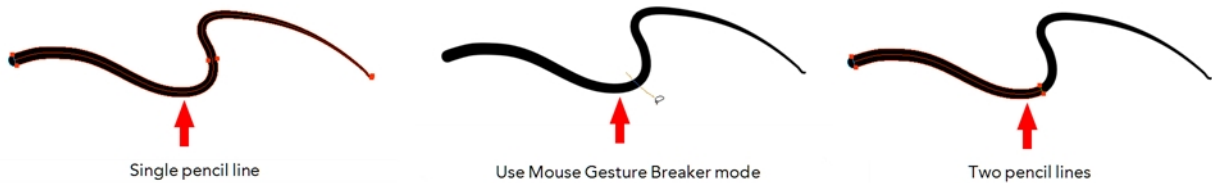
> **NOTE:** This option only works with pencil lines.

Tip Style
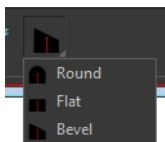
If you erase the end of a pencil line or erase a pencil line through the centre, new line tips or line ends are created. Use the Tip Style option to customize the shape of the new line tips that are created.

Antialiasing
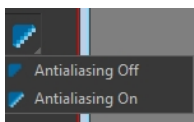
When drawing on a bitmap layer, lines are no longer clean vector shapes. For the edges to be smooth, a slight amount of antialiasing is used. When using the Cutter tool, you can cut a portion of your drawing with or without antialiasing. By default, the option is enabled. If you want to cut your drawing using a hard edge, you can select the Antialiasing Off option.

Flip Horizontal and Vertical

The Flip Horizontal ◁|▷ and Flip Vertical ⇕ operations flip the current selection horizontally or vertically.

    ‣   From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

Rotate 90 Degrees CW and CCW

The Rotate 90 Degrees CW 🔄 and Rotate 90 Degrees CCW 🔄 operations rotate the current selection 90 degrees clockwise or counter-clockwise.

    ‣   From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.

    ‣   Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

## Smooth Editor Tool Options

When you select the Smooth Editor tool, its properties and options appear in the Tool Properties view.
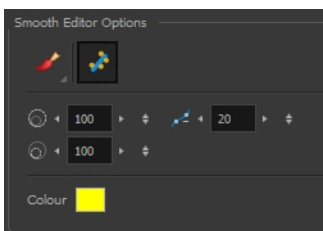
Brush, Marquee and Lasso Smoothing Style

The Smoothing Style options allow you to smooth a portion of your drawing by tracing a smoothing stroke over the zone to optimize or by selecting an area of the drawing with the Marquee or Lasso.

Note that by default, the Smooth Editor tool colour is yellow, it was changed to orange for screen grab clarity.
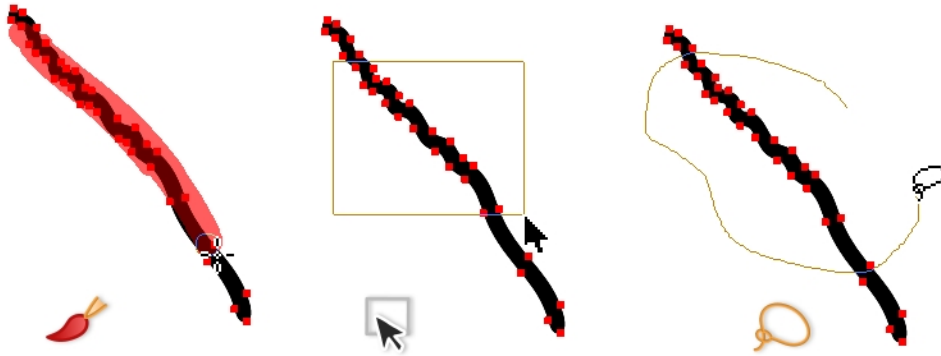
Show Control Points

The Show Control Points 🖋 option allows you to show or hide the Bezier points around lines. When the Bezier points are displayed, you can see the result of your smoothing and the number of points left on the curve. When it is turned off, only the original artwork is displayed.

Minimum Size and Maximum Size

This is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.

This options is available while using the Brush Smoothing 🖌 style.

> ‣ **Maximum and Minimum Size:** Defines the maximum and minimum width of the stroke.
> • **Up/Down arrows:** Use the up and down arrows to set the minimum and maximum size value.

Smoothness

The Smoothness ⌇ impacts the strength of the smoothing result. The higher the value, the more points are removed and the smoother the curve. The Smoothness range is from 0 to 100; the default value is 20.
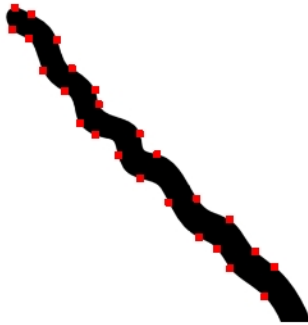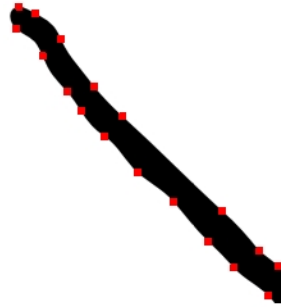
Smoothness = 2   Smoothness = 10

Colour

You can modify the colour of the control points displayed on the artwork while working with the Smooth Editor tool by double-clicking on the colour swatch.
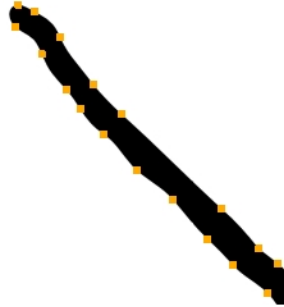
Text Tool

Use the Text tool's properties to select the font type and other formatting options you want to apply to the text.

If you already wrote your text, you must first use the Text tool and select the text portion you want to format.
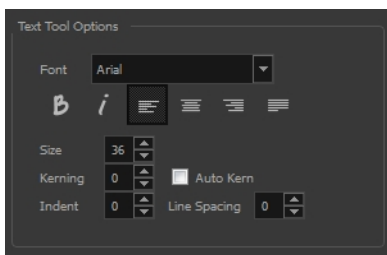
Font Type

Use the Font drop-down menu to select a font. OTF fonts are supported.
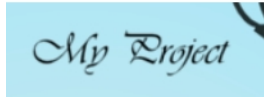
Vivaldi   Copperplate Gothic Light

My Project   MY PROJECT

Font Style

Use these buttons to select a style for your text:

- **B** Bold

My Project

- *i* Italic

My Project

Alignment

Use these buttons to align the paragraph.

Left	Centered
LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.	LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.
Right	**Justified**
LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.	LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.

Font Size

Enter a size for the text.

small text big text

Kerning

Use the kerning field to modify the spacing between letters and characters. You can select the Auto Kern option to set the kerning automatically based on the font's predefined standard. A negative value decreases spacing between each character, creating a letter overlap and a positive value increases it.

Lorem ipsum dolor
sit amet, consectetur
adipiscing elit.
Aenean vestibulum,
metus ac fermentum
porttitor, odio turpis
porttitor nibh, id
consequat magna
ligula et elit.
Curabitur
sollicitudin elit ac
lorem mollis acc
umsan.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit.
Aenean vestibulum, metus ac
fermentum porttitor, odio turpis
porttitor nibh, id consequat
magna ligula et elit. Curabitur
sollicitudin elit ac lorem mollis
acc umsan.

Indent

Enter a value in the Indent field to increase or decrease the indentation on the first line of your text. A positive value sets the first line of your paragraph farther to the right and a negative value sets it farther to the left.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit. Aenean
vestibulum, metus ac fermentum
porttitor, odio turpis porttitor nibh, id
consequat magna ligula et elit.
Curabitur sollicitudin elit ac lorem
mollis acc umsan.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit. Aenean
vestibulum, metus ac fermentum
porttitor, odio turpis porttitor nibh, id
consequat magna ligula et elit.
Curabitur sollicitudin elit ac lorem
mollis acc umsan.

Line Spacing

Enter a value in the Line Spacing field to decrease or increase the space between each line of text.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit. Aenean
vestibulum, metus ac fermentum
porttitor, odio turpis porttitor nibh, id
consequat magna ligula et elit.
Curabitur sollicitudin elit ac lorem
mollis acc umsan.

Lorem ipsum dolor sit amet,

consectetur adipiscing elit. Aenean

vestibulum, metus ac fermentum

porttitor, odio turpis porttitor nibh, id

consequat magna ligula et elit.

Curabitur sollicitudin elit ac lorem

mollis acc umsan.

Resizing the Text Box

You can resize the text box by selecting your text box with the Text $\top$ tool and moving the anchor point right or left. Using the Select tool will distort and scale your text itself rather than changing the width and height of your text box.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean vestibulum, metus ac fermentum porttitor, odio turpis porttitor nibh, id consequat magna ligula et elit. Curabitur sollicitudin elit ac lorem mollis acc umsan.
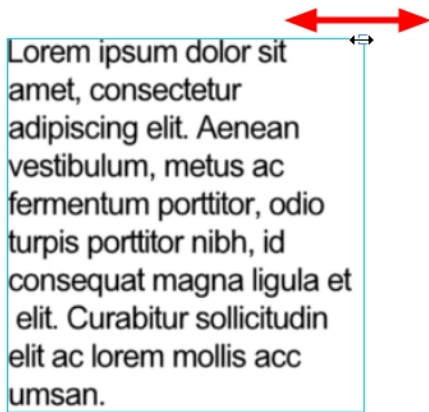
Converting Text into Separate Objects

Text contained in a text field is treated as a single drawing object. You can easily separate the text so each character becomes an individual drawing object that you can select and modify independently.

How to break a text object

1. In the Tools toolbar, click the Select ⬚ tool or press Alt + S.

2. In the Drawing or Camera view, select the text object you want to break.

    Lorem ipsum

3. From the top menu, select **Drawing > Convert > Break ApartText Layers**.

    ‣   From the Drawing or Camera view menu, select **Drawing > Convert > Break ApartText Layers**.

    Lorem ipsum

    Each character is surrounded by a bounding box that you can modify; they remain text objects that you can edit.

4. If you want to convert your independent letter to a complete vector object that you can deform, use the Select tool to select the letters to convert.

5. From the top menu, select **Drawing > Convert > Break Apart Text Layers** to break the selection into a regular drawing object, with no more text attributes.

    ‣   From the Drawing or Camera view menu, select **Drawing > Convert > Break Apart Text Layers** to break the selection into a regular drawing object, with no more text attributes.

Chapter 5: Colour Styling

Abigail Archer, Grossology © Nelvana Limited, Corus® Entertainment Inc.
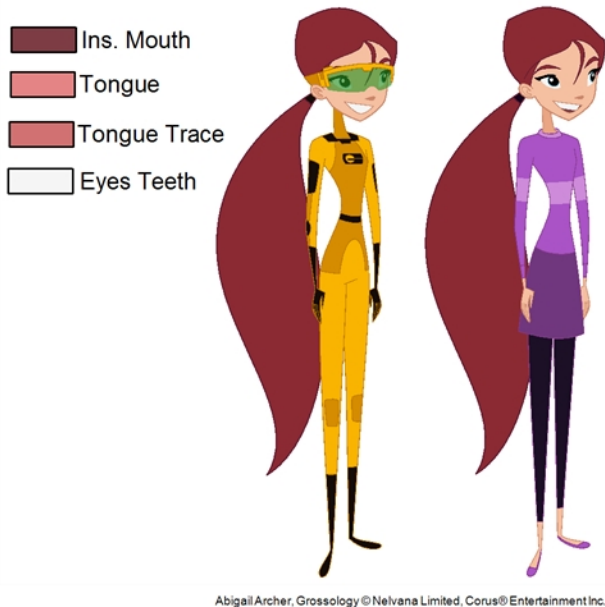
Once the characters, props and locations are designed, it's time for the colour styling and colour models creation. This is when the colours and moods are determined. The line models created during the design step are painted and organized as colour models for the colourists.

Harmony has a great concept of colour palettes. Each character can have its own set of colours that is carried through the entire project called the *master palette*. If the master is modified, the colours in the entire project are updated simultaneously.

By doing the colour styling in Harmony, your master palette will be created at the same time, so you do not need to use third party software. Also you will not have to recreate the colour palette again in Harmony. It is possible to create this step in an external software, but it is a great time saver to do it directly in Harmony.

NOTE: Throughout this section, there may be slight differences between your interface and the illustrations in this guide. This is because the images are taken from Harmony Premium.

To create the colour style and colour models, follow these steps:

- *Preparation* on page 109
- *Working with Palettes* on page 114
- *Colours* on page 135
- *Painting the Model* on page 147

Preparation

Before painting, you need to organize the colour model scenes and bring in your references. The colour styling preparation is done in five steps:

- *Colour Model Storage* on page 110

Colour Model Storage

First, you will need to create a storage location for all your models and palettes. The best way to do this is to create a colour model scene. There are different possibilities available to structure your designs and colour model scenes. We strongly recommend that you put all of your colour models in the same scenes. It is important to maintain a structure for your models so they do not end up scattered throughout the project.

There are four main model categories:

Characters

Props

Effects

Locations

Grossology © Nelvana Limited, Corus® Entertainment Inc.

If you have a small project, such as a short or an advertising contract, you can always place all the characters, props, effects, and locations in the same scene. For large projects such as feature-length productions or series, you should create four separate model scenes following these categories.

Scene Creation

In order to create colour models, you need to create your scenes.

When working on a paperless or cut-out animation project, if you have designed your characters, props, effects and locations directly in Harmony, you can paint your models directly in your design scene. You can also create a new colour model scene and import your designs in that one. Refer to the Fundamentals Guide to learn more about creating a scene.

If you have not already done so, refer to the Fundamentals Guide to learn about production structure, file organization, and how to create a Project root directory. We recommend storing your colour model scenes in the root directory or in a colour models subdirectory for even better organization.

A useful way to name your colour model scene is to include the project name, then the colour model type such as characters, props, effects, or locations, and finally `colourmodel`. For example, a character colour model scene

for the Adventure project would be named `adventure_characters_colourmodel`. This ensures that you always know what scene corresponds to what.
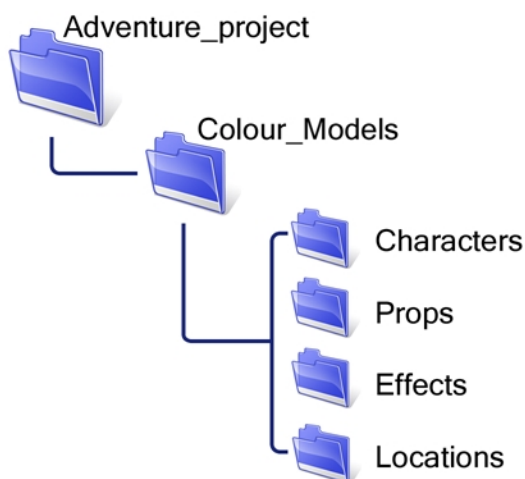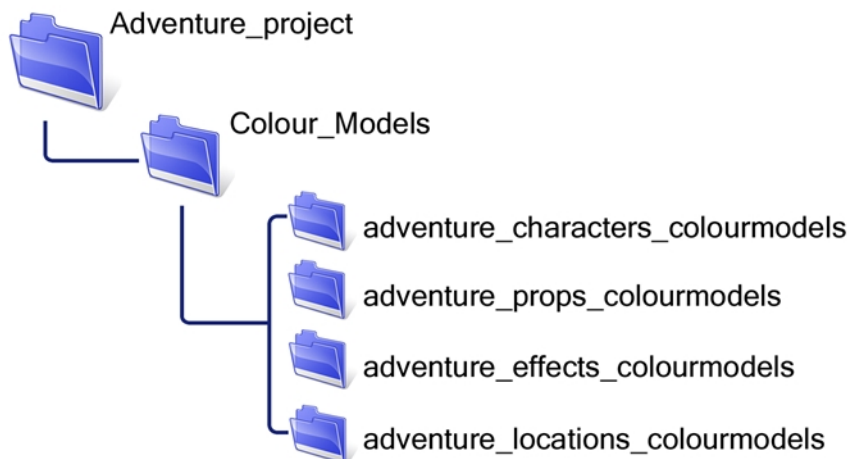
To learn how to create environment, job, and scene for your colour models, refer to the Control Center Guide.

Colour Model Scene Structure

To store your colour models in a scene, you should create one drawing layer for each character, prop, effect, or location. You should name these according to the model.

You can also load other colour references in the scene to balance your overall colours. For example, if you work in a character colour model scene, it's a good idea to import some of the key locations to compare and adjust the colours so they match well.

Setting Up the Workspace

Now that your scenes are created and structured, you can open the corresponding colour model scene. For the optimal workspace for inking and painting, set up your workspace with these views:

- Xsheet

- Camera

- Drawing

- Colour

Erik, Di-Gata Defenders © Nelvana Limited, Corus® Entertainment Inc.

Naming

Now that your models are imported, you can rename them appropriately. You should rename elements (layers) and drawings corresponding to the model. This will help keep the work organized and make it easy for others to follow.

For example, if there is a black and white character model called `Erik` in one drawing element and its colour models in another one, rename your elements to include the character's name. For example, the colour model for Erik's armour could be named: `erik_armour_colour`.
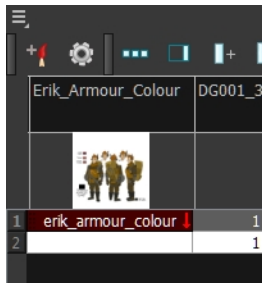
How to rename a drawing element

1. Do one of the following:

   ‣ In the Xsheet view, double-click on the column header of the drawing element.
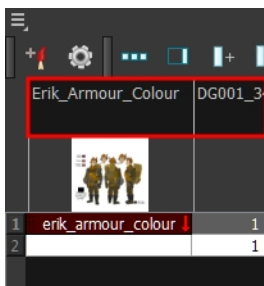
‣ In the Timeline view, double-click on the drawing element's layer.
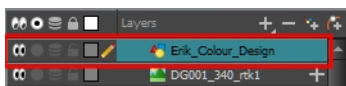
The Layer Properties window opens.
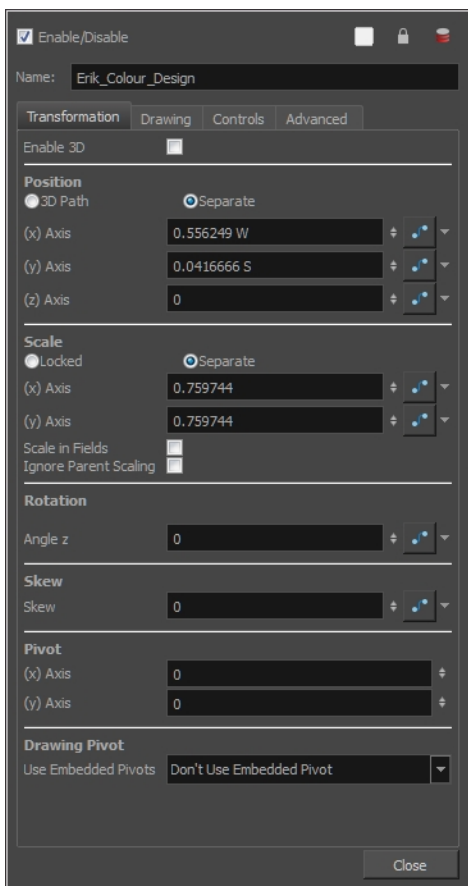
2. Type in a new name.

How to rename a drawing

1. In the Xsheet view, click on a drawing name.

2. Do one of the following:

    ‣   Press Ctrl + D (Windows/Linux) or ⌘ + D (Mac OS X).

    The Rename Drawing dialog box opens.
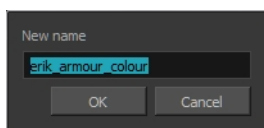
3. Type in a new name and click **OK**.

Working with Palettes

In animation, specific colours are used to paint each particular character. In order to maintain absolute consistency, a colour palette is created for each character, prop and effect throughout the production. This is referred to as a *master palette*[1].

Master palettes contain a colour swatch for each zone to colour with a precise RGBA colour value.

Using a master colour palette has many benefits, including:

*   Each character consistently retains their dedicated colours.

*   You cannot accidentally use a colour which is not in the master palette.

*   Standardization and colour consistency throughout the production

*   Multiple artists can use the same colour palette and produce the same results.

Toon Boom Harmony uses palettes to hold all the colours needed to paint your elements, allowing complete control and consistency in your painting process.

A palette is created by assigning a set of colours to each character, prop or effect. You will create a new palette and add a new colour, known as a *colour swatch*, for each zone of the character, such as the skin, hair, tongue, shirt, pants, and so on.

In Harmony, palettes are individual files that you can copy, transfer, and store. Palettes have a `*.plt` file name extension—see Palette File Storage.

When a zone on the character is painted with the colour contained in a colour swatch, a link is automatically created between that colour swatch and the zone. This means that if the tint of the colour in the colour swatch is changed, any zone linked to it will update to the new tint. This is one way that colour palettes can save time and money in your production.

Another advantage of this system is that you can create complete palettes for different lighting situations. For instance, in addition to the regular palette for a character, you could have one for that character in the rain using

---

[1]A group of colours attributed to a character or prop. The palette is used throughout the entire production to maintain consistency in the look and to ensure that the same colours are used throughout the production. Also known as palette.

colours that are duller and less vibrant than the dry daytime colours, or yet another for using in a night scene. Using palettes linked to your character in this way allows you to instantly change its colouring to suit the mood and atmosphere of the scene without tediously repainting each element.
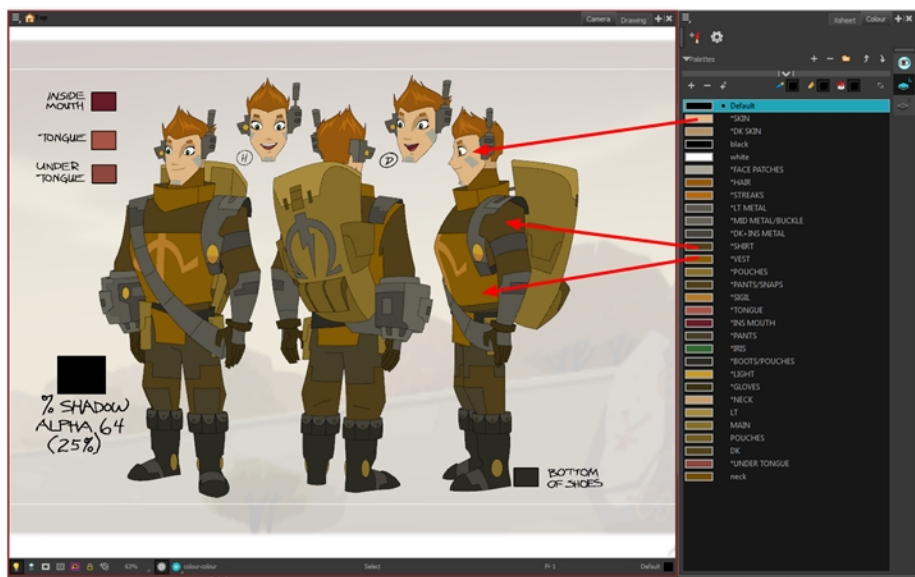
Erik, Di-Gata Defenders © Nelvana Limited, Corus® Entertainment Inc.

This section is divided as follows:

Palette Lists

The Colour view has two modes: basic and advanced.
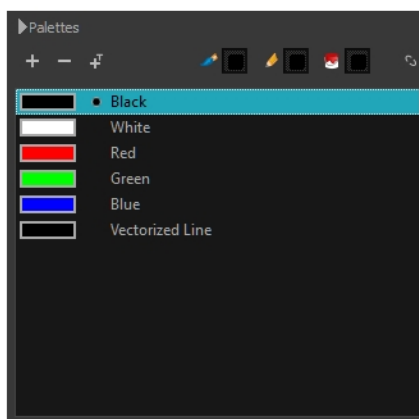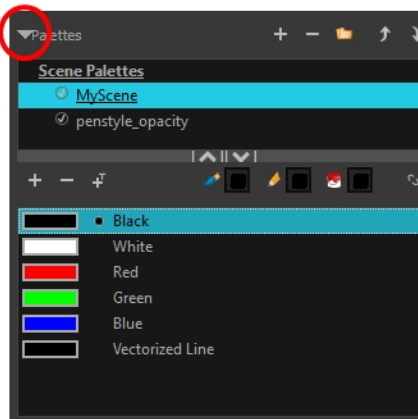
Basic mode   Advanced mode

- **Basic Mode**

  The Colour view's basic mode only shows the Colour list. When you open Toon Boom Harmony, you only see the colours available in the Default palette which contains six basic colour swatches and is automatically named the same as your scene. For simple projects, you can manage with the default palette, but for movies, series, or shorts it is recommended that you create palettes for your characters. To create a palette, you have to switch to the Advanced mode of the Colour view and show the Palette list.

- **Advanced Mode**

  The Advanced mode displays the list of all palettes that are linked to the scene. To create palettes for your characters, you must display the Palette list.

A palette list is a file containing all of the links to the original palette files. Every drawing layer has a palette list. The scene also has a palette list. For example, a drawing layer can use three different palettes stored in three different locations, while another drawing layer can use two of these palettes plus another one coming from another scene. The palette list keep track of the locations of the palettes.

There are two types of palette lists:

- **Scene Palette List**

  The Scene Palette list is mainly used with cut-out animation, but is also very useful for paperless and traditional animations. A cut-out character will often be divided into 20 to 30 different drawing elements that use the character's master palette.

  The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.

  The Scene Palette list is the simplest one to use. By default, Toon Boom Harmony is set to use only Scene Palette lists.
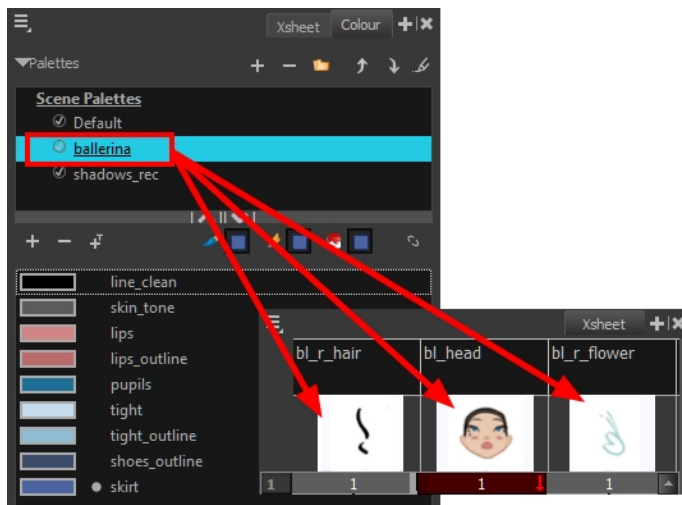
- **Element Palette List**

  In Toon Boom Harmony, you can switch to Advanced Palette List mode and choose to save your palette at an element's level. The Element Palette list is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds, and effects. The Element Palette list is used when you do not necessarily want all of the palettes for all of your elements linked in every column.

  The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a

global palette list, link your palettes to the Scene Palette list.
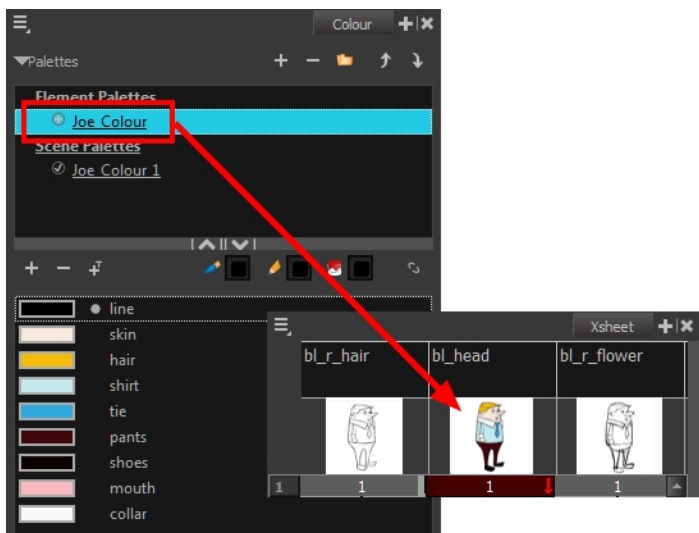
To prevent users from accidentally removing a link to a palette, the palette lists are locked. To link or create a new palette, the palette list must first be unlocked.

When you are using several cloned palettes that are related to the same original palette, Toon Boom Harmony uses the palette located highest in the list to determine the colour of the painted zones—see Cloning a Colour Palette .

How to show or hide the Palette list

▸ In the Colour view, click the Show/Hide Palette List View [▶] button to expand or collapse the Palette List area.

The Palette List window opens and displays all your palettes.
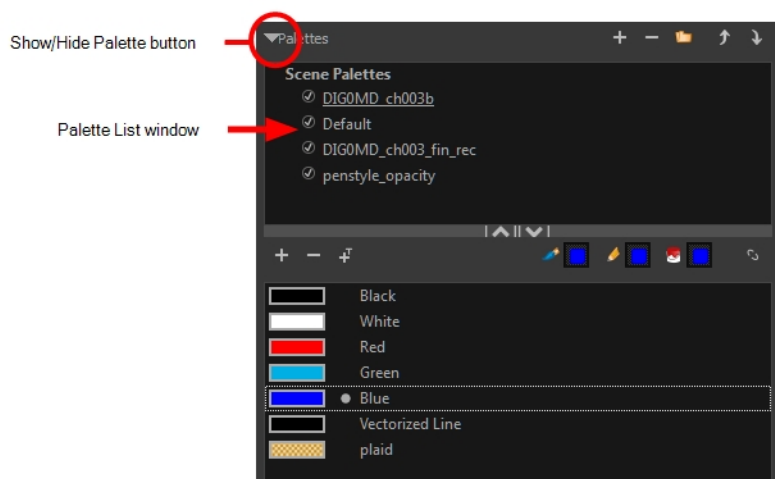
How to lock and unlock to the palette list

▸ From the top menu, select **Edit > Edit Palette List Mode**.

A grey pencil appears on the top-right corner of the Palette list to indicate that it can be modified.
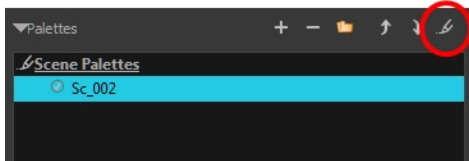
How to set the Advanced Palette Lists mode

1. Do one of the following:

   ▸ From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage Essentials > Preferences** (Mac OS X).

   ▸ Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

2. Select the **Advanced** tab.

3. In the section, select the **Advanced Palette Lists** option.

4. Click **OK**.

How to reorder palettes in the Palette list

Do one of the following:

▸ From the Colour View menu, select **Palettes** > **Move Up** or **Move Down**.

▸ In the Palette list, click the Up ⬆ and Down ⬇ buttons.
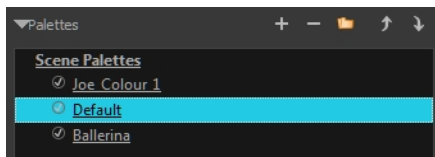
Palette File Storage
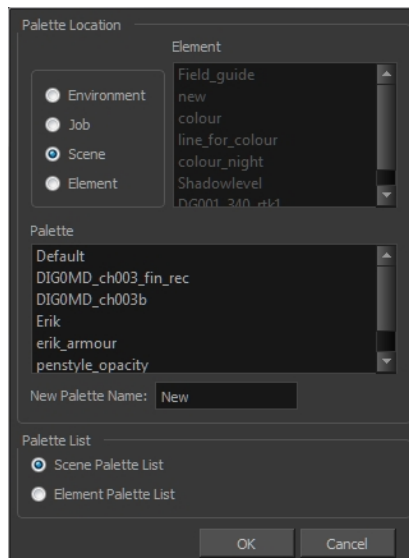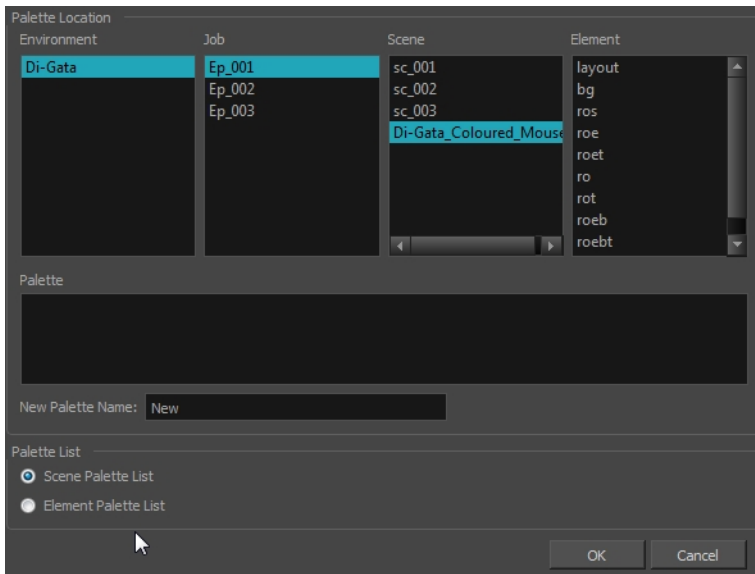
In Harmony, palettes are individual `*.plt` files that can be copied, transferred and stored. When a palette is created from Harmony, it needs to be stored somewhere. By default, the palette file is stored in the scene directory in a palette-library folder unless you specify a different location.

There are four locations where you can find palette-library folders:

- **Element:** The Palette Library folder is stored directly in the drawing Element folder.
- **Scene:** The Palette Library folder is stored directly in the Scene folder.
- **Job:** The Palette Library folder is stored in a Job folder contained in the Scene folder.
- **Environment:** The Palette Library folder is stored in an Environment folder contained in the Scene folder.

By default, the palette is stored at the scene level. For simple projects and standalone projects, it is recommended to keep it as is. If you work with a larger studio, it is recommended to verify with them on the file structure.

This existing structure is compatible with Harmony Server. Harmony's database has a leveled structure starting from the Environment down to the Element. Its client-server configuration allows all data, such as palettes and scenes, to be shared between a series of client machines.

Element Level

Working with Harmony Stand Alone, the Element level is very useful when there are a lot of different palettes. When a colour model drawing is created, it is stored in its element folder. By storing the corresponding palette file with the colour model, the colourist can load them both from the same location. This also creates a more organized structure.

Scene Level

Working with Harmony Stand Alone, a palette file can also be saved at the scene level, so that all of the palettes from the scene are stored together. The palette naming must be structured so the colourist or character builders can find the correct one. Saving the palettes at the scene level makes it very easy to back up the palettes and retrieve their location.

The scene level can also be useful for cut-out animation. Instead of creating a colour model scene that includes all of the characters, props, effects, and location, the colour palette or model will often be directly imported to, or created in, the character building scene. Just as with a cut-out character building scene, each element uses the same

palette so it would not be efficient to save the palette inside one element. Instead, it is saved at the scene level. This prevents a palette overload because all of the models are in different scenes. It also allows each scene to have its own set of palettes corresponding to its model.

When working on a cut-out animation production, it is highly recommended that you work with the Scene level.

Where to Save the Palette File

The palette storage location depends on the type of production and the backup plan being used. Some studios like to store their palettes at the Element level and others at the Environment level as this will not create a problem so long as the scene is in the Harmony structure. In fact, as long as the Harmony structure is maintained it can be stored at any level. However, difficulties may occur when the scene is backed up or transferred to another studio or database and removed from the structure.

What happens when you export a palette file?

It is important to understand what is happening to a palette file when the scene is exported.

Because of the Harmony client-server configuration, all of the data can be shared through all of the scenes in the database. This also includes the palette files, even if they are stored at the Element, Scene, Job, Drawing or Environment level. The palette files can be accessed from any scene of any project.

When you export scenes from Harmony to either archive or send them to other users or studios, the palettes stored in external scenes, jobs or environment will NOT be exported.

An exported scene will carry palettes stored in its own Element's Palette Library, scene's palette library, the Job and the Environment where it is stored. Any other palette from other Environments, Jobs, Elements or Scenes (even from the same job) will **NOT** follow. Instead a recovery palette will be created when the scene is reopened in another Harmony system. A recovery palette is a local palette created by the system when palettes and colours are missing. This palette is no longer shared with the rest of the project.

For example, in the following chart, if you export Scene 2 from Job 1, the package will carry the palettes from Scene 2, Job 1 and Environment. It **WILL NOT** carry the palettes from Element 3 in Scene 1, Scene 1 and Job 2. If Scene 2 was linked to any of these, the system will create a recovery palette the next time Scene 2 is opened in another Harmony system.
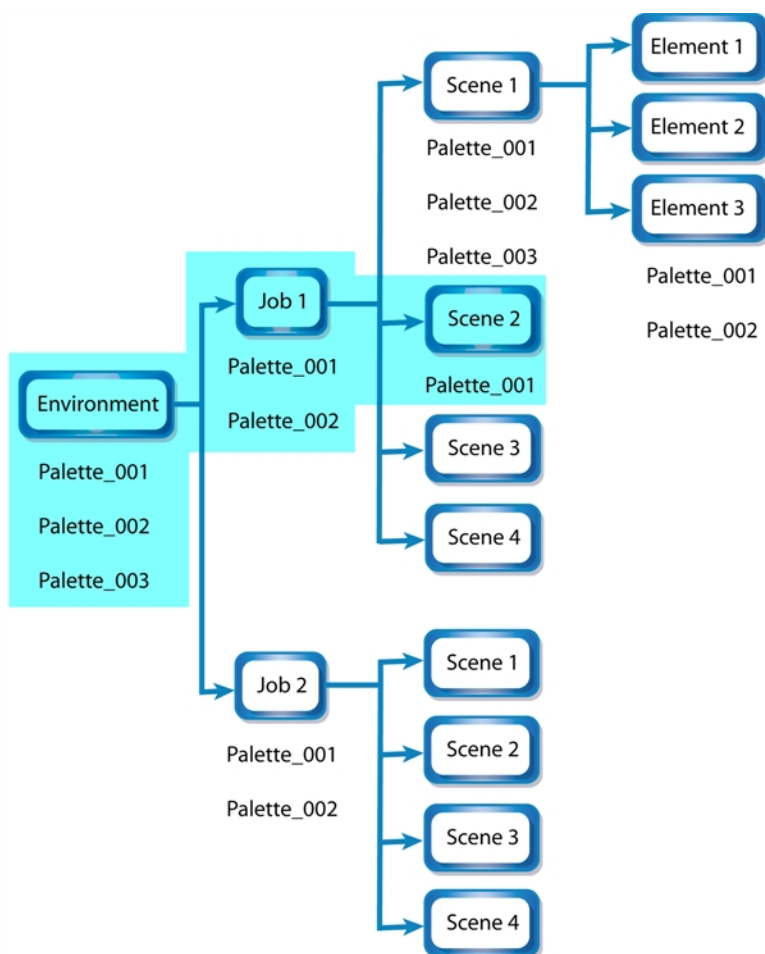
The best place to store your palette is:

- Environment level for a movie or series

- Job level for a publicity or small project

- Scene level for a student exercise

To store your palette with their colour models, you can use the Element level, however, it will require more structure when exporting the scenes. The scene will have to be exported along with its colour model scene. The other studio you are working with must recreate an identical structure to yours, then import the received scenes into the same location as you have them in order to maintain the links.

Palette Backup

When sharing palettes between scenes, some users may accidentally modify the colours, even though the palettes are locked by default. That is why it is a good idea to copy and back up your palette libraries and master palette directories.

When a palette file is copied, it automatically becomes a clone palette, so there will not be any trouble replacing an altered file. Harmony automatically updates all of the files and drawings linked to it.

Creating a Colour Palette

You can create a palette in either Basic or Advanced mode.

By default, Toon Boom Harmony is set to the Basic mode. For simple productions, it is recommended to use the Basic mode. This setting stores the palettes automatically for you and saves them at the Scene level. When you use the Advanced Palette Lists mode, you can decide at which level you want to store your palettes: Environment, Job, Scene, or Element.

If you are using Harmony Server, see Palette File Storage on page 1.

Before you can create a palette in the Advanced Palette Lists mode, you must first set your preferences to Advanced Palette Lists mode in the Preferences dialog box. You also need to have the rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode** from the top menu.

You can remove palettes from your Palette list if they're not needed in your scene. The actual palette file will not be deleted and you can reimport it in your Palette list later on.

How to set the Advanced Palette Lists mode

1. Do one of the following:

   ‣ From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage Essentials > Preferences** (Mac OS X).

   ‣ Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

2. Select the **Advanced** tab.

3. In the section, select the **Advanced Palette Lists** option.

4. Click **OK**.

How to create a new palette (Basic Palette Lists mode)

1. From the Colour view menu, select **Palettes** > **New** or click the New Palette ⊞ button.

   ‣ Make sure you have the rights to modify the palette list. If not, select **Edit > Edit Palette List Mode.** The Create Palette dialog box opens.

2. Enter the palette name according to the model.

3. Click **OK**.

   The palette appears in the drawing element's palette list.

How to create a palette from the Advanced Palette Lists mode

1. In the Timeline or Xsheet view, select the drawing that requires a palette.

2. Make sure that you have the necessary rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode.**

3. In the Colour view, click the **Show Palette List View** button to display the palette list.

4. Do one of the following:

   ▸ From the Colour view menu, select **Palettes > New.**
   ▸ Click the Create Palette ╋ button.

   The Palette Browser: Create Palette dialog box opens.

5. Select the level to store the palette file.

- ▸ **Environment**: The palette-library folder is stored in the scene's parent environment folder.
- ▸ **Job**: The palette-library folder is stored in the scene's parent job folder.
- ▸ **Scene**: The palette-library folder is stored directly in the scene folder.
- ▸ **Element**: The palette-library folder is stored directly in the drawing element folder.

When you select a level that has a palette stored in it, the palette names are displayed in the Palette field.

6. Name the palette. There is no need to add the suffix "palette" to the name as it is always recognized as a palette file.

7. Select a Palette List option.

The Scene Palette List is mainly used with cut-out animation. A cut-out character will often be divided in twenty to thirty different drawing elements that use the character's master palette.

The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.

The Element Palette List is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds and effects. The Element Palette List is used because you do not necessarily want all of the palettes for all of your elements linked in every column.

The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette List.

8. Click **OK**.

    The new palette appears in the palette list.

How to rename a palette

1. In the Colour view, select the palette to rename.
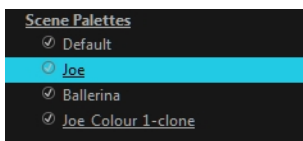
2. Do one of the following:

   ‣ Right-click and select **Rename**.

   ‣ From the Colour View menu, select **Palettes** > **Rename**.

3. In the Rename dialog box, give the palette a new name and click **OK**.
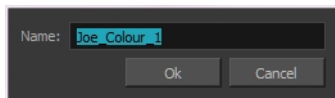
How to remove a palette

1. In the Colour view, select the palette to remove.
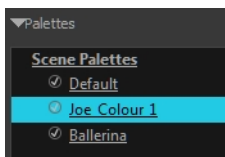
2. Do one of the following:

   ‣ From the Colour View menu, select **Palettes** > **Remove**.
   ‣ Right-click on the selected palette and select **Remove**.
   ‣ Click the Remove Palette ➖ button located above the Palette list.

   If the palette was used in your scene, the zones painted with its colours turn red.

Duplicating a Colour Palette

A duplicated palette is a simple copy of the original palette. It uses the same names, colour values, but has a different ID and is independent from the original palette. This ensures that both palettes are completely independent.

This option is used when there are similar models and you want to avoid recreating and naming all the colours. You can change the values and the names afterward without affecting the original palette. You can also keep some RGBA values, such as the eyes, teeth, tongue, inside mouth, etc.

How to duplicate a palette

1. In the Colour view, select the palette to be duplicated.
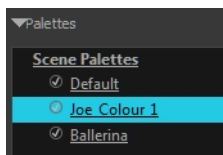
2. Do one of the following:

   ‣ From the Colour menu, select **Palettes** > **Duplicate**.
   ‣ Right-click on the selected palette and select **Duplicate**.

   The Palette Browser: Duplicate Palette window opens.

3. If you are in Advanced Palette List mode, select the palette storage level–see Palette File Storage .
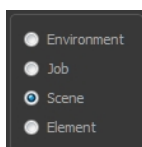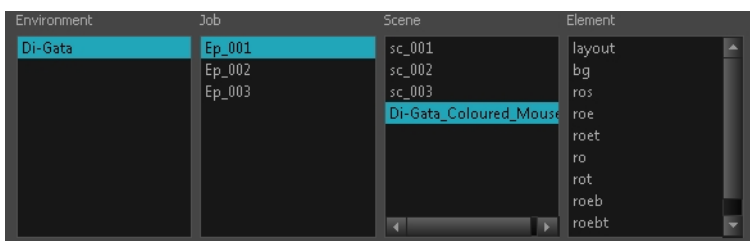
4. In the New Palette Name field, name the palette.
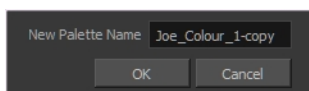
5. In the New Palette Name field, name the palette.

6. Click **OK**.

The palette appears in the palette list.

Cloning a Colour Palette
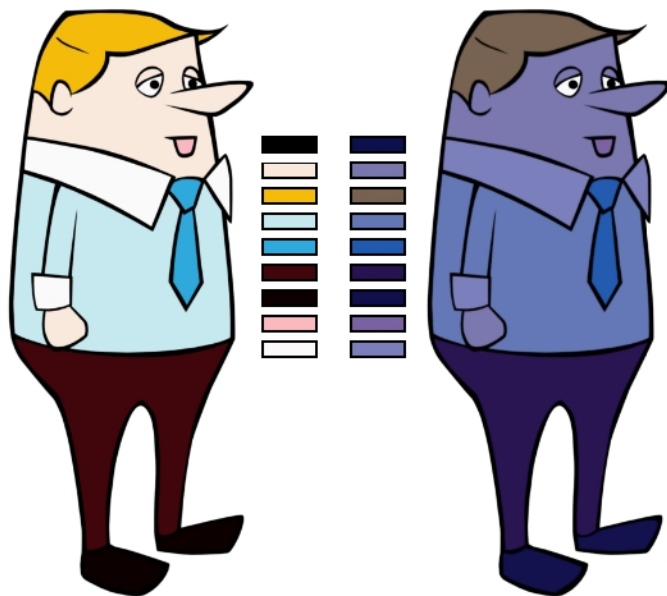
A character usually has only one master palette, although there are times when the characters are placed in different lighting conditions and require a different colour shading. The night palette is a popular choice when a scene or sequence changes from day to night. It can be difficult and time-consuming to repaint everything and creating two independent palettes can be quite complex. As an alternative, Toon Boom Harmony provides clone palettes.

The clone palette is a copy of the master palette. The colours in each palette have the same properties. The colours have the same identification number pointing to the same colour zones, but they can have different names and RGBA values. Depending on the palette (night or day) you're currently using, the painted drawing will update. So there's no need to repaint the animation. All you have to do is create or import a clone palette (palette style).

How to clone a palette

1. In the Colour view, select a palette to clone.
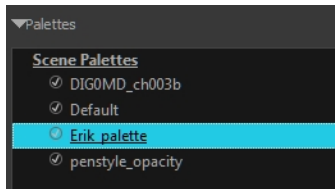
2. From the Colour menu, select **Palettes > Clone** or right-click and select **Clone**.

   The Palette Browser: Clone Palette dialog box opens.
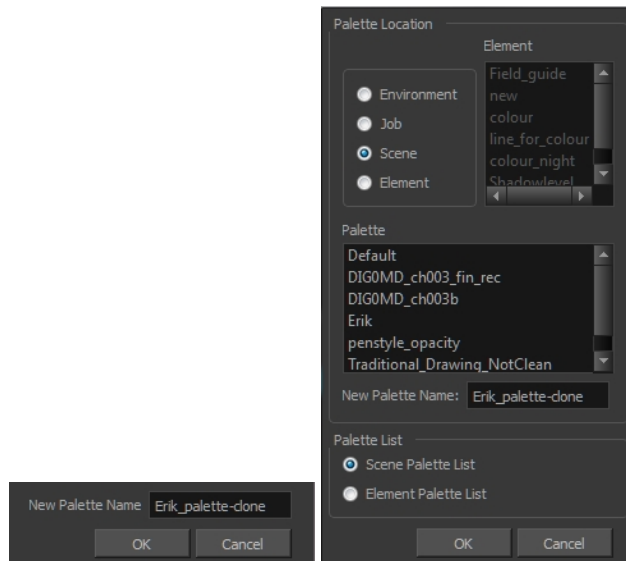
Basic palette   Advanced Palette List mode
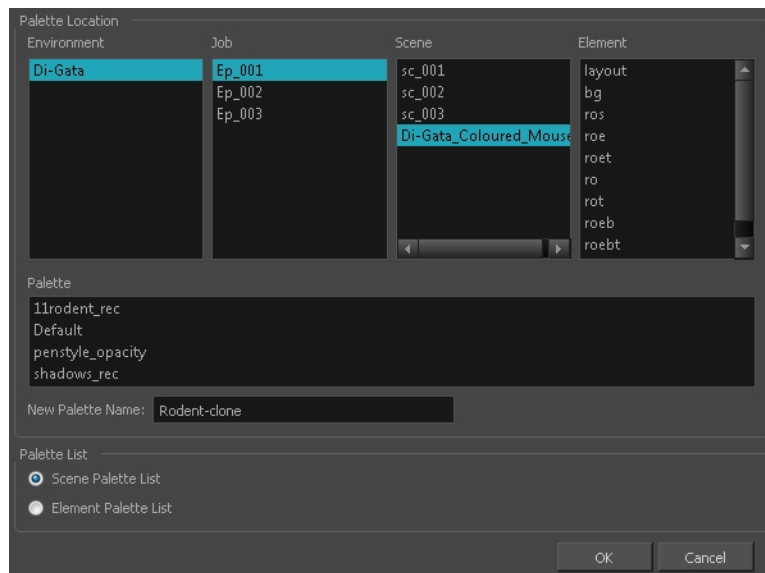
Advanced Palette List mode

3. If you're in Advanced Palette List mode, select the palette storage level—see *Palette File Storage* on page 118.
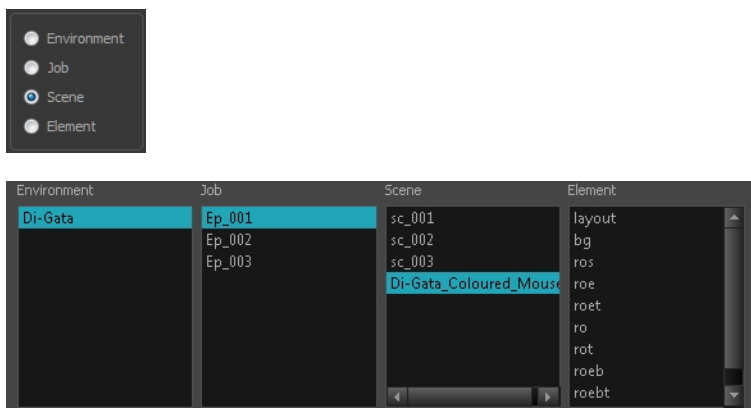
4. In the New Palette Name field, name the palette. We recommend keeping the "-clone" in the name.

5. Click **OK**.

   The cloned palette appears in the palette list.
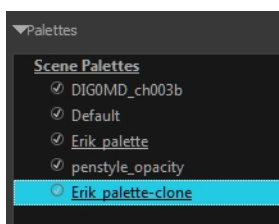
6. In the Palette list, select the clone palette you created to offset or blend colours—see *Mixing Colours* on page 145.

7. From the Colour View menu, select **Palettes > Tint Panel** or right-click and select **Tint Panel**.

   The Blend/Offset Tint panel opens.
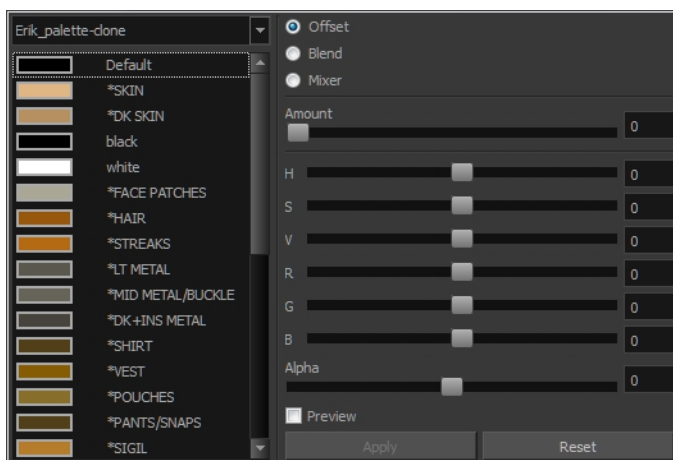
8. Select one or more colours to modify. You can select all your colours by pressing Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).

9. Offset, blend, or mix the colours using the sliders and increasing the Amount value.
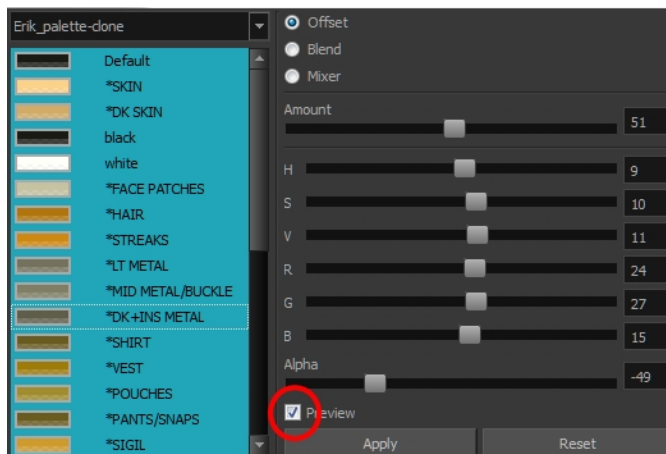
10. Select the **Preview** option to see a preview of the colours while you adjust them.

NOTE: You can also modify the colours individually with the Colour Picker window.

Importing and Linking Palettes

Before starting colouring work such as ink and paint or even creating new colour models, you may want to load existing colour palettes to your scene. You can do so by linking colour palettes to your palette lists.

You may encounter a case where only a colour palette is visible when a layer is selected. If you need that palette in a second layer, you can link the palette to the second layer's palette list. A good example would be a scene where there is a character on one layer and its arm is on another. In order for both layers to access the palette, you must link both Element Palette lists to that palette. If your palette is linked to the Scene Palette list, it will be accessible by all layers.

If you created a palette in another project and you want to import it in your current project, you can browse for the palette file on your computer and add it to your scene. When the palette is imported in your scene, the file is copied in the project's directory. It is not linked to the original file.

With Toon Boom Harmony as a stand-alone application, every scene is local to the machine. This means that all of the scene's data is only accessible from that particular scene. Palettes are also local to the scene; they can be shared between all drawing layers, but not between scenes.

However, you may want to share palettes across a whole project. Harmony offers that possibility. By default, a palette is an independent file stored in your scene. This file can be copied, moved, or deleted.

To link a palette throughout an entire project, you need to create a central directory where you can copy all the palettes you created. Every time you link a palette in an element, it is linked to this folder. If you modify the palette, it will be updated throughout the whole project.

This method is not recommended. It is always safer to have the palettes contained within the database to avoid data loss if the source palette were to be deleted or the project exported without including the external palettes.

You will notice that when you create or link a palette, a small icon appears on its left. These icons represent the palette's link status.

Icon	Description
	Indicates that the palette is safe. There won't be any problems once the scene is exported. For example, the palette file is stored in the scene folder and is linked to the Scene Palette List.
	Indicates that the palette file is stored in a directory external to the scene's structure. The palette file is probably stored in a Master Palette directory on a hard drive external to the palette-libraries planned for the palette storage. The warning in this case is that if you move your Master Palette directory to another location, you may loose the palette in your scene.
	Indicates that a palette file stored in a level such as Element, Scene, Job or Environment is linked to a Palette list that is not on the same level. For example, a palette file is stored into the Environment folder and is linked to the Element Palette list. The palette is shared.
	Indicates a potentially dangerous situation. Problems may occur when trying to export or link to the palette file. For example, a palette file is stored into the element folder and is linked to the Scene Palette list. The issue in this case is that if you decide to delete the layer containing the palette, it will be lost from your scene.

How to link a colour palette

1. Do one of the following:

   ‣ From the Colour View menu, select **Palettes** > **Link**.

   ‣ Right-click and select **Link**.

   ‣ Click the Import 📁 button.

   The Palette Browser: Link Palette dialog box opens.
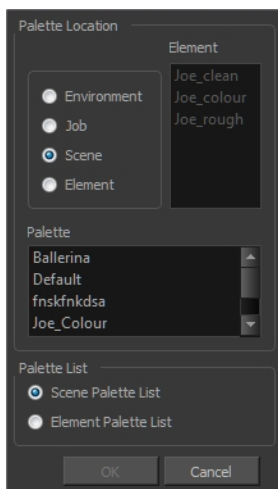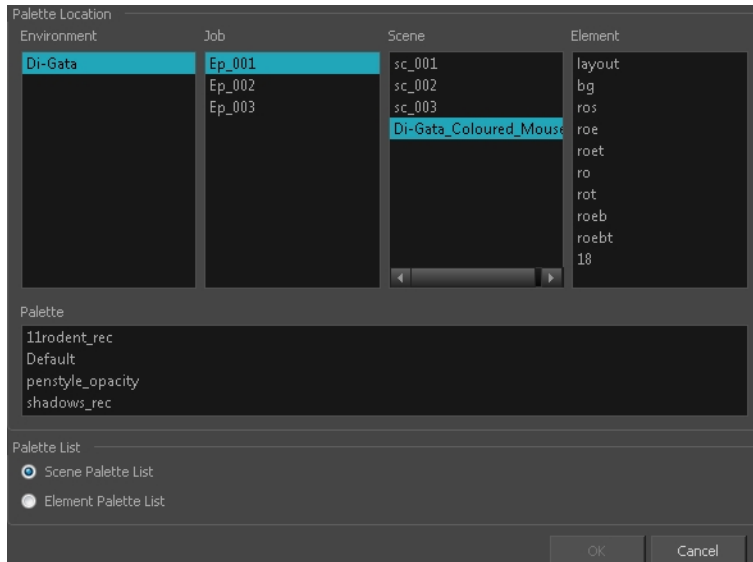
2. Select the level where the palette file is stored—see *Palette File Storage* on page 118.

3. Select the palette list linking level by enabling either **Scene Palette List** or **Element Palette List**—see *Palette Lists* on page 115.

   The palette appears in the Colour view.

How to import a palette into your project

1. Do one of the following:

   ‣ From the Colour menu, select **Palettes** > **Import**.
   ‣ Right-click and select **Import**.
   The Browser window opens.

2. Browse for a palette file located (`*.plt`) on your hard drive. You will generally find the palettes in your project's palette-library directory.

3. Click **Open**.

   The Palette Browser opens.

Basic Palette List mode   Advanced Palette List mode
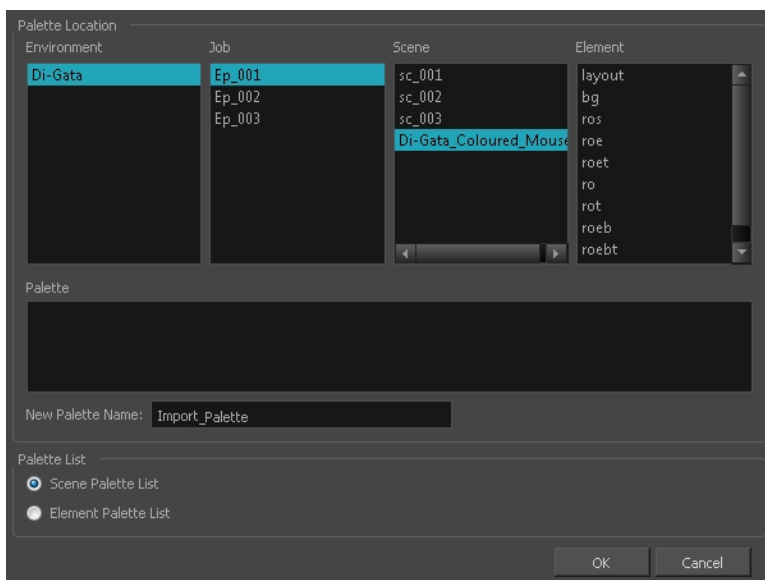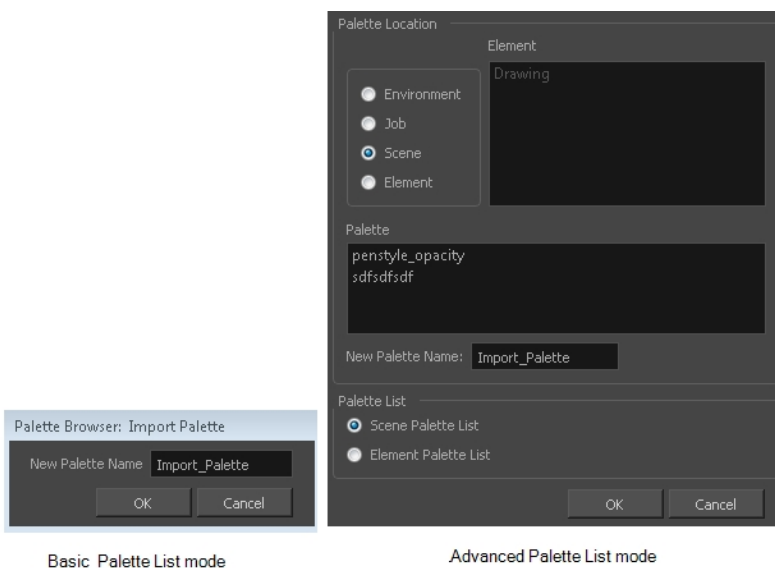
4. If you're in Advanced Palette mode, select the level where the palette file is stored–see Palette File Storage .

5. If you're in Advanced Palette mode, select the palette list linking level by enabling either **Scene Palette List** or **Element Palette List**–see Palette Lists.

6. In the New Palette Name, name the imported palette.

   The palette appears in the Colour view and the file is copied in your project.

How to link to an external palette

1. In the Colour view, click on the **Create Palette** ➕ button to create a palette to be used as external.

2. Save your scene by selecting **File > Save** from the top menu or by clicking the Save 🖫 button or press Ctrl + S (Windows/Linux) or ⌘ + S (Mac OS X).

3. On your computer or server, create a master directory. Ideally, this should be created in your Root folder to keep it within the project directory. You could also place it inside your Colour Model's subdirectory—see *Chapter 6: Project Organization and File Structure* in the Fundamentals Guide.
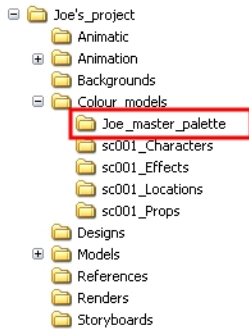
4. Name the folder appropriately, for example: **Joe_master_palette**.

5. From your operating system, browse to your Toon Boom Harmony scene and open the palette-library folder.
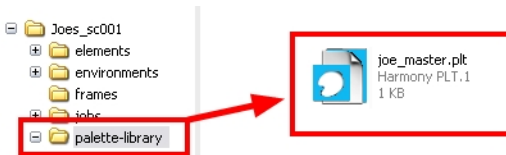
6. Select and copy your palette ***.plt** file to copy it to the master palette directory.
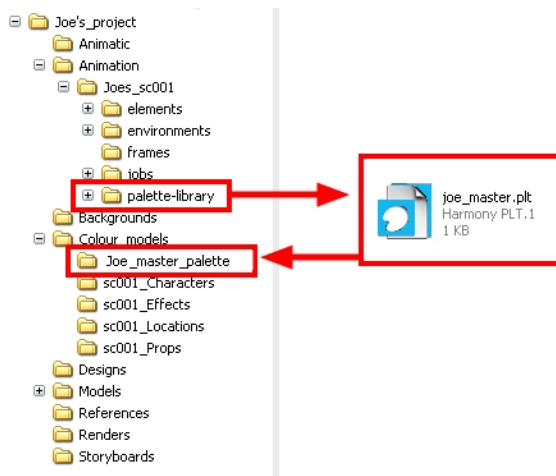
7. Create a new Toon Boom Harmony scene or open the scene where you will link this palette.

8. In the Timeline or Xsheet view, select the element to link the palette to.
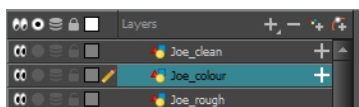
9. From the Colour View menu, select **Palettes > Link to External.**

The Link to External Palette dialog box opens.
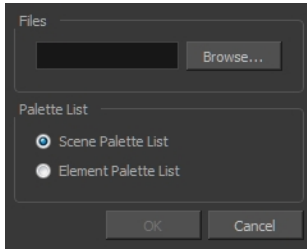
10. Click **Browse** to search for your master palettes folder and select the palette `*.plt` file you want to link.

11. In the Palette list section, select how you want to load the palette; at the scene or element level.

12. Click **OK**.

The linked palette appears in the Colour view.

If a palette is outside the scene, the External ⊙ icon appears beside the palette name.

NOTE: To link an element (such as a colour model) to the palette that is stored in the external palette directory, you must remove the original palette from the element's palette list. You will then load the duplicated palette into the palette list using the Link to External command, like you did for the other elements.

Colours

Toon Boom Harmony has some very powerful colouring features when it comes to painting. To paint your drawings, you will use different colour swatches, unlike some other painting programs where you modify the main swatch each time you want to paint with a different colour.

In the Colour view, you choose a different colour swatch for each colour you want to paint in your drawing. You can add as many swatches as you want. You can also rename them and modify existing ones.

When you modify the colour of an existing swatch, it automatically updates all the zones painted with this swatch throughout the entire project. The colour swatch has a unique ID number that associates it with the painted zones. This way, you can change the look of your character at any time without having to repaint it!

This section is divided as follows:

- *Adding a Colour Swatch*

- *Editing Gradients and Textures* on page 142

- *Colour Display Modes* on page 143

- *Copying and Pasting Colours* on page 144

- *Mixing Colours* on page 145

Adding a Colour Swatch

You can use several different types of colour swatches, including solid colour, gradient colour and bitmap texture swatches.

Solid Colour Swatch   Gradient Colour Swatch   Bitmap Texture Swatch

A colour palette is an actual file on the hard drive. These palette files can be stored in a different location on the server. They can be stored in the Environment, Job, Scene, or Element folder and linked to any palette list. This means that if the original palette file is modified, it will update in every drawing element the palette is linked to.

To avoid accidentally modifying the palette, the palette files can be locked. If a palette must be modified, you must get the rights to modify them before doing so.

How to lock and unlock the palette list

‣ In the Colour view, click the Edit Palette Mode 🔒 button.

A grey pencil icon appears in the top-right corner of the Palette list.

How to add or modify a solid colour swatch

1. In the Colour view, click the Add Colour ➕ button.

2. From the Colour view menu, select **Colours** > **Edit** or double-click on the colour swatch.

The Colour Picker window opens.
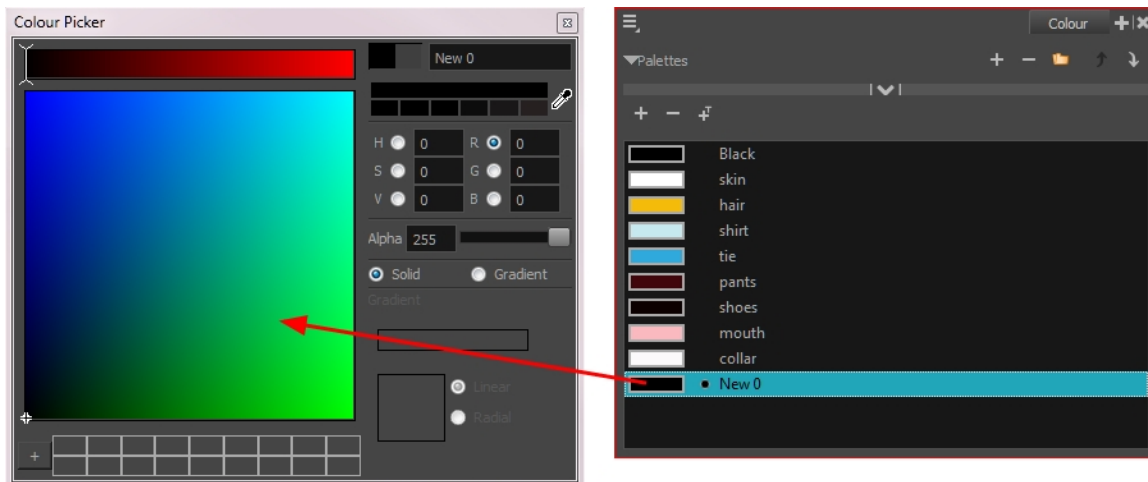
3. To set your colour, do one of the following:

‣ In the colour wheel, select a colour.

‣ Enter the HSV or RGB values in the corresponding fields. Select the **R,G,B,H,S** or **V** options to change the look of the colour picking area.
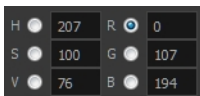
‣ Click the Dropper 🖊 button to select any colour on your screen. It can be from the Harmony interface, your operating system or any other open application.

How to add a new colour swatch using the default colour

‣ From the Colour View menu, select **Colours > New**.

A new swatch is added to your palette using the default colour swatch colour. The new swatch created with the New command will be named `New 0`.

How to create a gradient colour swatch

1. In the Colour view, select a colour to modify .

2. Do one of the following:

   ‣ Click the new colour and from the Colour View menu, select **Colours > New**.

   ‣ Double-click on the colour swatch.
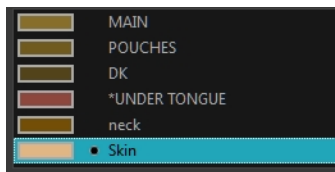
The Colour Picker window opens.
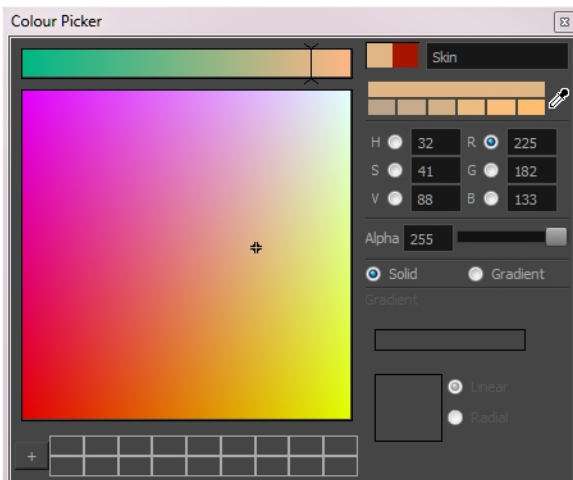
3. Select the **Gradient** option.

4. Select the **Linear** or **Radial** option.

5. Adjust the Gradient arrows to modify the colours.
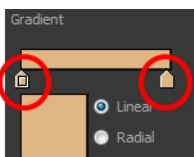
▸   Add extra colours by clicking between the arrows below the gradient bar. Then click on the Colour Preview to select a colour.

▸   Pull down the arrows to remove them.
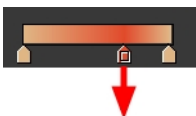
▸   Move the arrows left and right to modify the gradient distance.

NOTE: To learn how to reposition the gradient zones in your drawings, see *Editing Gradients and Textures* on page 142.

How to create a texture colour

1. From the Colour menu, select **Colours > New Texture** or click the New Texture button.

    The Browser window opens.

2. Browse for a PSD or TGA bitmap file created with a third party software and click **Open**.

    The texture is added to the colour list.
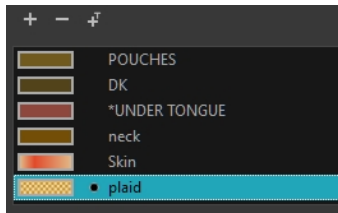
NOTE:
To learn how to reposition the textured zones in your drawings, see *Editing Gradients and Textures* on page 142.

You can also replace a texture once it is painted. If you decide to make the character's shirt wool instead of plaid, just update the texture file in the swatch and the entire project updates. Any transformation previously applied to the texture's position in your drawings will be kept.
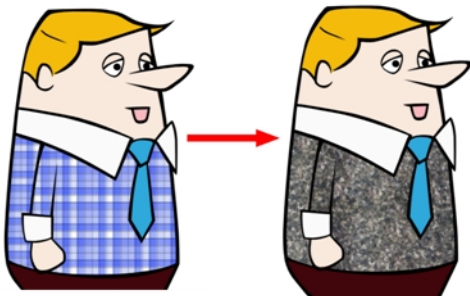
How to replace a texture swatch

1. In the Colour view, select the texture swatch that contains the bitmap texture you want to replace.
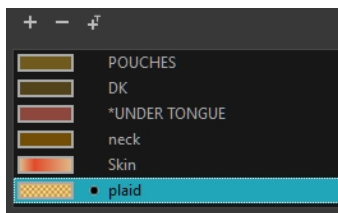
2. From the Colour View menu, select **Colours > Edit Texture** or double-click on the swatch.

   The Browser window opens.

3. Browse for the new PSD or TGA bitmap file created in a third party software.
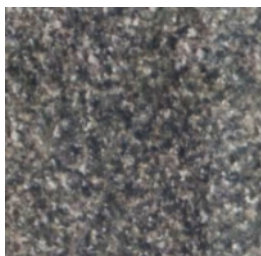
4. Click **Open** to update the colour swatch.
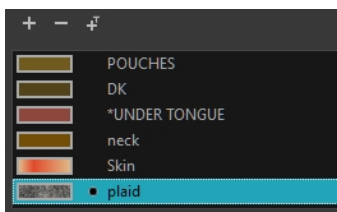
How to delete a colour swatch

1. In the Colour view, select the colour swatches to delete.
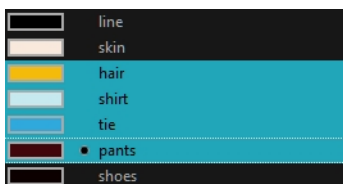
2. Do one of the following:

   ‣ From the Colour View menu, select **Colours > Delete**.

   ‣ Click the Delete Colour ➖ button.

   ‣ Right-click and select **Delete**.

   ‣ Press Delete.

   If the colour swatch is used in a drawing, the Delete Colour dialog box opens.
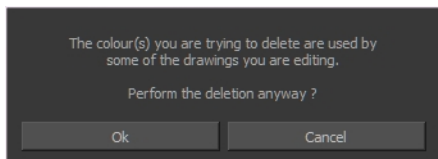
3. Click **OK** to delete the colours or click **Cancel** to abort the operation.

   ‣ If you delete colour swatches already in use, the zones painted with them turn red so you can easily identify them.

Editing Gradients and Textures

If you paint a zone with a gradient or texture colour, you can use the Edit Gradient/Texture tool to modify its position in the zone. You can move, scale, rotate and skew. If you want to match the colour to the animation, set the first texture position and copy the Edit Gradient/Texture position. When moving to the next drawing, you can select the next texture and paste the previous position to continue the modifications.

If you are painting a hand-drawn animation or if your want the Brush tool and Paint tool to use your gradient's position, angle and scale settings instead of the default ones, you can store your own settings and reuse them afterward.

This way of editing a texture using the Edit Gradient/Texture tool also works with pencil lines drawn with textured "brushes". If you then paint your textured pencil line with a gradient, you can do so and then edit both elements independently at the same time.

How to use Edit Gradient/Texture tool

1. Do one of the following:

    ‣ In the Tools toolbar, click the Edit Texture ▭ tool.

    ‣ Press Shift + F3.

2. Click the gradient or texture colour to modify.

Erik, Di-Gata Defenders © Nelvana Limited, Corus® Entertainment

A blue selection frame surrounds the selected gradient or texture.

Blue selection frame

Texture was scaled down and skewed

3. Edit the gradient or texture by adjusting the control handles around the selection frame.

Colour Display Modes

The Colour view has two display modes:

- List

- Swatch

You can also display the RGB values and names of your solid colour swatches instead of only the name. This option is not available when displaying the colours in Swatch mode.

How to switch between the display modes

1. From the Colour View menu, and do one of the following:

   ‣ Select **Colours > Swatch Mode** to display the swatches.

   ‣ Deselect **Colours > Swatch Mode** to display the colour list.
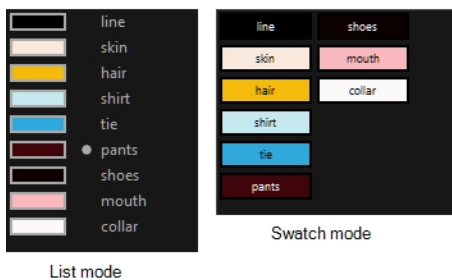
How to display the swatch colour values

‣ From the Colour View menu, select **Palettes > Display Colour Values**.

The solid colour swatches' RGB values are displayed between the colour swatch and its name. The gradient colour swatches will be identified as (gradient).

Copying and Pasting Colours

When you're creating palettes, you may want to copy colour swatches or their values and paste them in other palettes to save time. You can also quickly copy a colour value from a palette in your scene to a selected colour swatch in a different palette.

You can copy a selected colour swatch and paste it as a clone. Since it produces a clone colour swatch, it is impossible to use the Paste as Clone command in the same palette as you copied the original colour swatch from.

If you would like to keep a reference file of some colour IDs or use them with custom plug-ins, you can copy the colour swatch IDs. Here is an example of colour ID: **075cf5b552401130**.

```
ToonBoomAnimationInc PaletteFile 2
Solid    Black              0x075cf5b15fe006a1   0    0    0 255
Solid    White              0x075cf5b15fe006a3 255  255  255 255
Solid    Red                0x075cf5b15fe006a5 255    0    0 255
Solid    Green              0x075cf5b15fe006a7   0  255    0 255
Solid    Blue               0x075cf5b15fe006a9   0    0  255 255
Solid    Custom             0x075cf5b15fe006a8   0    0  150 255
Solid    "Vectorized Line"  0x0000000000000003   0    0    0 255
```

  ‣ In the Colour view, click the Edit Palette Mode 🔒 button to edit the colour list.

How to copy and paste colours

1. In the Colour view, select one or more colours to copy.

  ‣ In the Colour view, click the Edit Palette Mode 🔒 button to edit the colour list.
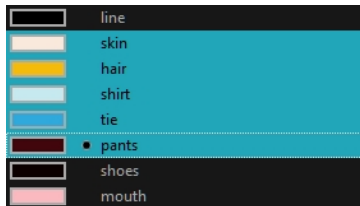
2. In the Colour View menu, select **Colours > Copy** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).

3. In the Palette list, select the palette in which you want to paste the colours.
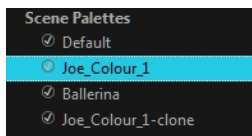
4. From the Colour View menu, select **Colours** > **Paste as New Colours** or press Ctrl + V (Windows/Linux) or ⌘ + V (Mac OS X).

  ‣ To paste the colour values of the copied swatch over an existing colour swatch, select **Colours** > **Paste Colour Values**.

How to clone a colour swatch

1. In the Colour view, select the colour swatch you want to clone.

    ‣   In the Colour view, click the Edit Palette Mode button to edit the colour list.

2. From the Colour View menu, select **Colours > Copy** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).

3. In the Colour view, select the colour palette you want to paste the clone into or create a new palette.

4. From the Colour View menu, select **Colours > Paste as Clone**.

    The cloned colour swatch appears in the palette.

How to copy a colour ID

1. In the Colour view, select the colour swatch you want toget the ID from.

    ‣   In the Colour view, click the Edit Palette Mode button to edit the colour list.

2. From the Colour View menu, select **Colours > Copy Colour ID** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).

3. Paste the copied value as plain text in the desired document.

Mixing Colours

If you want to modify a series of colours to blend a tint in them or offset their RGBA values, you can use the Tint panel. You can also create palette styles, such as night and day styles.

How to mix colours

1. In the Colour view, select the palette that contains the colours you want to offset or blend.
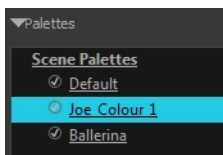
2. Do one of the following:

    ‣   From the Colour View menu, select **Palettes** > **Tint Panel**.
    ‣   Right-click and select **Tint Panel**.
    The Tint Blend/Offset panel opens.
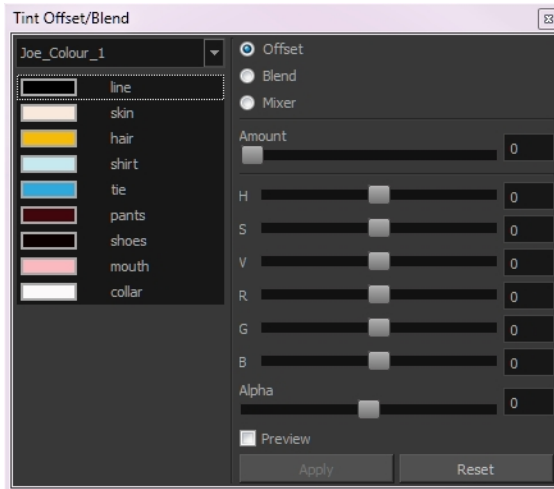
3. Select one or more colours to modify in the colour list. To select all the colours, press Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).
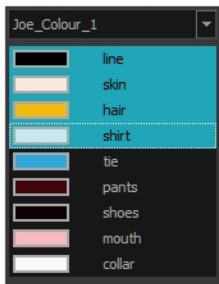
4. Select **Preview** option.

5. Select the **Offset**, **Blend**, or **Mixer** option.

Parameter	Description

Offset	Offsets the selected colours by the adjustments made using the HSB and RGB sliders. Use the Amount slider to adjust the degree of offset. Use the Alpha slider to adjust the opacity of the selected colour.
Blend	Blends the selected colours with the colour swatch in the top-right corner. Use the Amount slider to adjust the degree of blend. A blend of 100% turns the selected colours into the same colour as the swatch. Adjusting the HSB and RGB sliders affect the swatch colour, which in turn affects the selected colours on the left. Use the Alpha slider to adjust the opacity of the swatch.
Mixer	Select a Base and Tint colour to form a third colour swatch. Use the slider just beneath to mix the Base and Tint colours by different amounts. This will affect the mixed swatch whether it is selected or not. Select either the Tint or Base swatch and use the HSB and RGB sliders to adjust its colour. This will affect the mixed swatch colour, which in turn affects the selected colours on the left.

6. Click **Apply**.

Painting the Model

Now that you've created the colours and the palette, you're ready to paint your model.

The colour model needs to be painted in order to adjust the colours with the other elements in the production. You can paint your model regardless of the colour RGBA and adjust them later when all the elements are together.
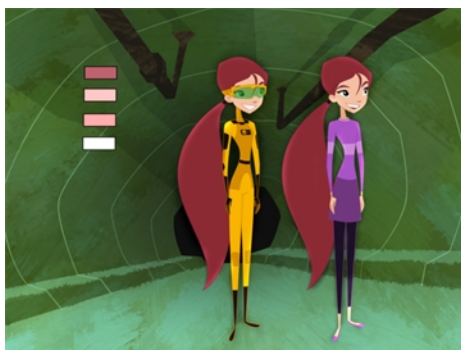
Abigail Archer, Grossology © Nelvana Limited, Corus® Entertainment Inc.

For paperless and cut-out animation, it's a good idea to provide a line-up template with the colour model to show the scale ratio between the characters, props and backgrounds.

Once your colour model is completed, create a line-up template by pasting one of the production's main characters, or even just a hand, beside the colour model to show the relative size. This allows the animator, layout artist, or scene setup artist to retain the correct scaling throughout the entire project when setting the elements in the scene. You can store your template in the Library.

How to paint a colour model

1. Create your master colour palette—see *Creating a Colour Palette* on page 121

2. Add new colours to the palette—see *Adding a Colour Swatch* on page 136.

3. Select your Paint Bucket 🖌 🖌 🖌 tool. We recommend the Paint Unpainted 🖌 tool.

4. In the Colour view, select a colour to paint your drawing.
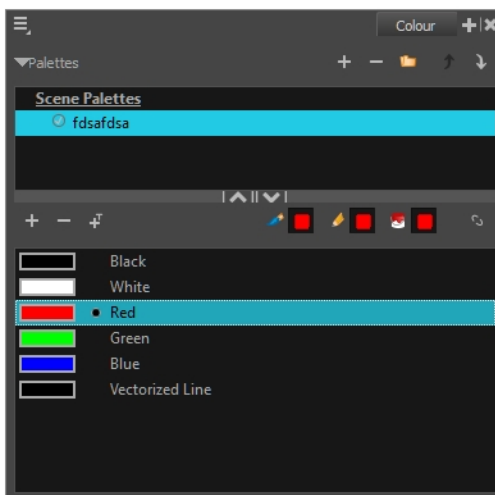
Colour view when working with vector layers   Colour view when working with bitmap layers
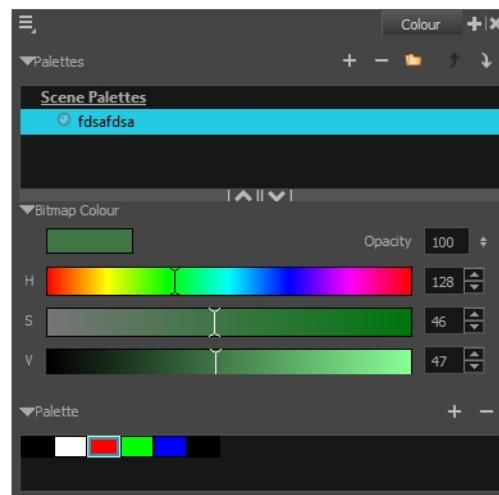
5. Paint the model by selecting colour swatches in the palette and clicking on your drawing. Note that only closed zones will be painted. If there's a gap in your artwork, you must close before you can paint it.

Abigail Archer, Grossology © Nelvana Limited, Corus® Entertainment Inc.

6. Adjust the colours—see *Mixing Colours* on page 145.

Chapter 6: Timing
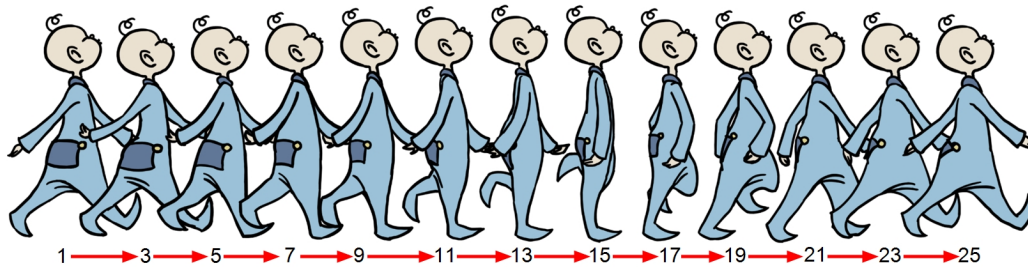
When you create hand-drawn animation traditionally or in a paperless environment, it's important to know how to set and modify the timing of your drawings.

In a traditional workflow, the person in charge of the digital exposure sheet reproduces the paper exposure sheet created by the animator. In a paperless workflow, the animator creates and manages their own exposure sheet directly in Harmony without the need for reproduction.

If you're more of a traditional animator, you will probably work with an exposure sheet. If you're a digital animator, you may prefer to work with a timeline to visualize your timing. Harmony offers both.

The Xsheet view displays the digital reproduction of a traditional paper exposure sheet used in hand-drawn animation. You can set the animation sequence's exposure and name the drawings.

The Timeline view is also used to visualize timing, and represents elements and groups of elements as layers.

You can adjust timing in both views; your choice depends on which technique you're accustomed to using. Depending on your working style, some actions may seem preferable to do in one view instead of another. Many of the actions you perform in the Xsheet can also be accomplished in the Timeline. This chapter will often show both techniques. You can choose which one you prefer.

In this chapter, you will learn how to work on your drawing's exposure and length. The exposure and animation paths for symbols are covered in separate chapters.

> NOTE: The exposure sheet is not mandatory for cut-out animation. It can be useful for creating characters and parts, but is not really needed for animation and timing. If you plan to work with cut-out animation, you can still learn useful tips by reviewing the section on exposure sheets.

The basic digital exposure sheet process is divided into the following steps:

Preparation

The digital exposure task is quite simple. There are very few things to prepare in order to get ready.

Opening the Scene

The scene is generally created during a previous step, such as scanning (in a traditional animation workflow), scene

set up, digital layout, or production organization.

Using the Workspace

The person creating the exposure sheet will need only the Xsheet view to create the digital exposure sheet, although the Timeline view may also be helpful. If you're doing paperless animation, use the Camera or Drawing view if you want to sketch at the same time.

If you work with this layout often, you can use the Workspace Manager to save it as a workspace, and name it **Xsheet**, for example.
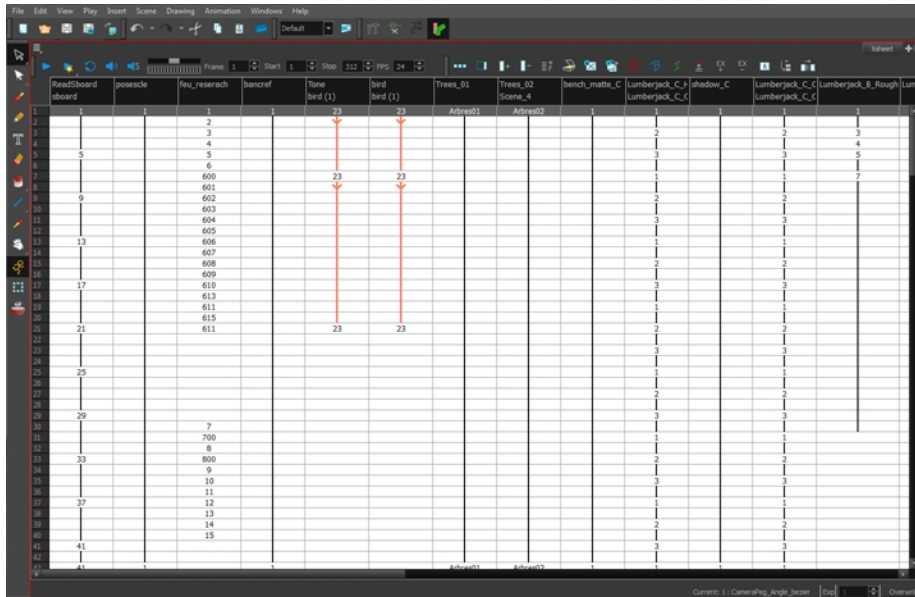
While drawing and animating paperless animation, you can use the Workspace Manager to save a frequently used layout and name it **Paperless Animation**, for example.

Preparing References

To start an exposure sheet, you need to prepare your references. For traditional animation, you will need to reproduce the animator's paper exposure sheet. If you're working remotely, the studio can scan the paper exposure sheet using third-party software and send the digital files to be opened and viewed digitally.

In paperless animation, you will usually create an exposure sheet from the Xsheet view. The information from your layout and posing or storyboard will help you approximate how many elements are required in the scene.

Setting the Scene Length

Once the references are ready, you need to set the scene length by adding the right number of frames to your scene. You can set the global scene length from the top menu.

In the Xsheet and Timeline view, you can add and remove frames from a scene to edit its length.

How to set the scene length

1. From the top menu, select **Scene > Scene Length.**

   The Set Scene Length dialog box opens.
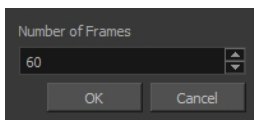
2. In the Number of Frames field, enter the number of frames needed.

How to extend or reduce the scene length in the Timeline view

When you remove frames at the end of a scene to reduce the scene length in the Timeline view, the exposed drawings and symbols are not deleted. They're still available if you extend the scene afterward.

1. In the Timeline view, drag the scene length bracket:

   ‣ **Right**: To add more frames to your scene.
   ‣ **Left**: To reduce the number of frames in your scene.
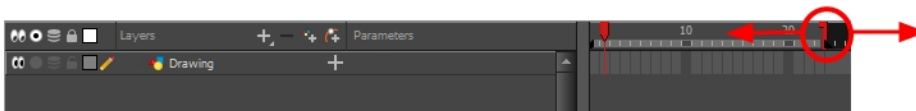
How to add frames in the middle of a scene

You can add frames anywhere in the middle of the scene—before or after a selection. If you select a frame row in the Xsheet view, Harmony will add the new frames before or after the selection, depending on your choice.

1. Do one of the following:

   ‣ In the Timeline view, select the frame to which you want to add frames before or after.
   ‣ In the Xsheet view, select a frame row.

▸ In the Timeline view, select the frame to which you want to add frames before or after.

2. Do one of the following:

▸ From the top menu, select **Scene > Frame > Add Frames Before Selection** or **Add Frames After Selection**.

▸ In the Xsheet view, right-click and select **Frames > Add Frames Before Selection** or **Add Frames After Selection**.

▸ In the Xsheet toolbar, click the Add Frames ⬚ button to add frame after your selection.

▸ Press Ctrl + G and Ctrl + H (Windows/Linux) or ⌘ + G and Ctrl + H (Mac OS X).

The Add Frames dialog box opens.
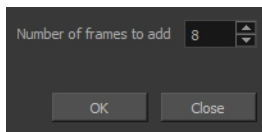
3. In the Number of Frames to Add field, enter the number of frames needed in the scene.

4. Click OK.
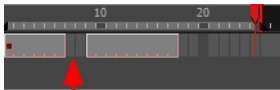
Two frames were added
before selected frame

How to add frames at the start or end of a scene

1. In the top menu, select **Scene > Frames > Add Frames at Start** or **Add Frames at End**.

The Add Frames dialog box opens.
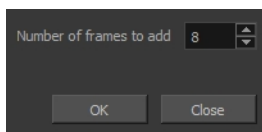
2. In the Number of Frames to Add field, enter the number of frames needed in the scene.

3. Click OK.

How to remove a frame or a range of frames to reduce the scene length in the Xsheet view

In the Xsheet view, you can remove any selected frame range, such as the last frame.

1. In the Xsheet view, do one of the following:

   ‣ Select a frame in a given column.

   ‣ Select a frame range by clicking the first frame's number and then dragging the selection highlight down to the last frame to delete.

2. To delete the selected frames, do one of the following:

   ‣ From the top menu, select **Scene > Frame > Remove Selected Frames**.

   ‣ Press Delete to delete the selection.

   ‣ Click the Remove Frames button. To remove several frame selections, click the button repeatedly.

   If you selected a range of frames, the Warning dialog box may open.
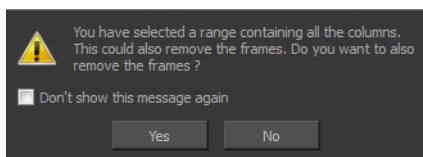
3. To complete the operation:

   ‣ Click **Yes** to delete the selection.

   ‣ Click **No** to delete only the exposure in the cell and not the frames.

   ‣ Select the **Don't Show This Message Again** option to prevent the warning message from being displayed each time you delete a frame range.

Creating Drawings

Before filling any value or setting any timing or exposure, you need to add different drawing elements.

Each drawing element is represented as a vertical element column in the Xsheet view and a horizontal element layer in the Timeline view.

In Harmony, whether you work in the Timeline or Xsheet view, any modification you do to one view will be applied to both.

To start an exposure sheet, you will use drawing elements. Drawing elements are drawing containers. Any image file, either bitmap or vector, will use a drawing element.

When you add a drawing element to your scene, a folder is added to the scene directory. This folder is named the same way as the drawing element. Its purpose is to contain all the drawings related to this element. For example, in cut-out animation, a character can have many heads available. All of the head drawings will be contained in this folder, even if they are not exposed in the Timeline or the Xsheet view. There is always a drawing container connected to a drawing element (layer, column).

> **NOTE:** There are different element types available, such as sound and expression. A sound element contains sound files. Expressions, Beziers, 3D path, Quadmaps and Pegs are for motion purposes during the compositing step. It's not necessary to create these types to create your exposure sheet.

You can add drawing elements from the Timeline view, Xsheet view, and the Scene menu.

This section is divided as follows:

Layer Basics

A layer is linked to a directory, the location where all its drawings are saved. This directory has the same name as the layer. When a name is typed in a cell ,Harmony searches the layer's directory for the corresponding drawing to display. If there is no corresponding drawing, a new one is created.

Drawings are exposed in cells and linked to the drawings saved in the layer's directory. When you remove a drawing from a cell, it is not displayed and still exists in the directory.

A drawing that is exposed multiple times (for example, in a walk-cycle) would be linked to the same original drawing in the layer's directory. If you modify, repaint, or correct the drawing, all exposed drawings with the same name are updated simultaneously. You must duplicate or create a new drawing to modify a single exposure and retain the others.

When you create a drawing cycle, all of the repeated drawings are linked to the original files. This means that when you modify, repaint, or correct a drawing named "1," all drawings named "1" are updated simultaneously. In order to modify a drawing independently from its other exposures, you must duplicate the drawing.

Layer and Column Types

A column is also known as a layer. There are several types of layers that you can add in the Xsheet and Timeline view. Each layer is indicated by an icon to help you differentiate them. Some layers are represented differently in the Xsheet view.

Drawing Layer

The most common layer type is the drawing layer. Any time you need to create a vector drawing or import a symbol or image, you can use a drawing layer. You can also create bitmap artwork on a drawing layer.

NOTE: Bitmap images are contained in bitmap layers.

Bitmap Layer

If you import a bitmap images (as original bitmap) in your project, they are inserted in a Bitmap layer. If you choose to vectorize your image when you import, the vectorized object will be placed on a Drawing layer.

When importing a bitmap image, you have the option of encapsulating the image in a symbol. If you place a bitmap into a symbol, you will be able to mix vector drawings with it on the same layer.

Camera Layer

You can only have one Camera layer at a time in the Timeline view. By default, there is no Camera layer when you create a scene. You need to add a Camera layer when you want to create a camera motion.

The Camera layer is not visible in the Xsheet view.

NOTE: If you want to have several cameras with different settings, you can keep adding Camera layers in your Timeline view (however, only one will ever be visible at a time as you can only have one camera at a time in your timeline). To switch to a different camera, select **Scene > Camera** and select another camera layer.

Effect Layer

To enhance the look of your scene, you can add effect layers and attach your drawings to them.

When you select the Effect layer in the Timeline view, the effect's parameter columns are displayed in the Functions section of the Xsheet view.

Colour-Card Layer

The Colour-Card layer is used to add a plain colour background to a scene. By default, your scene has no background colour and if you render it as a QuickTime movie or image sequence, it will have a black background.

This layer is not visible in the Xsheet view.

Group Layer

A Group layer can be used to organize the Timeline view. You can drag and drop other layers onto a Group layer and then collapse the Group layer to hide these other layers from view.

If you create the Group layer in the Timeline view.

Peg Layer

A Peg layer is a trajectory or motion path layer that does not contain drawings. It can be attached to any drawing layer, cut-out puppet, or other peg layers; they will all follow the trajectory you set in the Peg layer.

When you select the Peg layer in the Timeline view, the peg's function columns are displayed in the Functions section of the Xsheet view.

Quadmap Layer

A Quadmap layer can be described as a deformation transformation layer that does not contain drawings. This can be attached to any drawing layer, cut-out puppet, or even other Peg layers. They will all follow the deformation you set in the Quadmap layer.

When you select the Quadmap layer in the Timeline view, the Quadmap's function columns are displayed in the Functions section of the Xsheet view.

Sound Layer

You can import sound files to add dialog and sound effects to your project. The sound layer will be added to your Timeline and Xsheet view when you import a sound file in your scene.

In the Xsheet view, the Sound layer is a dark grey colour.

Advanced Column Types

In the Xsheet view, you can add several advanced column types to create particular animation paths. When you create these columns, they are not linked automatically to any particular drawing layer. You can create a motion path using these columns and then link or unlink several drawing or peg layers to it.

Advanced column types include:

- Timing

- 3D Path

- 3D Rotation

- Bezier Curve

- Expression

- Annotation

Adding Layers and Columns

There are different ways to add a drawing layer to your project. By default, when you create a new scene there is one Drawing column in the Xsheet view and one corresponding Drawing layer in the Timeline view.

You can add an element for each drawing and it will appear as a column in the Xsheet view, a layer in the Timeline view.

How to add a drawing element from the Timeline view

1. In the Timeline view, click the Add Drawing Layer button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

   The Add Drawing Layer window opens.
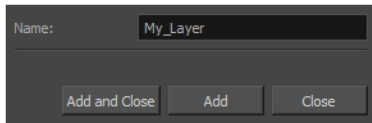
2. In the Name field, name your new layer.

3. Do one of the following:

    ‣ Click **Add** to add a first layer and keep the window open to add more layers.
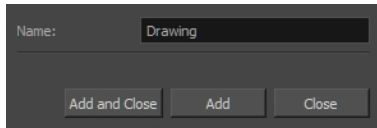   ‣ Click **Add and Close** to add a new layer and close the window.

    A new drawing layer is added to the Timeline view.

How to add a drawing element from the top menu

1. From the top menu, select **Insert > Drawing**.

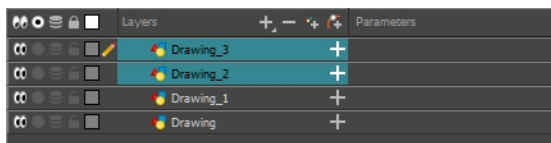   The Add Drawing Layer dialog box opens.

2. In the Name field, type a relevant element name and click **OK**.

    The new drawing element appears in your scene.

Deleting Layers and Columns

You can delete an element in the Timeline view or Xsheet view.

How to delete layers in the Timeline view

1. In the Timeline view, select the layers to delete.

2. Do one of the following:

    ‣ In the Timeline's Layer toolbar, click the Delete Layers   button.
    ‣ Right-click on the selection and select **Delete**.

How to delete columns in the Xsheet view

1. In the Xsheet view, select the columns to be deleted by clicking on their header.

2. Do one of the following

▸ Right-click on the selection and select **Delete Columns**.

▸ In the Xsheet toolbar, click the Delete Columns ▯- button.

▸ Press Delete.

The Confirm Delete dialog box opens.
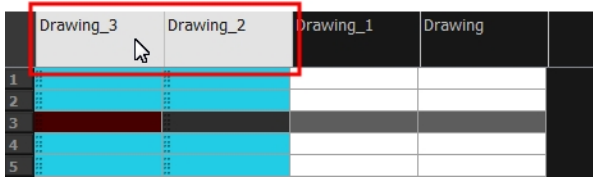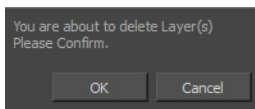

3. To complete the operation:

▸ Click **OK** to delete the selected layers.

▸ Click **Cancel** to cancel the operation.

Layer and Column Properties

Each element has its own set of properties that you can modify, including effect and peg layers.

If you want to modify an element's properties, you can display the properties of a selected layer in the Timeline view. If you're working with the Xsheet, you can display its properties as well. You can display a layer's properties as a window or as a view of its own.

The Layer Properties editor allows you to:

• Rename the layer

• Enable or disable the layer

• Lock the layer

• Change the track colour

The Column Properties editor allows you to:

• Rename the layer

• Enable or disable the layer

How to display a layer's properties

1. Do one of the following:

▸ In the Layer Properties view is not part of your workspace, from the top menu, select **Windows > Layer Properties**. In the Timeline view, select a layer

▸ In the Timeline view, double-click on a layer.

▸ Press Shift + E.

The properties display.
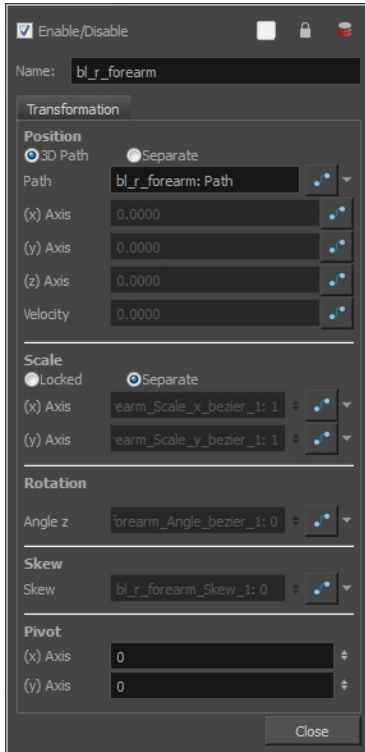
Modifying Layers and Columns

Once you add layers and columns to your project, you can modify their properties, names, or ordering.

You can change the order of your elements in the Timeline view and Xsheet view. When you change the order of your elements in one view, the other one is updated.

How to rename a layer in the Timeline view

1. In the Timeline view, double-click on the name of the layer to rename.

2. In the Name field, rename the layer and press Enter/Return.
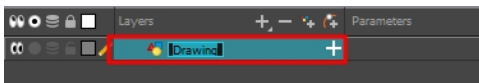
How to rename a layer in the Layer Properties editor

1. In the Timeline view, double-click anywhere on the layer except the layer name to rename.

   The Layer Properties editor opens.

2. In the Name field, rename the layer.

3. Click **Close**.

How to reorder layers in the Timeline view

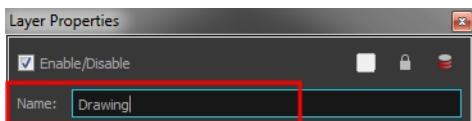1. In the Timeline view, select the layers to move.

2. Drag the selection to the new location.

3. Do one of the following:

   ‣ Drop the selection on an existing layer to make it a child of another element layer.
   ‣ Drop it between the existing layers. Timeline layers that are located above the selection are displayed in front it. Layers located under it in the Timeline View are displayed behind it.
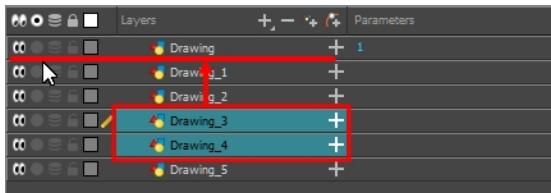
How to reorder columns in the Xsheet view

1. In the Xsheet view, click on the column's header with the middle mouse button.
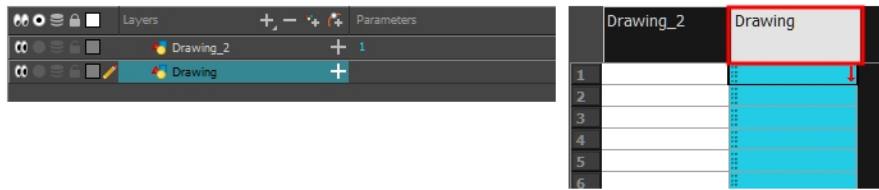
2. Drag the column to its new position.
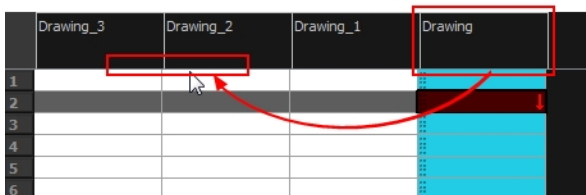
Duplicating Layers and Columns

Duplicating an element provides you with a copy of the drawings and their exposure. You can modify anything you want in the duplicated element without affecting the original one.

How to duplicate an element

1. In the Timeline or Xsheet view, click the layer or column to duplicate.

2. Do one of the following:

   ‣ (Xsheet) Right-click on the column and select **Duplicate Selected Columns**.
   ‣ (Timeline) Right-click on the layer and select **Duplicate Selected Layers**.

   The new duplicated layer or column appears.

Cloning Layers and Columns

Cloning a layer or column provides you with a copy of the selected element that uses the same drawings as the original. For example, if you modify a drawing in the cloned or original column, it is updated in both columns.

You can choose whether or not to copy the column timing to the cloned columns.

   • You can modify the column timing independently from each other, but the drawings remain linked.

   • You can copy the columns timing, so drawings and timings remain linked.

You can clone selected nodes from the Node view in the same way.

This is useful when you want to reuse a hand-drawn animation but have different timings.

How to clone an element

1. In the Timeline or Xsheet view, select the layer or column to clone.
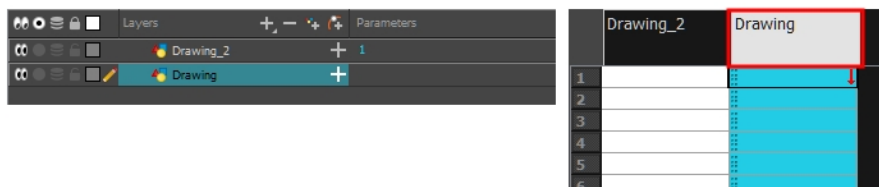
2. Do one of the following:

   ‣ From the top menu, select **Edit > Clone: Drawings Only** to clone only the layer or column drawings.

   The new cloned layer or column appears.

Filling Exposure

Harmony provides different tools to fill in exposures and values, create cycles, and set increments.

This section is divided as follows:

Filling Exposure Mode

In the Xsheet view, you can fill columns using two different filling modes: Overwrite or Insert. These modes control the filling behaviour. The Timeline view only uses the Overwrite mode.

By default, the Xsheet view is set to Overwrite mode. Adding a new value or a new value sequence overwrites existing ones. The existing timing sequence remains in the same place and is not pushed down the column.

The Insert mode is the opposite of the Overwrite mode. When you add a new value or a new value sequence over existing ones, the new values are inserted between the old ones. The existing timing sequence is pushed down the column.

How to switch between Overwrite and Insert modes

1. Do one of the following:

   ‣ In the bottom-right corner of the Xsheet view, click **Overwrite/Insert**.

   ‣ Press I.

Typing Exposure

If you want to type an exact drawing name or value in the Timeline view, you must use the Parameters section of the Timeline.

NOTE: You can only use alphanumeric values. (`0-9`, `a-z`, underscore (`_`) and dash (`-`)).

How to type a value in the Timeline view

1. In the Drawing Substitution field, double-click to edit the field and type the name of the drawing you want to create.
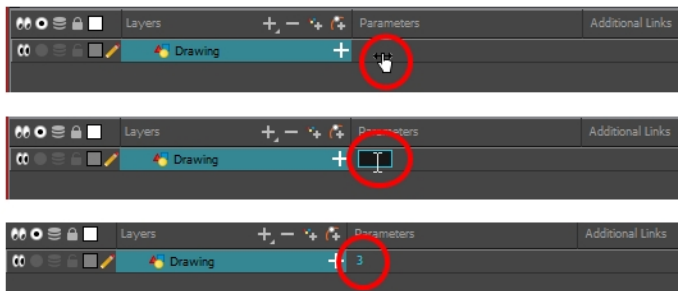
2. Press Enter/Return to validate the value.

Holding Exposure

Drawings in an animation project are often exposed for more than one frame. The most common exposure of a drawing is two frames. In the industry, this type of exposure is known as *animation in double frames* or *animation on twos*. A drawing can also be exposed for three, four, or five cells and so on. To prevent mistakes and save time, you can hold cells automatically as you type in the Xsheet view.

How to hold exposure

1. Do one of the following:

   ‣ From the top menu, select **Animation > Cell > Hold Exposure > the desired option**.

2. Type a value or drawing name in the cell.

   ‣ Press Enter/Return to move on to the next cell.
   ‣ Press Esc to quit the typing mode.

Extending a Single Exposure

Extending the exposure lets you select a cell that contains a value and pull it down to the desired frame.

How to extend a cell exposure gesturally

1. In the Xsheet view, select the red arrow ▌ in the cell's right side. Make sure you see the drag down ↕ cursor.

2. Pull down the selected cell to the desired frame.

> NOTE: The red selection box must be visible when releasing the cursor. If not, the action is considered cancelled.
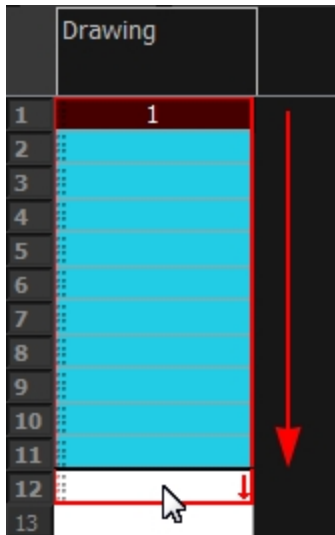
How to extend a sequence from the top menu

1. Select a cell and do one of the following:

   ‣ From the top menu, select **Animation > Cell > Extend Exposure**.
   ‣ Press F5.

   The Extend Exposure dialog box opens.

2. Enter the frame number you want to extend the cell to.

Extending an Exposure Sequence

When working with a sequence that contains only numbers, you can extend an exposure sequence in a similar manner to extending a single exposure.

How to extend an exposure to create a sequence

1. In the Xsheet view, select a cell containing a number.

2. In the selected cell, click the red arrow ▌ on the cell's right side. Make sure to see the drag down ↕ cursor.
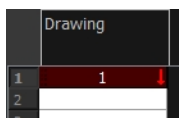
3. Hold down the Shift key. Make sure a plus sign (+) appears.

4. Pull down the selection box to the desired frame.
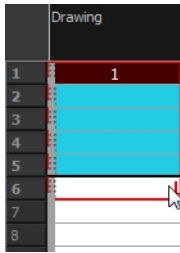
> **NOTE:** The red selection box must be visible when releasing the cursor. If not, the action is considered cancelled.

5. First release the Shift key, then release the mouse button.
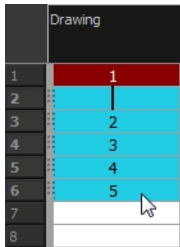
Extending the Exposure of Previous Drawings

When drawing on a blank frame you can automatically create a new drawing and extend the timing from the previous exposed drawing.

In the following example, a cell is selected on the timeline for creating a new drawing in image A. In image B, the previous exposure does not extend to the new drawing, while in image C, it does.

How to extend the exposure of previous drawings

1. Open the Preferences dialog box by doing one of the following:

   ‣ From the top menu, select Edit > Preferences.
   ‣ Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

   The Preferences dialog box opens.

2. Select the **General** tab.

3. In the Timeline section, select the **Extend Exposure of Previous Drawing** option.

4. On the left side of the Timeline view, select a cell and create a new drawing.
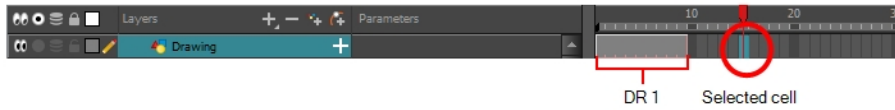
   The previous exposure automatically extends to the beginning of the new drawing.

Dragging Cells

To readjust your timing, you can drag one or more cells to a new location. You can drag a cell to any other frame in the same column or into another column.

You can turn off the Gestural Drag mode for the Xsheet view to prevent drawings from being dragged from one location to another. This feature does not apply to Annotation columns.

How to drag a cell to another location in the Timeline view

1. In the Timeline view, select one or more cells to move.
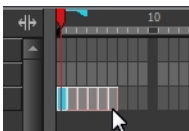
2. Drag the cells to the new location.
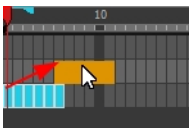
3. Drop the selection by doing one of the following:

   ‣ Drop by simply releasing the mouse or pen.
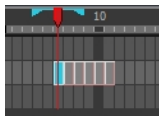
   ‣ Hold Ctrl (Windows/Linux) or ⌘ (Mac OS X) while dropping the selection to copy the cells. The original cells will not be moved.
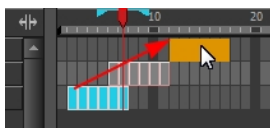
   ‣ Press Shift while dropping the selection to insert them between existing frames.
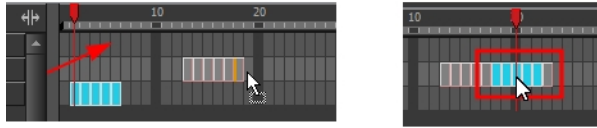
How to drag a cell to another location in the Xsheet view

1. In the Xsheet view, select one or more cells.

2. In the Xsheet view, position the pointer over the small dotted area ⠿ ⠿ on the left side of the selected cells.

3. Drag the selection to any other cell in the same column or in another column.

4. Do one of the following:

   ▸ Drop the selection to overwrite the existing cells.

	Drawing_2	Drawing_1	Drawing
1		1	
2		2	
3		3	
4		4	
5		1	
6		2	
7		3	
8		4	
9		5	
10		6	
11		11	
12		12	
13		13	
14			

▸ Hold down Ctrl (Windows/Linux) or ⌘ (Mac OS X) while dropping the selection to copy the cells. The original selection will not be moved.
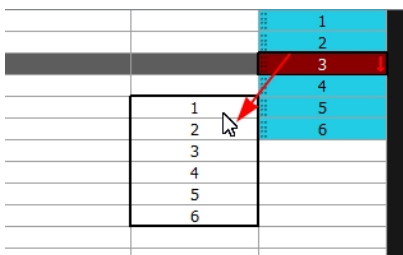
▸ Press Shift while dropping the selection to insert it between existing frames.

	Drawing_2	Drawing_1	Drawing
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		1	
9		2	
10		3	
11		4	
12		5	
13		6	
14		8	
15		9	
16		10	
17		11	
18		12	
19		13	

Increasing and Decreasing Exposure

Once a value is entered in the Timeline or Xsheet view, you can increase and decrease its exposure.

Increasing the exposure adds one more exposure to a selected cell; repeating this action adds an extra cell each time. This is an efficient way to extend a drawing's exposure and is always set in Insert mode. Increasing an exposure pushes the existing exposure forward.

Decreasing the exposure removes one exposure from a selected cell and pulls any cells following it to the beginning of selection.

How to increase exposure

1. In the Timeline or Xsheet view, select a cell.
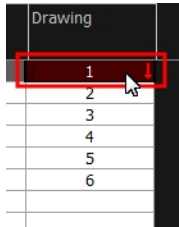
2. Do one of the following:

    ▸ From the top menu, select **Animation > Cell > Increase Exposure**.

    ▸ In the Xsheet toolbar, click the Increase Exposure ᴇx button.

    ▸ At the bottom-right corner of the Xsheet view, set the number of cells over which the drawing will be exposed.

    ▸ Right-click and select **Exposure > Increase Exposure**.

    ▸ Press +.

How to decrease exposure

1. In the Timeline or Xsheet view, select a cell.
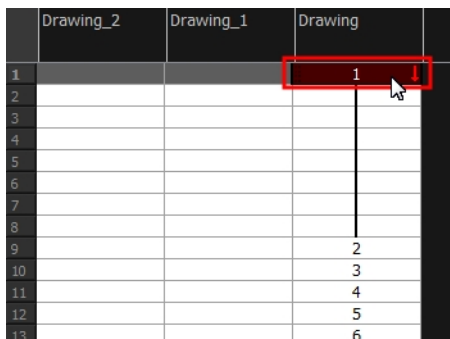
2. Do one of the following:

    ▸ From the top menu, select **Animation > Cell > Decrease Exposure**.

    ▸ In the Xsheet toolbar, click the Decrease Exposure ᴇx button.

▸ At the bottom-right corner of the Xsheet view, set the number of cells over which the drawing will be exposed.

▸ Right-click and select **Exposure > Decrease Exposure**.

▸ Press -.

How to use the Clear Exposure and Pull feature

1. In the Timeline or Xsheet view, select a range of cells.

2. Do one of the following:

▸ From the top menu, select **Animation > Cell > Clear Exposure and Pull**.

▸ Right-click and select **Exposure > Clear Exposure and Pull**.

▸ In the Xsheet toolbar, click the Clear Exposure and Pull ⤴ button.

The exposure is reduced by the selected number of cells.

Deleting Exposure

You can delete a drawing's exposure in several ways. When you delete a drawing's exposure from the Timeline or Xsheet view, you are not deleting the actual drawing file. You can always retrieve it by typing its name again in a cell.

You can delete the exposure in a selected cell range or delete the entire exposure of a drawing exposed over several cells. Note that you can also delete the exposure for drawings inside a collapsed group.

How to delete selected exposures

1. In the Timeline or Xsheet view, select the exposure you want to delete.

2. Do one of the following:

▸ Right-click and select **Delete**.

▸ Press Delete.

How to clear the entire exposure of a drawing

1. In the Timeline or Xsheet view, select a cell of a drawing exposed over several cells.

2. Do one of the following:

   ‣ From the top menu, select **Animation > Cell > Clear Exposure**.
   ‣ In the Timeline view, right-click and select **Exposure > Clear Exposure**.

Inserting Blank Cells

You can place an empty cell between other cells.

How to insert blank cells

1. In the Timeline or Xsheet view, select the cell in which you want to insert a blank cell.
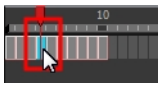
2. Do one of the following:

   ‣ In the top menu, select **Animation > Cell > Insert Blank Cell**.
   ‣ Right-click and select **Exposure > Insert Blank Cell**.
   ‣ In the Timeline or Xsheet toolbar, click the Insert Blank Cell ⬛ button (you may have to customize the toolbar to display it).
   ‣ Press Shift + J.

   A blank cell is inserted.

How to clear a selected cell range without changing the exposure and timing

1. In the Xsheet view, select a frame range to clear.

2. Right-click and select **Clear**.

Setting the Exposure

You can easily increase or decrease the exposure for a selected cell range.

How to set the exposure

1. In the Timeline or Xsheet view, select the cell range on which you want to set the exposure.
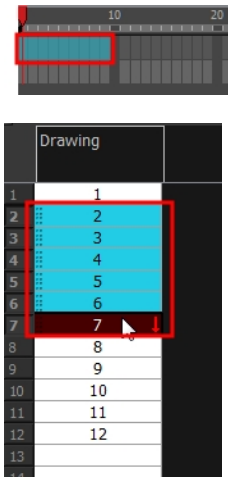
2. Do one of the following:

    ▸   From the top menu, select **Animation > Cell > Set Exposure to > Set Exposure to 1**, **2**, **3**, or **Set Exposure**.

    ▸   In the Timeline toolbar, click one of the Set Exposure EX EX EX EX buttons (you may have to customize the toolbar to display them).

    ▸   In the Xsheet view, right-click and select **Exposure > Set Exposure to > Set Exposure to 1**, **2**, or **3**, or **Set Exposure**.

3. If you chose the Set Exposure option, the Set Exposure dialog box opens. Enter the number of frames you want the drawings to display and click **OK**.
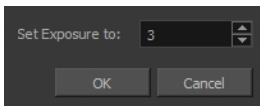
The new timing is displayed in the Xsheet view.
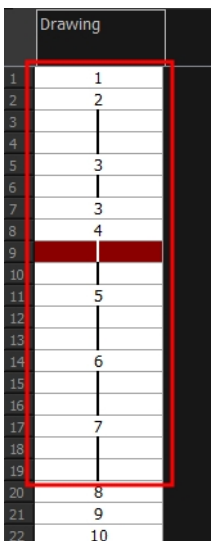
Filling a Selection with a Single Exposure

You can fill the same value over an entire selection. The selection can be over one cell, a cell range in one column, a cell range over many columns, an entire column, or many columns. You can use numbers, words, letters, or any alphanumeric value.

How to fill a selection with a single exposure

1. In the Timeline or Xsheet view, select a cell range.
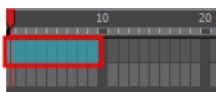
2. Do one of the following:

   ‣ From the top menu, select **Animation > Cell > Fill Selection**.
   ‣ Press Ctrl + T (Windows/Linux) or ⌘ + T (Mac OS X)).

   The Fill Selection dialog box opens.
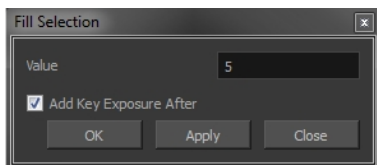
3. In the Value field, type the desired value.

4. To insert a key exposure in the frame following the last cell in the selection, select the **Add Key Exposure After** option. Otherwise, leave it deselected.

5. Click **OK**.

Filling a Selection with a Sequence

You can create a numbered sequence over a selection. The sequence can be forward, backward, single, double or higher increment, as a cycle, and so on. The selection can be over one cell or a cell range in one column or more or

an entire column or many entire columns.

How to fill a selection with a sequence

1. In the Timeline or Xsheet view, select a cell range.
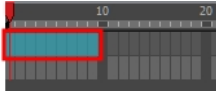
2. Do one of the following:

   ‣ From the top menu, select **Animation > Cell > Sequence Fill**.
   ‣ In the Timeline view, right-click and select **Exposure > Sequence Fill**.
   ‣ Press Ctrl + M (Windows/Linux) or ⌘ + M (Mac OS X)).

   The Sequence Fill dialog box opens.
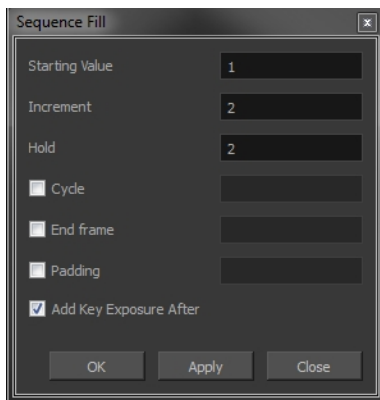
3. In the Starting Value field, type the first number in the sequence.

4. In the Increment field, type the number by which the drawing number will increase from frame to frame. For example, an increment of 1 gives you: `1-2-3-4`; an increment of 2 gives you: `1-3-5-7`; and -2 gives you this: `8-6-4-2`.

Filling a Selection Randomly

You can fill in random values over a selection. You can give a maximum and a minimum value and create a range for Harmony to choose the random values from. The selection can be over one cell or a cell range in one column or more or an entire column or many entire columns.

How to fill cells randomly

1. In the Timeline or Xsheet view, select a cell range.
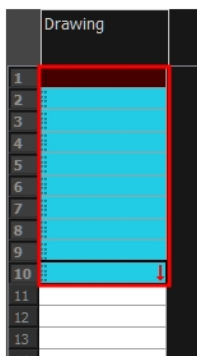
1. In the Xsheet view, click the Fill Cells Randomly [icon] button (you may have to customize the toolbar to display it).

   The Fill Cells Randomly dialog box opens.
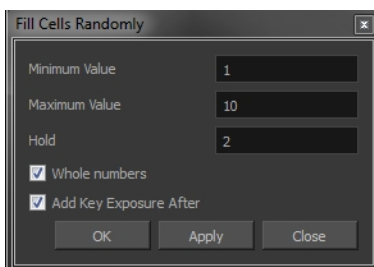
2. In the Minimum Value field, enter the lowest acceptable value.

3. In the Maximum Value field, enter the highest acceptable value.

4. In the Hold field, choose an exposure holding value.

5. If you are applying this option to a drawing column, select the **Whole Numbers** option to avoid decimal points.

6. Click **OK**.
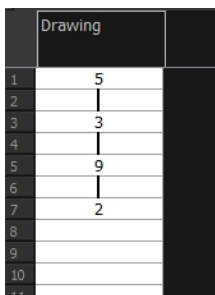
Filling Empty Cells

You can fill empty cells to extend the exposure of single frame drawings to fill the range of empty cells after each one.When creating drawings on cells that are not side-by-side, the exposure of the first drawing no longer fills automatically. You must select the frame range where you want your drawings to hold their exposure up to the next drawing and use the Fill Empty Cells command.

How to fill empty cells

1. In the Timeline or Xsheet view, select a cell range.
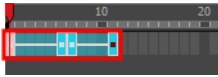
2. Do one of the following:

   ‣ Right-click and select **Exposure > Fill Empty Cells**.
   ‣ From the top menu, select **Animation > Cell > Fill Empty Cells**.
   ‣ In the Timeline toolbar, click the Fill Empty Cells button.
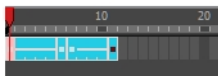
   Each drawing in the selection is exposed in the range of empty cells that follow it.

Creating Cycles

Once you have entered a series of drawings and exposures, you can create cycles out of them in several ways.

You can loop your drawings using the following command:

• Create Cycle

When you create a drawing cycle, all the repeated drawings are linked to the same original files. When modify, repaint, or correct a drawing named "1" for example, all drawings named "1" are updated simultaneously. In order to modify a drawing independently from its other exposures, you must duplicate the drawing.

How to create a cycle

1. In the Timeline or Xsheet view, select the cell range to loop.
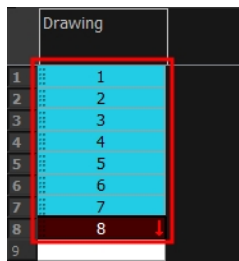
2. In the Timeline toolbar, click the Create Cycle button (you may have to customize the toolbar to display it).

   The Create Cycle dialog box opens.
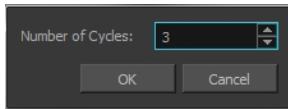
3. Enter the number of cycles you want, including the current selection.

Managing Key Exposures

Before working with key exposures, it's important to understand how keyframes, exposure and key exposure work in Harmony:

- **Keyframe**: A keyframe is a point in time where a change to the properties of the object or character occurs. In Harmony, keyframes consist of the coordinates that determine how an entire layer and its contents are moved. Keyframes include these parameters: XYZ position, skew, scale, angle and pivot.

- **Exposure**: Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.

- **Key Exposure**: A key exposure in Harmony is a type of exposure that forces a drawing to remain exposed on a specific frame. If a drawing is exposed before a key exposure and you swap out that drawing for another one, then the original drawing is retained. This preserves the key drawing. Note that Harmony automatically sets a key exposure when you perform a drawing swap.

Adding Key Exposures

Key exposures are mainly used for swapping drawings in cut-out animation where you will have numerous drawings for the various positions of the mouth or eyes of a character for example.

If there is a particular drawing you want to keep on a specific frame, you can set it as a key exposure. This prevents it from be overwritten by a drawing swap on a preceding frame. A key exposure is simply a property of an exposure that forces it to be exposed on a certain frame regardless of whether the previous exposure is the same drawing or not.

NOTE: Keep in mind that if you modify the artwork in a drawing, all instances of that drawing will be automatically updated even if set as a key exposure. This keeps your existing animation key poses intact. It is frequently used on a mouth or eyes layer.

Example: Swapping a drawing with no key exposure

In the following example, drawing 3 (DR 3) is selected on the timeline and it contains no key exposure.

When it is swapped for drawing 4 (DR 4), the entire duration of drawing 3 substituted for drawing 4.

Example: Swapping a drawing with a key exposure

Here's what happens when swapping a drawing with a key exposure. In the following example, the playhead is positioned in the middle of drawing 5 (DR 5) to set the position for the new key exposure. When the new key exposure is added, drawing 5 is split in two; both halves contain drawing 5. Now if you swap the first drawing 5 for drawing 1, the second drawing 5 retains its exposure.

How to add a key exposure

1. In the Timeline view, select the drawing cell to set as the key exposure.

2. Do one of the following:In the Timeline toolbar, click the Add Key Exposure ⬚ button.

   ‣ In the Timeline toolbar, click the Add Key Exposure ⬚ button.
   ‣ Right-click and select **Exposure > Add Key Exposure**.

   A new key exposure is added.

   If you added a key exposure at the beginning of the drawing, the entire exposure is filled with that same drawing. If you added a key exposure anywhere other than the beginning of the drawing, then the drawing is split in two and both parts contain the same drawing.

Removing Key Exposures

When you no know longer need a key exposure, you can remove it. When you do this, the existing key exposure is replaced by the preceding exposure. In the following example, a key exposure is set to drawing 1 (DR 1). When the key exposure is removed, the exposure is replaced by the preceding exposure, drawing 4 (DR 4).

Before: Key exposure is set to drawing 1.

DR 1

After: Key exposure is removed. The preceding exposure, drawing 4, replaces the exposure.

DR 4

How to remove a key exposure

1. In the Timeline view, select a key exposure to remove.

2. Do one of the following:

   ‣ In the Timeline toolbar, click the Remove Key Exposure button.

   ‣ Right-click and select **Exposure > Remove Key Exposure**.

   The key exposure is removed and replaced by the preceding exposure.

Removing Duplicate Key Exposures

When working with drawings to adjust the timing of a mouth in a lipsync, for example, and forcing the use of specific key exposures, unnecessary key exposures will be created. You can delete these duplicates without affecting the rest of the drawing. The first drawing of the selection will be used for the range.

NOTE: Duplicate key exposures may occur when pasting with the Enforce Key Exposure option selected.

How to remove duplicate key exposures

1. In the Timeline view, select the layer that contains duplicate key exposures.

2. In the Timeline toolbar, click the Remove Duplicate Key Exposure button (you may have to customize the toolbar to display it).

Navigating between Frames and Columns

Once a cell is selected in the Timeline or Xsheet view, you can navigate between the drawings, frames, and layers using keyboard shortcuts that work in the Camera, Drawing, Xsheet and Timeline views.

You can navigate through:

• Drawings

• Frames

- Columns

How to navigate through drawings, and frames and columns

1. In the Timeline or Xsheet view, select a cell.
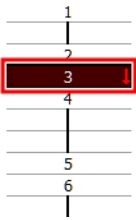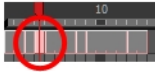
2. Once the cell is selected, you can navigate between:

   ‣ **Previous and next layers**: From the top menu, select **Drawing > Previous Layer** and **Next Layer** or press H and J.
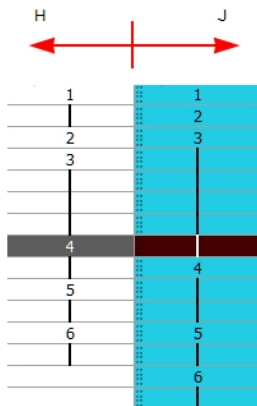
   ‣ **Previous and next drawings**: From the top menu, select **Drawing > Previous Drawing** and **Next Drawing** or press F and G..
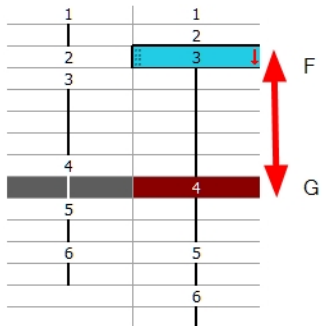
   ‣ **Previous and next frames**: From the top menu, select **Play > Previous Frame** and **Next Frame** or press comma (,) and period (.).
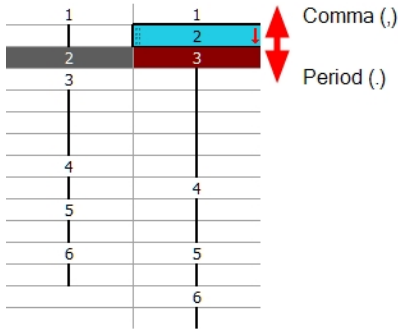
Managing Drawings

Drawings that are created in Toon Boom Harmony are not stored in their cells. They are actual files stored in the project's folder. If you want to rename a drawing or delete a drawing from your project, you need to edit the file and not the cells.

This section is divided as follows:

Renaming a Drawing

To rename a drawing, you need to select the drawing cell and use the Rename Drawing command.

How to rename a drawing

1. In the Timeline or Xsheet view, select the drawing to rename.
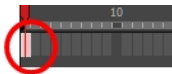
2. Do one of the following:

   ‣ Right-click and select **Drawings > Rename Drawing**.

   ‣ In the Timeline toolbar, click the Rename Drawing ⒜ button (you may have to customize the toolbar to display it).

   ‣ Press Ctrl + D (Windows/Linux) or ⌘ + D (Mac OS X).

   The Rename Drawing dialog box opens.
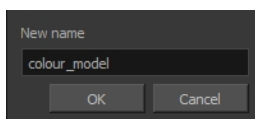
3. In the New Name field, type in the new drawing name.

Deleting a Drawing

You can permanently delete a drawing file from a project's folder.

NOTE: Deleting a drawing file is an operation that cannot be undone.

How to delete a drawing

1. In the Timeline or Xsheet view, select the drawings to delete.

2. Do one of the following:
   - ‣ From the top menu, select **Drawing > Delete Selected Drawings**.
   - ‣ Right-click and select **Drawings > Delete Selected Drawings**.

Duplicating a Drawing

If you want to modify a drawing that already exists, but keep the original drawing intact, you can duplicate the drawing and work on the copy. When duplicating a drawing, the selected cell is replaced with the new drawing. The exposure of the original drawing that was on the current cell is removed. The original drawing is not deleted from the project folder or other cells in which it is exposed.

With Toon Boom Harmony, you can create a keyframe at the same time as you duplicate your drawing. This way, you can modify and reposition drawings without affecting the original drawing.

How to duplicate a drawing

1. In the Timeline or Xsheet view, select the drawing to duplicate.
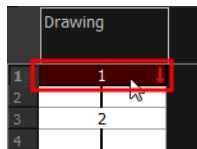
2. Do one of the following:
   - ‣ From the top menu, select **Drawing > Duplicate Drawings**.
   - ‣ Right-click and select **Drawings > Duplicate Drawings**.
   - ‣ In the Xsheet toolbar, click the Duplicate Drawing 🖼 button.

‣ Press Alt + Shift + D.
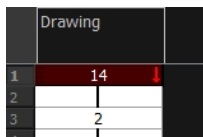
Copying and Pasting Drawings

When you copy and paste a selection in the Timeline or Xsheet view, you are not copying and pasting the actual drawings, you are pasting the exposure. Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.

If you want to copy and paste selected drawings into a different layer or paste the selection in the same layer to duplicate the drawings, you must use the Paste Special feature.

There are four different ways to paste your selected drawings with the Paste Special dialog box:

> When adding exposures to a drawing layer, drawing files will not be created.

> **Only create drawing files when they do not exist**: When adding exposures to a drawing layer, new drawings will be created only when drawings with the same name do not already exist in the destination.

> **Replace existing drawings. Create drawing files when they do not exist:** Replace drawings with the same names to update a scene with new modified drawings and preserve the animation.

>> **Tip**: If you don't want to lose the existing animation when pasting a template, such as when placing new drawings after the animation, then delete the template's animation. It will still have updated the drawings but not override the existing animation.

> **Always create drawing files**: When adding exposures to a drawing layer, new drawings will always be created. If drawing files with the same name already exist, Harmony will create a new name for the drawing.

If you want to perform another Paste Special operation using the same settings you used previously, you can use the Paste Special Again command instead. You can paste your selection using the same settings as in the most recent Paste Special operation, without opening the Paste Special dialog box.

How to paste drawings with the Paste Special command

1. In the Timeline or Xsheet view, select the drawings to copy and press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
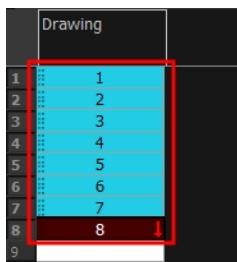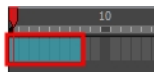
2. In the Timeline or Xsheet view, select the cell where you want your pasted selection to start.

3. Do one of the following:

   ‣ Right-click and select **Paste Special**.

   ‣ From the top menu, select **Edit > Paste Special**.

   ‣ In the Xsheet or Timeline toolbar, click the Paste Special button (you may need to customize the toolbar to display it).

   ‣ Press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).

   The Paste Special dialog box opens.
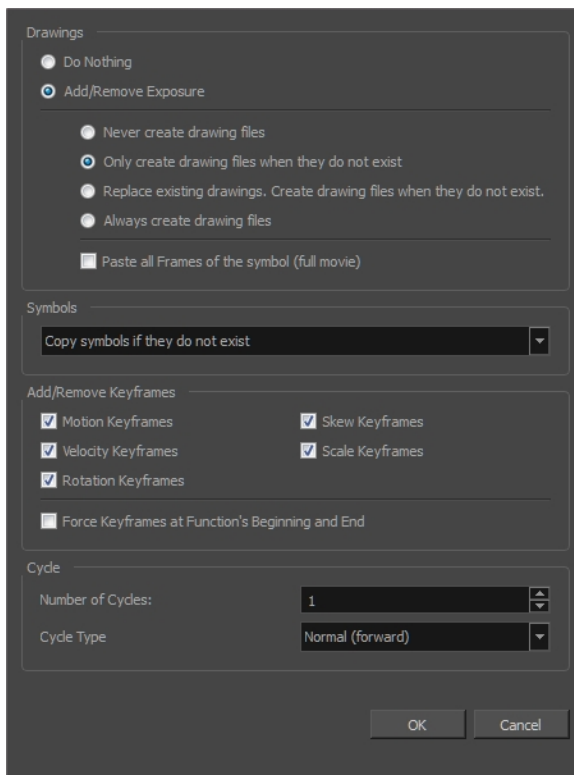
4. In the Drawings section, select the **Always Create Drawings** or **Only Create Drawings When They Do Not Exist option.**

How to paste new drawings with the previous Paste Special settings

1. Do one of the following:

   ‣ From the top menu, select **Edit > Paste Special Again**.

   ‣ Right-click and select **Paste Special Again**

   ‣ In the Timeline or Xsheet toolbar, click the Paste Special Again ⭐ button (you may have to customize the toolbar to display it).

   ‣ Press Ctrl + Shift + B (Windows/Linux) or ⌘ + Shift + B (Mac OS X).

Merging Drawings

Combines all drawings. Unused columns and layers will be deleted, but the original drawing files are still accessible.

How to merge drawings in entire layers or columns

1. In the Timeline view, select the layers you want to merge.
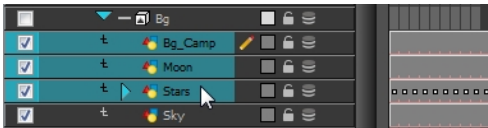
2. In the top menu, select **Edit > Merge**.
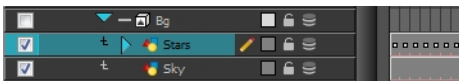
Customizing Layers and Columns

You can change the way a column in the Xsheet view displays. You can change the way a layer in the Timeline view or a column in the Xsheet view displays. You can stay organized without changing the content of elements or your animation output.

This section is divided as follows:

- *Expanding and Collapsing Layers and Columns* on page 191
- *Showing or Hiding Layers* on page 192
- Showing and Hiding Columns on page 1
- Xsheet Thumbnails on page 1
- *Changing the Layer or Column Colour* on page 194

Expanding and Collapsing Layers and Columns

To simplify the look of the Timeline or Xsheet view, you can expand and collapse the layers and columns. If some layers are parented to other ones, you can collapse the parent layer to hide its children.

How to collapse or expand selected layers in the Timeline view

1. In the Timeline view, select the layer(s) to collapse or expand.

2. Do one of the following:

   ‣ Right-click on the selection and select **Collapse/Expand > Collapse/Expand**.
   ‣ Click the Expand Children Arrow ▼ button on the parent layer.
   ‣ Click the Collapse/Expand ⥮ button (you may have to customize the toolbar to display it).
   ‣ Press Ctrl + I (Windows/Linux) or ⌘ + I (Mac OS X).
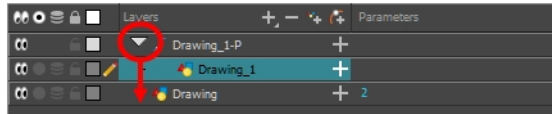
How to collapse or expand all layers in the Timeline view

1. Do one of the following:

   ‣ Right-click on the layers and select **Collapse/Expand > Expand All** or **Collapse All**.
   ‣ In the Timeline toolbar, click the Collapse All ⥮ or Expand All ⥮ buttons (you may have to customize the toolbar to display them).
   ‣ Press 0 and 9.

How to collapse and expand 3D path or rotation columns in the Xsheet view

1. In the Xsheet toolbar, click the Show Column List ▢ button to display the Functions list.

2. In the Xsheet view, select the column header of the 3D path or 3D rotation column to collapse or expand.

3. Do one of the following:

   ‣ Right-click on the column's header and select **Expand/Collapse > Collapse Selection** or **Expand Selection**.

How to collapse or expand all 3D path and 3D rotation columns in the Xsheet view

Do one of the following:

   ‣ Right-click on any column's header and select **Expand/Collapse > Collapse All** or **Expand All**.
   ‣ Press 0 and 9.

Showing or Hiding Layers

As you work in the Drawing or Camera view, some layers may be in the way or are used as references. You can hide these layers to make your work area less cluttered and easier to navigate. You can show and hide layers in the Timeline view in several different ways.

When using the Solo mode to show or hide layers, here's how it works:

- If you have anything selected, it is not affected.

- When multiple layers are selected and you enable/disable the Solo mode on any of those layers, it is applied to all the selected layers.

- When multiple layers are selected and you enable/disable the Solo mode on layers that are not part of the selection, it is applied only to those particular layers.

When exporting or rendering a scene, the Solo mode setting of layers is ignored.

NOTE: When a layer is affected by an inverted cutter, enabling the Solo mode for this layer will not show it unless the mask is also enabled.

How to show or hide all layers

1. Click one of the following in the Layers toolbar:
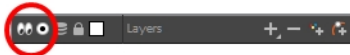
   ‣ Enable/Disable All   button to show or hide all layers.

     Any hidden layers are unhidden, so you can view all layers.

   ‣ Solo Mode   button to view disable your current Solo mode selection. Any soloed drawing or sound layers are disabled, so you can view all layers. When you click again on the Solo Mode button, you last Solo selection is displayed.

How to show or hide individual layers

1. Do one of the following:

   ‣ In the Layer toolbar, click the Solo Mode   button.

   ‣ Click the layer's Enable/Disable All   button to show or hide that layer.
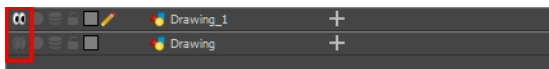
   ‣ Press A to show a layer or D to hide selected layers.

   ‣ In the Timeline toolbar, click the Enable/Disable   button (you may have to customize the toolbar to display it).

   When you deselect a layer in the Timeline view, the corresponding column is hidden in the Xsheet view.

How to enable the selected layer and disable all others

1. Do one of the following:

   ‣ Hold down Alt and click the Solo Mode   button of the layer you want to solo and hide all other layers.

   ‣ In the Timeline toolbar, click the Disable All Others   button (you may have to customize the toolbar to display it).

   In the Timeline view, you can hide or show certain types of layers such as Effect.

Changing the Layer or Column Colour

To easily identify elements in the Timeline or Xsheet view, you can change the colour of layers and columns.

How to change the layer's colour in the Timeline view

1. In the Timeline view, click the Change Track Colour ☐ button of the layer you want to modify.
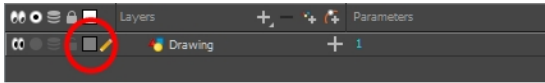
2. In the Select Colour dialog box, select a new colour for your layer.
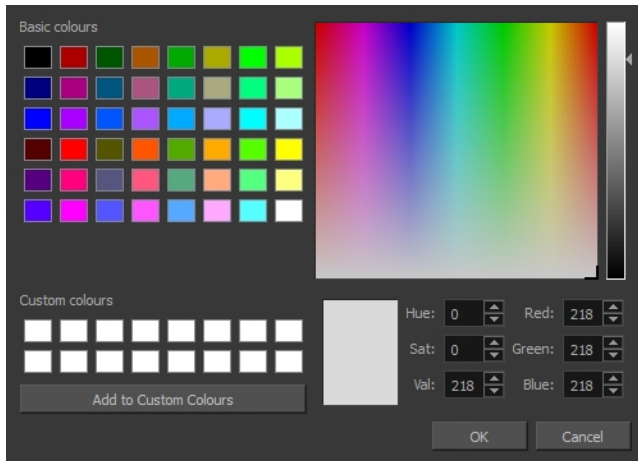
3. Click **OK**.

   The layer's background colour is updated. In a Drawing layer, exposed cells are the brighter, selected colour for easy identification. The corresponding column colour is also updated in the Xsheet.

How to reset a layer's colour in the Timeline view

1. In the Timeline view, select the layers to reset.

2. In the Timeline toolbar, click the Default Track Colour ▤ button (you may have to customize the toolbar to display it).

How to change a column's colour in the Xsheet view

1. In the Xsheet view, select one or more columns to modify.

2. Right-click on the column's header and select **Colour > Change Columns Colour**.

3. In the Select Colour dialog box, select a new colour for your columns.
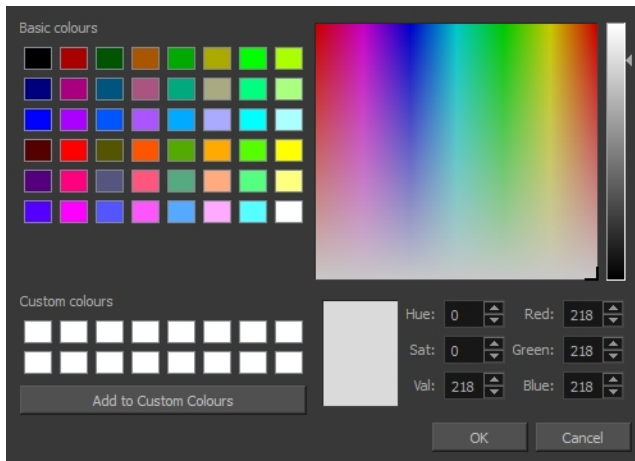
4. Click **OK**.

   The column's colour is updated. The corresponding column colour is also updated.

How to reset the column's colour in the Xsheet view

1. In the Xsheet view, select the columns to reset.

2. Right-click on the column's header and select **Colour > Default Columns Colour**.

Chapter 7: Character Building

Harmony is a great tool for building characters. You can use different techniques and features to break down your puppets.

This chapter will guide you through all the steps to create a complete simple rig. Harmony allows you to create very advanced puppets using deformations, hierarchies and z ordering. As you practice and get familiar with those concepts, you will be able to develop more complex rigs and combine various advanced features.

This chapter contains the following topics:

About the Model

To begin breaking down your puppet, you must first import your character into a new project. You can also draw your character directly in the scene.

You can import your character in several different formats:

- Library template—see *Library* on page 267

- External vector format—see Compositing Guide > Import chapter > Import AI and PDF Files topic

Model Alignment
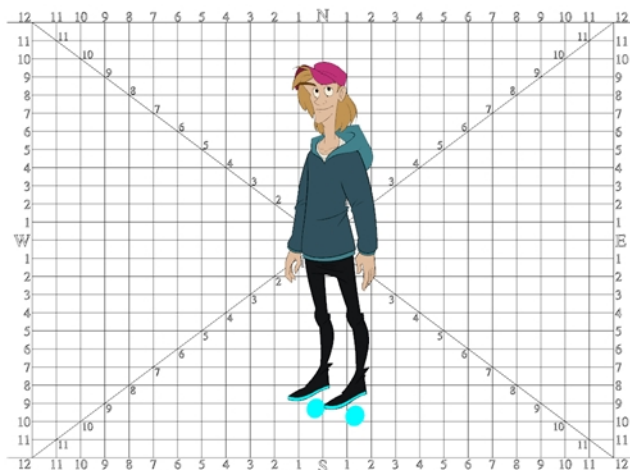
When setting the character model in your scene, we recommend that you to center it in the Camera view and scale it to fit inside the safe area frame—see *Field Chart* on page 1.

If you have several views of your character, place each view in a separate cell and center them one on top of another. This will facilitate the break down process and ensure that all of your puppets are aligned and the same size.
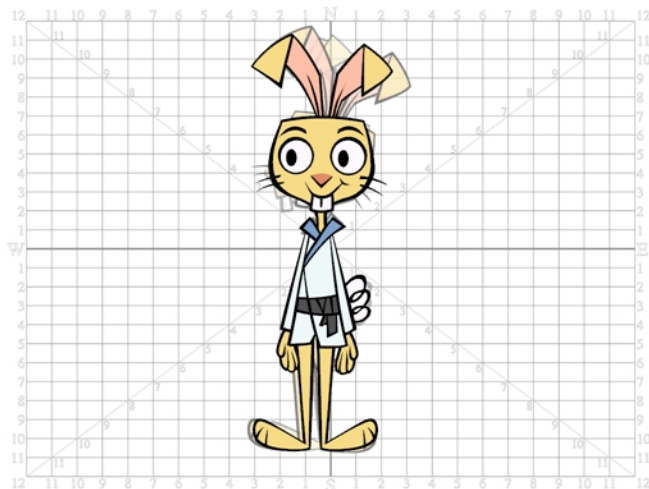
Photo Puppets

If you are creating a cut-out puppet out of photos, break down the different parts in a bitmap editing software. Then, import your parts and vectorize them as textured images.

A good way to set and import your bitmap parts is to organize them in a multilayered PSD file.

In Adobe Photoshop, organize your file so that all your layers are "grouped" into individual folders, or that all the elements you want to import as a single layer in Harmony are grouped together in their own folder. Any layer that is not in a folder group, by itself or otherwise, will not be imported.
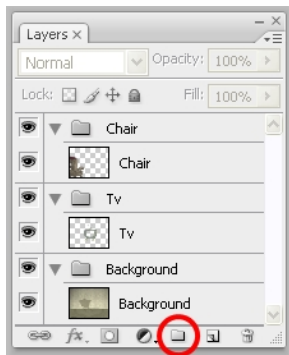
Relative Sizes

Understanding the relative size of every character and prop is important for maintaining consistency and structure throughout your project.

A production may contain many characters and props. It is not unusual for these to have been created by different people. If there is no size control implemented, the characters and elements created by different artists can vary greatly in size. When this occurs, the characters that are put together in a scene will be out of proportion. The animator or person doing the scene setup will then have to scale them to the correct size.

When a character or a prop is scaled down, the outline will get increasingly thinner. By the time the element is scaled to its proper size, the outline may be so thin that the difference between one character's outline and another's will not look very good.

These tips will help you to create and determine the correct relative sizes for each puppet:

- *Line Up* on page 200
- *Field Chart* on page 201
- *Brush Size* on page 201

Line Up

A line up consists of copying and pasting all of your character designs into the same drawing and then scaling them so they are in proportion with each other. This line up is very important and should be handed to any animator, layout and posing artist, or scene setup person working on the project.

For the prop design, it is recommended that you paste one of the main character's hands or even the full body beside the prop. This enables the animator to know what size to draw or set the prop.

In your character design scene, it is a good idea to create a layer for the character line up. The line up is usually done during the character design step. When the character builder imports the model to the break down scene, the size relation should be correct.
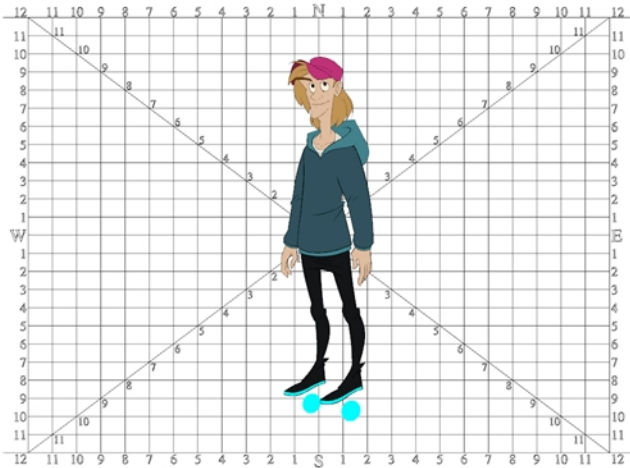
Field Chart

The field chart in Harmony is a tool that is very useful when setting the height of characters and props. You can display the field chart using the Show Grid option in the Camera and Drawing views.

How to display the field chart

1. Do one of the following:

   ‣ From the top menu, select **View > Grid > Show Grid**.
   ‣ Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
   ‣ Click the Show Grid ⊞ button in the Camera View and Drawing View toolbars.

Brush Size

There are a variety of pens and brushes in Harmony and you can also create and save your own. It is a good idea to create and save pens with precise sizes and parameters to trace and design your models and break downs—see *Drawing with the Brush Tool* on page 43.

Studying the Model
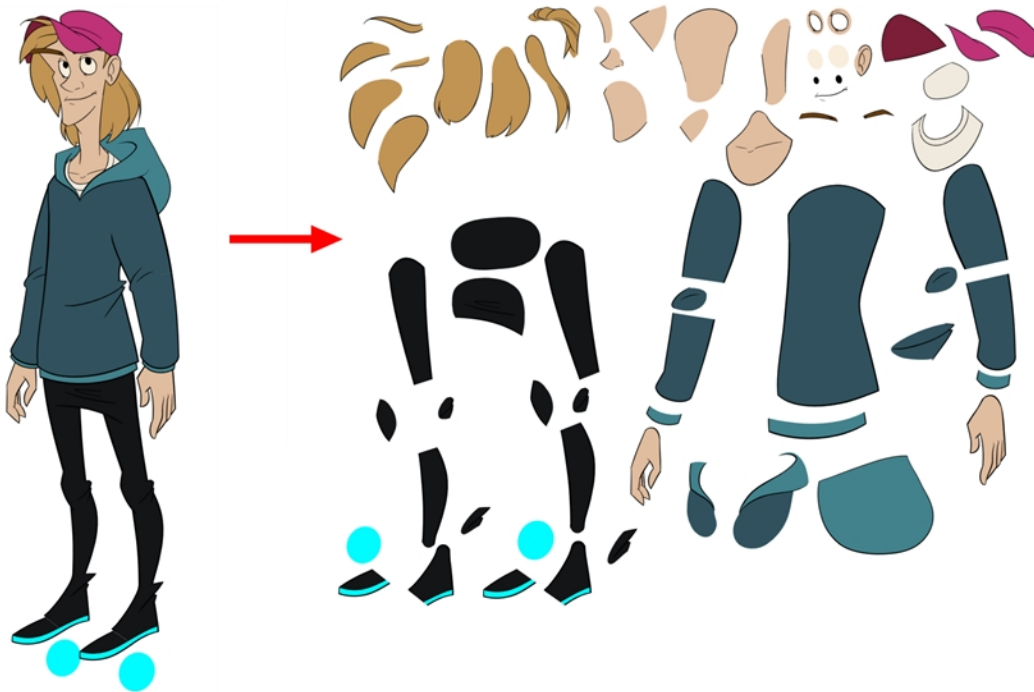
Now that you have imported or designed your model, the next step is to analyze it. This is to determine what parts will be broken apart and how they will be divided. Will the hair be separated into one, two or three sections? Will the hand be separated from the sleeve? To determine what is best for your character, observe the model in the Camera or Drawing view.

Eyelids and Pupils

For increased flexibility when animating the eyes, you can split them into three layers: the eyeball, the pupil and the eyelid. The eyelid layer is used for the blink and to cut the pupil when it gets too close to the side of the eyeball. For a more advanced break down, the two eyes are separated on their own individual three-layer sets.

Separating the Mouth Elements and Jaw
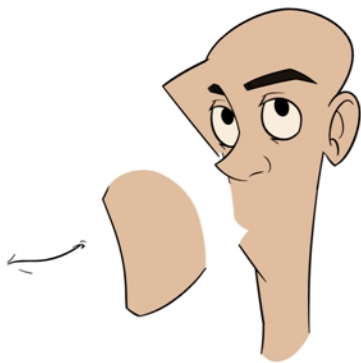
To get a greater level of flexibility, you can separate the jaw from the head. You can also separate the mouth shape, teeth, tongue and interior one from another.

Keeping Fingers Attached to the Hand
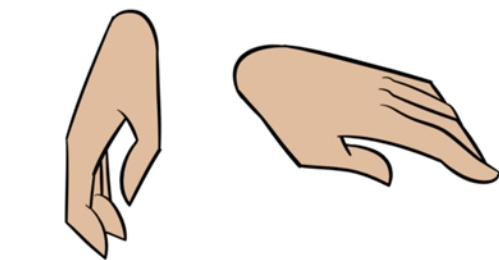
To avoid needlessly complicating the break down, the fingers are not usually separated from the hand. The full hand is a single layer with a bank of different hands stored inside. This technique is easy to work with and produces a less mechanical effect.

Flipping Logos
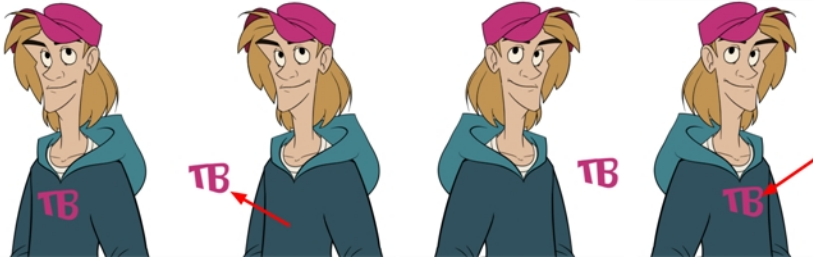
You can separate logos and letters that appear on a character or a prop. This allows you to flip and reuse a character's puppet.

Complete and Overlapping Pieces

Head and Neck Pieces with Overlap

Normal Position

Head Tilt with Overlap

Head Tilt without Overlap
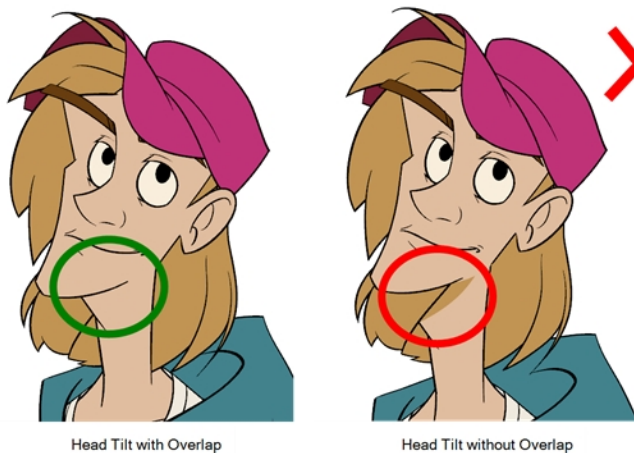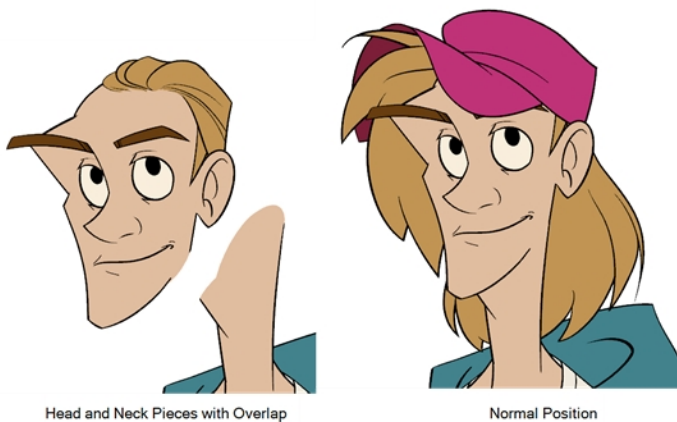
For a better result with animated parts, it is important to understand that they must be properly overlapping and complete. A common mistake is to trace the part just as it appears on the model.

Setting the Default Separate Position Preferences

Before you adding layers to your puppets, make sure the Default Separate Position is enabled.

With the Default Separate Position preference selected, when you create new peg layers, their X, Y and Z axes are independent from each other.

For cut-out animation, you want to have three independent axes so you can control them individually.

When you lock the three positions together, each time you add a keyframe, it is added on all three positions at the same time.
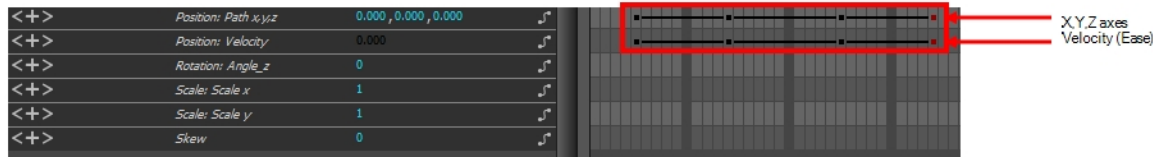
When you separate the three positions and add a keyframe on one axis, it is not added on the other two. This gives you more freedom when animating with motion keyframes and nudging parts forward and backward over time.
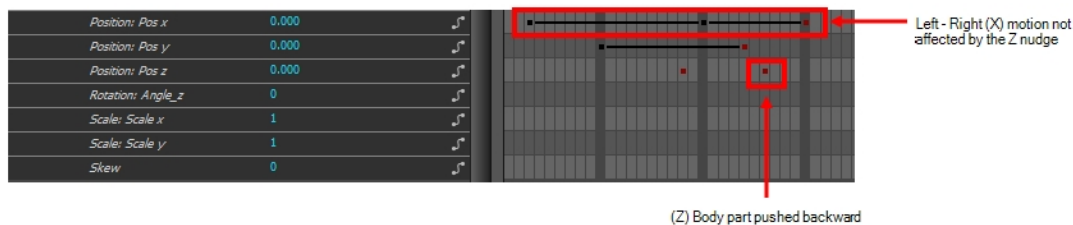
How to set the Default Separate Position option

1. Do one of the following:

   ‣ Windows/Linux: Select **Edit > Preferences**.

   ‣ Mac OS X: Select **Stage Essentials > Preferences**.

   ‣ Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

2. In the Preferences dialog box, select the **General** tab.

3. In the Settings section, select the **Default Separate Position for Pegs** option.

4. Click **OK**.

Naming Conventions

When working on a production, it is critical to keep work well organized with a naming convention chart before starting the project. It is crucial that everyone follows the criteria laid out in the naming convention chart. When dealing with thousands of characters, pieces and puppets, it is easy to get lost.

Adding a Prefix or Suffix to a Layer

It is highly recommended that you incorporate a naming convention for the layers. This will be very convenient in later steps. We suggest that you add one or two letters for the character/prop name before the part name and an "R" or "L" for right and left to identify the corresponding character/prop:

- Character Abby's right arm = ab_r_arm.

If you plan to work with different angles for your characters (front, side, three-quarter, back), you can add one or two letters to identify the angle:

- Character Abby's right arm, front view = ab_r_arm_f.

Breaking Down the Character
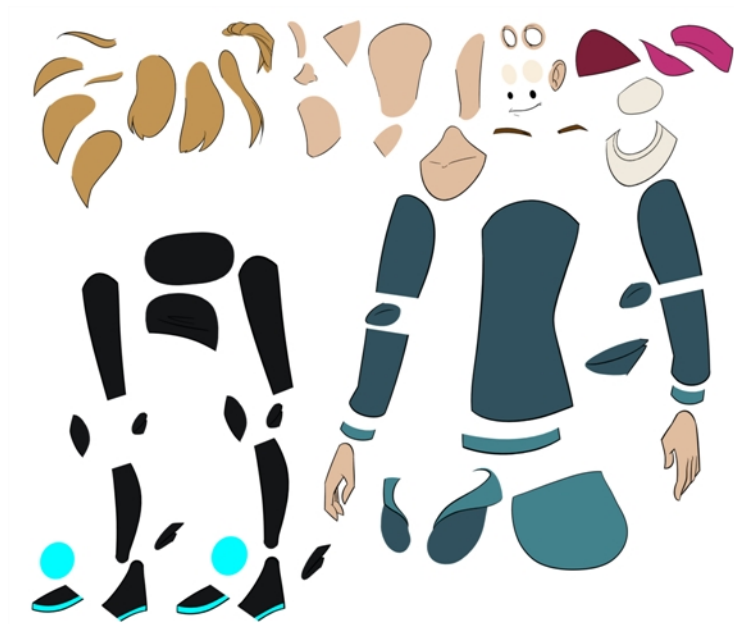
There are many techniques you can use to break down a puppet. In this section, you will learn about one of the most common and simplest methods. For your first character **breakdown**[1], follow these instructions to get an idea of the way Harmony works. Once you understand Harmony's basic functions and commands, you will be able to create your own techniques to satisfy the needs of your production.

This section is divided as follows:

Tracing the Model

The main breakdown technique shown here is to trace your model.

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[1]In cut-out animation, breakdown is the action of breaking a character into pieces to create a puppet with articulations. To break down a character, the artist cuts parts, such as the hands and arms, from the character's model and pastes them in separate layers. Next, the joints are fixed and the pivots set. In traditional animation, a breakdown is an animation pose generally found between two key poses. The key poses are the main poses in an animation and the breakdowns are secondary poses, ones that help describe the motion and the rotation curve (usually referred to as an arc).

How to break down a character

1. In the Timeline view, add a new drawing layer for each body part to separate. You can press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X)–see *Naming Conventions* on page 205.
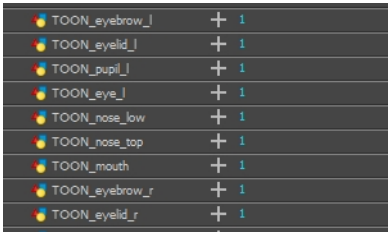
2. In the Timeline view, select the layer's first cell in which you want to draw the part.
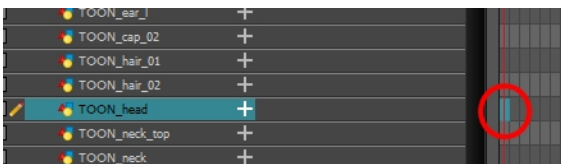
3. In the Tools toolbar, select a drawing tool.

4. In the Colour view, select a colour swatch. If you haven't created a palette for your character yet, see *Colour Styling* on page 109.

5. In the Camera or Drawing view, draw the new part with as with as few points as possible so the pieces are easy to manipulation, modify or redraw. Using the Polyline ⌒ tool would make it easy to do this.
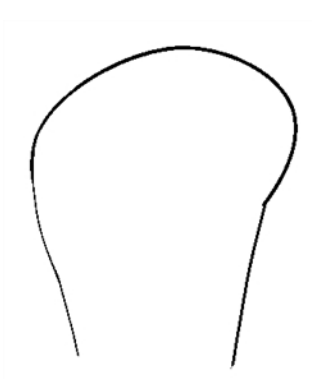
   If you are working in the Drawing view, click the Light Table 💡 button in the Drawing View toolbar to display the other layers as washed out colours. You can also press Shift + L.

6. You can use the Stroke tool in the Tools toolbar to create an invisible hairline if you want to close a shape without drawing an actual stroke.

   ‣ Select **View > Show > Show Strokes** or press K to display the invisible lines.
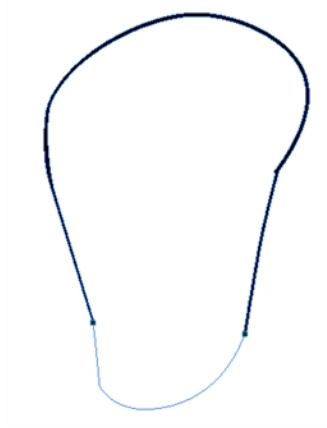
7. In the Tools toolbar, select the Paint ☺ or Paint Unpainted ☺ tool to colour your drawing.

8. In the Colour view, select the corresponding colour.

9. In the Camera or Drawing view, paint your drawing.
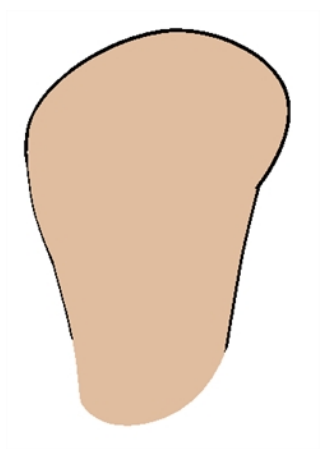
10. In the Tools toolbar, select the Select ⭲ tool. Select your drawing and flatten the lines by clicking the Flatten ⯮ button in the Tool Properties view.

11. Repeat the entire process until the break down is completed.
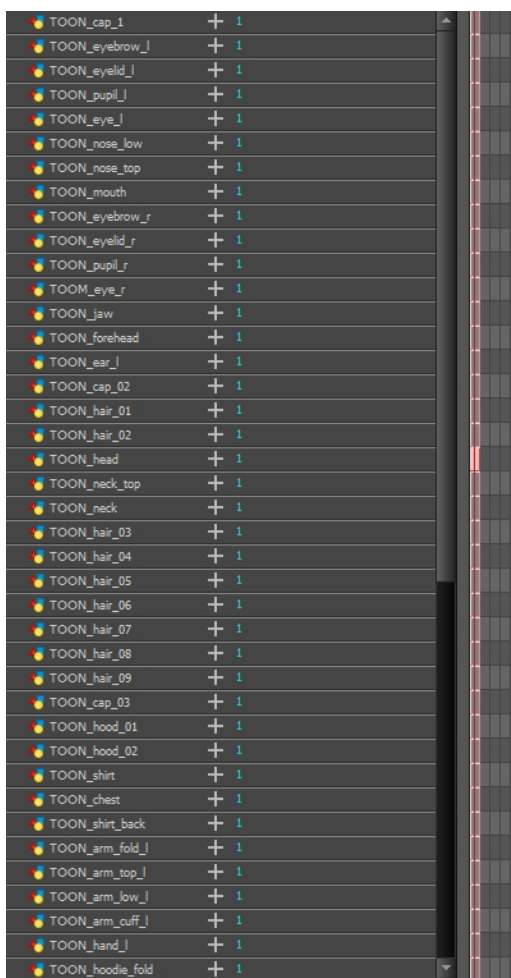
Articulations
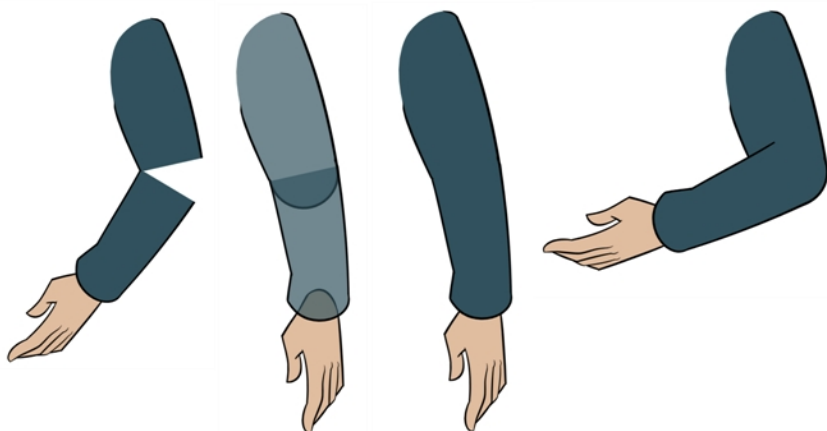
Once your pieces are traced, you can go ahead and complete the articulations.

Articulations are an important aspect of any cut-out break down because without them, a puppet cannot move properly and will not look good.

If you are using deformations to animate the limbs, your articulations don't need to overlap. The deformer effect will create the joint for you.
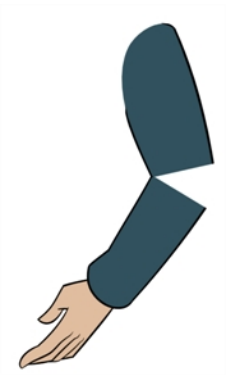
Classical Articulation

Classical articulation is the most popular technique for basic characters. It is quite simple and produces excellent results, but it's not the most efficient method. In many instances, it causes limitations and extra drawing corrections. For example, there may be a gap in the articulation if the part is bent too far. Joint design is usually a circle; the overlapping part cannot be sent behind without showing the joint.
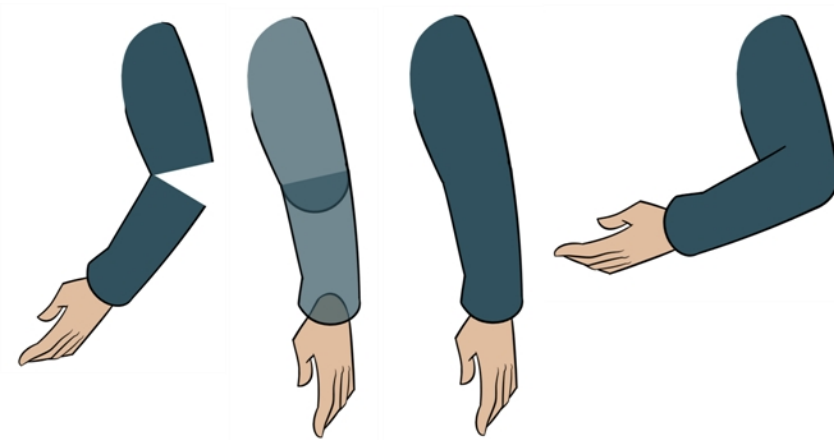
Classical articulation is done by erasing a part of the line from the overlay layer, leaving the colour overlapping the bottom layer. You can use this technique for all the articulations on your puppet.

How to create a classical articulation

1. In the Timeline view, select the cell containing the part to modify (piece located behind), such as the upper arm.
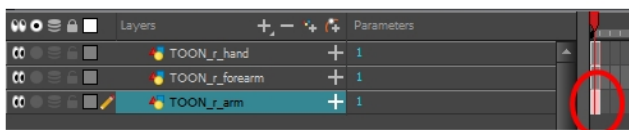
2. In the Tools toolbar, select the Pencil ✐ , Polyline ç , Ellipse ○ , Cutter ◢ , or Contour Editor ▷ tool.

3. In the Colour view, select an outline colour.

4. In the Drawing or Camera view, use your drawing tool to make sure the joint overlaps the other part in a half-circle shape.
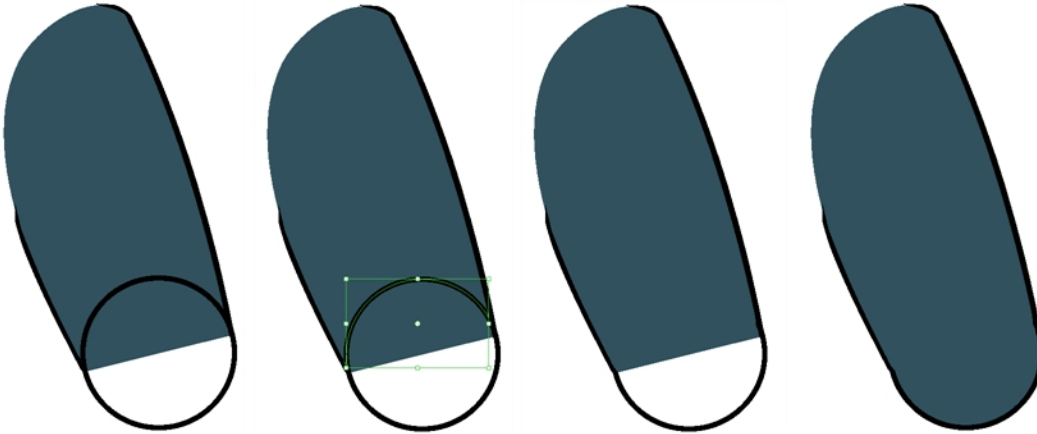
If you are working in the Drawing view, click the Light Table 💡 button in the Drawing toolbar or press Shift + L.

5. From the top menu, select **View > Show > Show Strokes** or press K to display the invisible lines that may be present in your drawing.

6. In the Drawing or Camera view, select all the strokes in your drawing.

7. In the Tools Properties view, click the Flatten ≡ button.

8. In the Drawing or Camera view, select all the strokes in your drawing.

9. Repeat the previous steps for the other articulations.

10. In the Timeline view, select the cell of the part that will be on top of the joint.
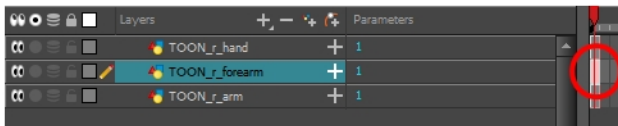
NOTE: When placing rotation pivots later on, make sure they are positioned at the centre of the articulation.

Ordering the Layers
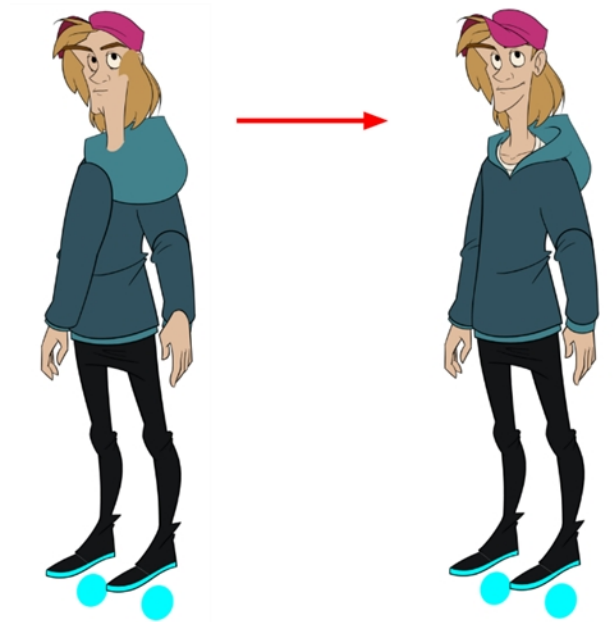
At this point, it is possible that your character's pieces may show up in the wrong order.

There are several ways to fix this. First, you can reorder your layers by dragging them to a higher or lower level in the Timeline view. The top layer is displayed in front of the others and the bottom one is displayed behind. Second, you can use the Z-axis nudging (forward and backward) if you have extra views included in the same layers (front, three-quarter, back, etc.).

This topic is divided as follows:

Ordering the Timeline Layers

In the Timeline view, the layer positioned at the top will be displayed in front and the ones below will be displayed behind. If you have multiple views, you should order your layers based on the most common view, which is generally the three-quarter front.

How to order the layers

‣ In the Timeline view, drag a layer to reorder it and drop it between other layers.
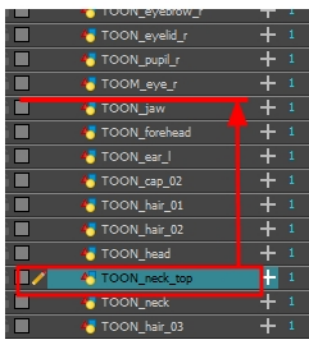
If you drop it on a layer, it will create a parent hierarchy, so make sure to drop it between layers.
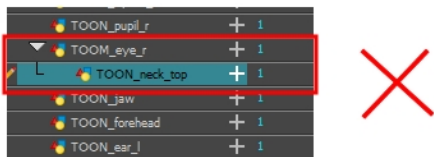
Nudging Parts Backwards and Forwards

If you created a hierarchy on your arms, legs or other body parts, it is possible that you will want a part, such as the hand, to appear in front of its parent. Yet, if you move the hand layer above the arm layer, you will break the hierarchy. To reorder a layer rigged in a hierarchy, nudge it backwards or forwards on the z-axis.
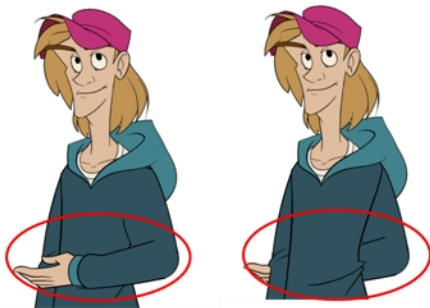
NOTE: You will do the same for the layers that are not in the right order on the extra views. Do not place the drawing on another layer. You want to keep all your drawings of the body parts in the same layers like a box containing all of the hands or all of the shoes.

Harmony allows you to move your elements in three dimensions:

• Up and down (Y-axis)

• Left and right (X-axis)

• Backwards and forwards (Z-axis)

In the same way you create multiplane backgrounds (depth), you can perform a micro nudge of the part to be reordered and see it in front of the other elements, even if its layer is actually behind the other ones in the Timeline view. The forward-backward position can also be animated over time.

Repeat the following instructions for all the views.

How to nudge your parts backward and forward

1. In the Tools toolbar, select the Transform ⊡ tool. Make sure to enable the Animate ⚘ mode.

2. In the Camera view, select the element you want to reorder. Make sure the focus (red outline) is around the Camera view before selecting the element.

3. To move the element forward, press Alt + Down Arrow and to move the element backward, press Alt + Up Arrow.
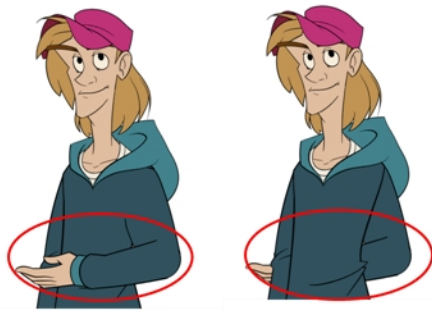
Rigging

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The rigging process is where building a puppet can take several different directions.

In this section, you will learn how to create a simple rig. Afterwards, you will learn how to add pegs and create a hierarchy. You can also see more advanced tricks in the _Appendix_ on page 238.

About Rigging

There are some basic concepts to know when rigging and layer parenting:

Simple Rigging

Simple rigging is very fast and easy to do. It is built as follows:

- All the body parts are independent

- All the timeline layers are attached to a master peg layer (trajectory layer)

The advantage of using this technique is that you are free to move any part around without being influenced by a parent layer.

However, since the parts are not parented to each other, the parts will move from point A to point B along a straight trajectory. The hand will not follow the arm's rotation. You will have to set more keyframes for the hand to move along a curved path.
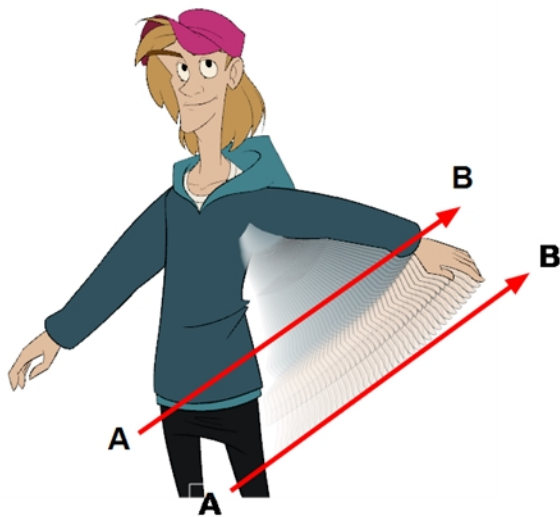
Parenting Layers
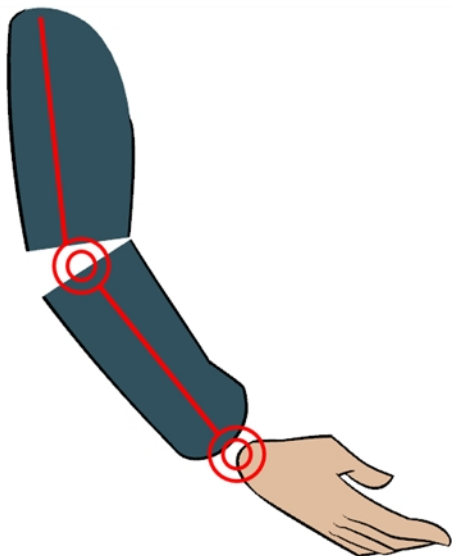
When you want one part to follow another part, such as the forearm following the arm, you can attach the layers one to the other. For example, you can attach the forearm layer to the arm layer without having to encapsulate the forearm into the arm layer. They will still be parented, but you can access the forearm directly without having to enter the arm layer.
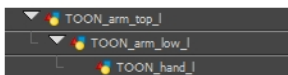
The advantage of parenting layers is that the child layers will follow the parent smoothly without having to select them or create a series of keyframes.
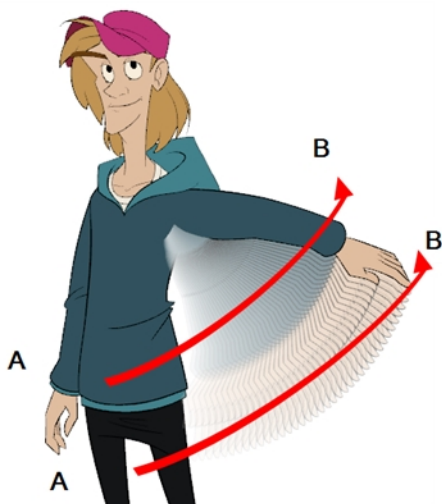
The disadvantage of parenting layers is that you are not able to move the parent independently of its children, since the child layers receive all the transformation information from their parent.
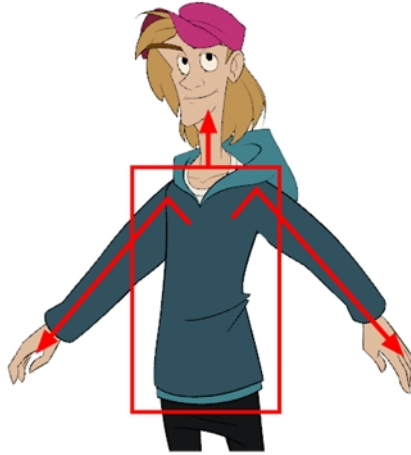
Parenting layers, such as the arms and legs, and allowing the torso and hips to be independent from them is often a good solution.

NOTE:
To attach one layer to another, you must drag the desired layer onto the other one in the Timeline view.

Harmony offers powerful techniques to create hierarchies between your layers without having to encapsulate layers into each other. These techniques are a great improvement over the less efficient and time consuming method of creating parenting between your layers by inserting symbols into other symbols. Therefore, rigging with symbols inside symbols is **NOT** recommended.

Rigging Using Pegs

Peg layer are useful when you are doing more advanced puppet rigging. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to control your entire puppet or advanced hierarchies.

Parenting a drawing layer to a peg layer allows you to divide your motions on two separate levels. You can scale a body part up the chain of pegs directly on the drawing layer. This way, you do not affect any child layers that could be attached to that part.

Then, you can perform your translation and rotation on the peg layer so all the parts attached to that peg layer follow the same trajectory.

Translation and Rotation on
the forearm and hand

Scale, Squash and Stretch on the forearm,
independently from the hand
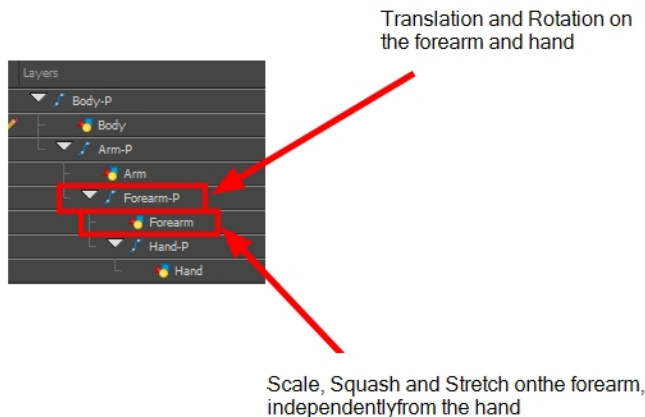
Adding Pegs

It is recommended to add parent pegs to your drawing layers which are path layers that let you add keyframes to modify the positions of pieces over time. It is not mandatory, but it is helpful to have your drawings and keyframes separated.

How to parent drawing layers to pegs

1. In the Timeline view, select all the layers.
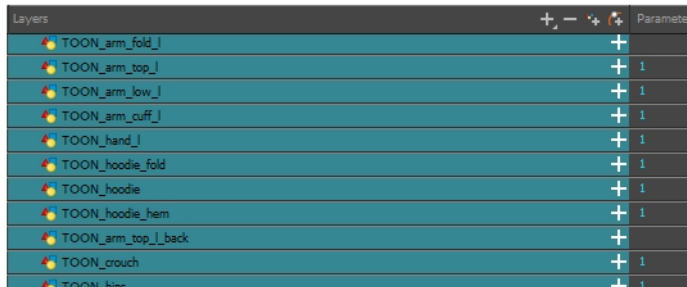
2. In the Timeline Layer toolbar, click the Add Parent Peg button to add a parent peg to all selected layers.
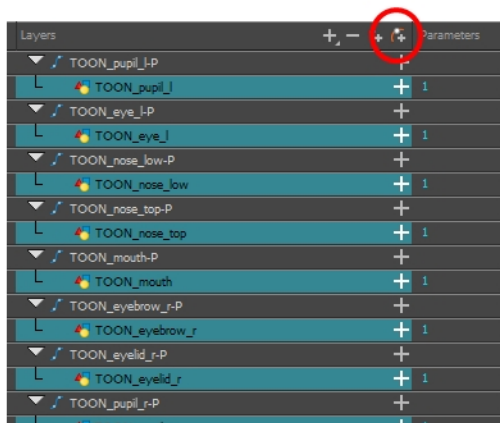
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Rigging the Head

You will start by attaching the facial features to the head.

The advantage of parenting the head and the facial features to the same peg is that you can easily animate each facial feature, and they will all follow the head motion.

You can also use additional pegs to control smaller groups of pieces such as the facial features or all the left eye pieces. You can parent as many pegs as you want to obtain a maximum of control on your rig.
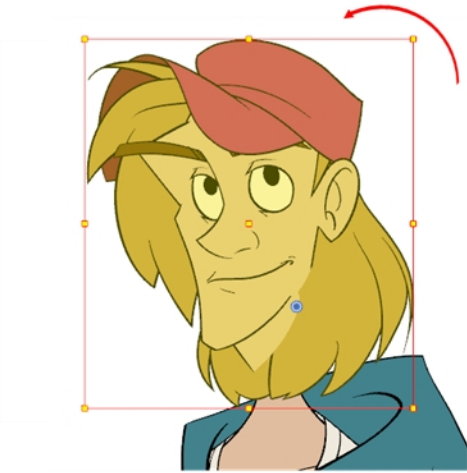
How to parent the facial features to the head

1. In the Timeline view, deselect any selected layers.

2. Select the head peg layer.

3. In the Timeline View Layer toolbar, click the Add Parent Peg button to add a new peg layer to your timeline. You can rename the peg to keep your work organized.
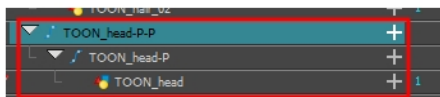
A new peg is added and parented to the head peg layer.

1. Select all the remaining head and facial feature layers and drag them **ONTO** the peg layer or **BETWEEN** the head peg layer and the new head peg to parent them.
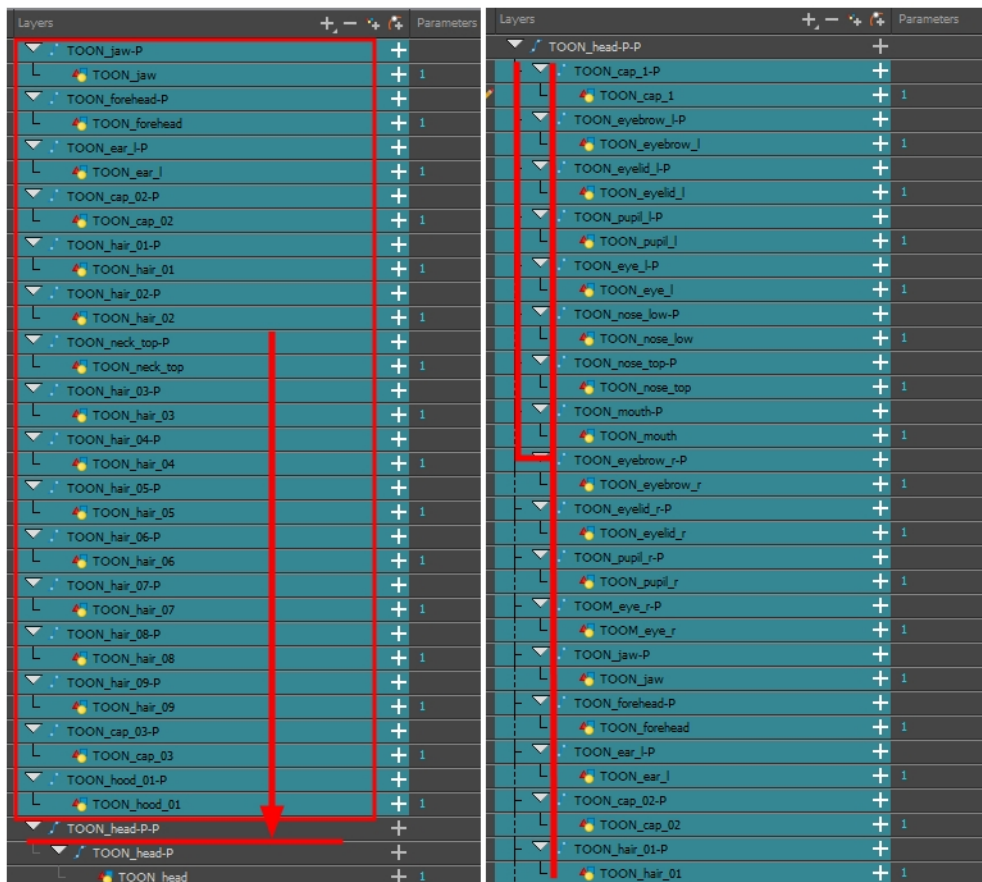
Rigging the Body

When the character's head is ready, you can move on to rigging the body. You can do a simple rigging where all the body parts are independent of each other, or create parenting between some of the layers. Refer to *Creating a Hierarchy* on page 222 to learn how to parent your layers.

Simple rigging consists of leaving the layers in the Timeline view without doing any kind of parenting. Later on, you will attach those layers to a master peg and organize them in the correct order—see *Adding the Master Peg* on page 224 and *Ordering the Layers* on page 212.

Creating a Hierarchy

Harmony lets you extend your rigging techniques beyond normal boundaries and sets new standards. You can create hierarchies without encapsulating pieces inside each other by creating a linked structure between layers.

You should create a hierarchy on the arms and legs, and keep them separated from the body. This gives you more animation freedom, and when you need to scale or skew the torso, it will not affect the entire body.

Head hierarchy

Right arm hierarchy

Left arm hierarchy

Independent torso and hips

Right leg hierarchy

Left leg hierarchy
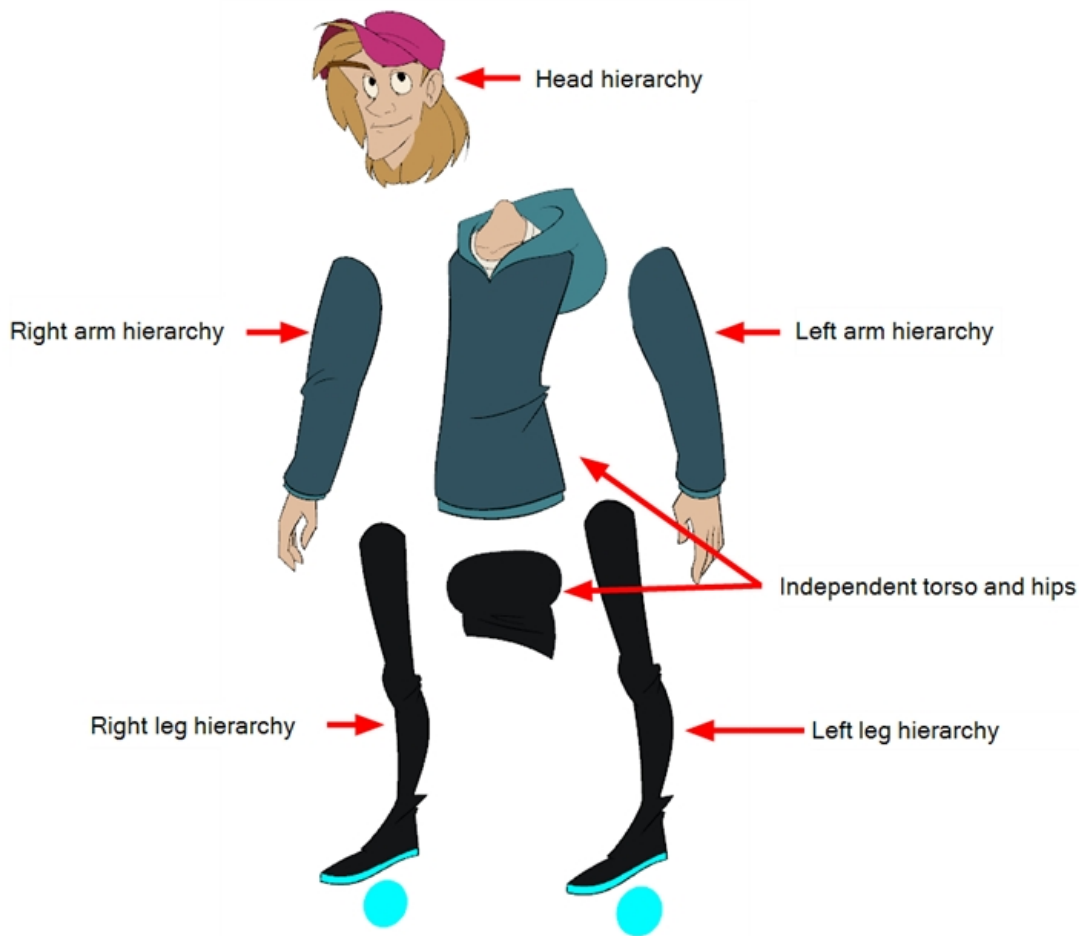
How to create a hierarchy in the Timeline view

1. Drag the child piece (hand) and drop it ON the parent piece (forearm). Then, you can drag the parent (forearm) piece onto another parent piece (upper arm).
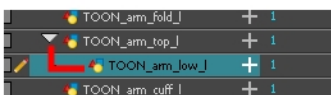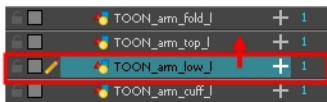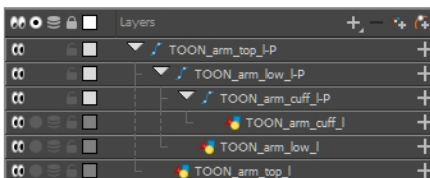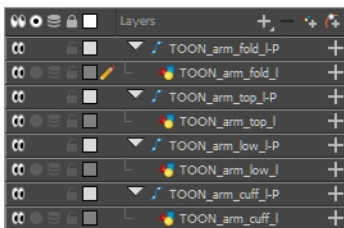
▸ You can unparent layers by holding down Shift and dragging the selected parents away from the child layer. Drop your selected between other layers.

Adding the Master Peg
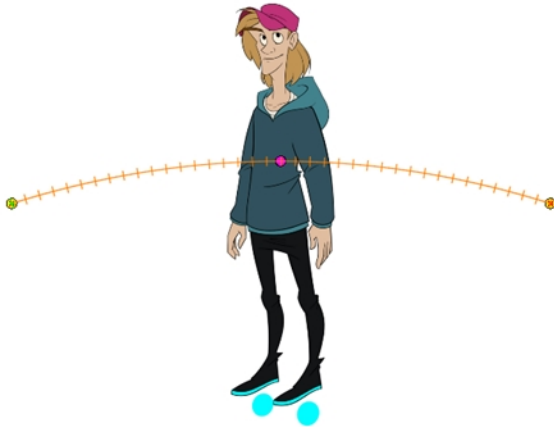
When you animate your character, you will probably need to resize and reposition it to fit your scene. When you need to scale down or move your character, it is a good idea to hook (attach) the whole puppet to a trajectory.

Attaching your puppet to a **peg**[1] will allow you to scale it and reposition it without having to do this to the different parts and pieces. Only one layer will contain the position information, which makes your animation easier to modify and control.

How to add a master peg

1. In the Timeline view, select the top layer to parent a peg to it. You need to select a layer to be able to add a peg to your scene.

2. In the Timeline view, click on the Add Peg ⟳ button.

   A new peg is added to the timeline as a parent of the selected layer.

3. Name the new peg **Master** plus the character's name.

4. In the Timeline view, select all the layers you want to attach to your new peg. Remember that one item is already parented to that peg.

5. Drag your selection **ON** to the peg layer to parent all your character's pieces to the peg. If your layers are added above the already parented layers, move that parented layer back on top of the layer stack.

---

[1]In traditional animation, a tool used to ensure accurate registration of action as cel layers move. In digital animation, in which you are doing a more advanced puppet rigging, you can use peg layers. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to add path articulations. For the latter, you can also use an inverse kinematics tool.

Creating the Keyframes

Once all your drawings are ordered and your master peg is added, you need to insert keyframes on each cell to create all of the function curves and block your pose in place.

How to create the keyframes

1. In the Timeline view, collapse the master peg by clicking the Expand ▽ arrow.
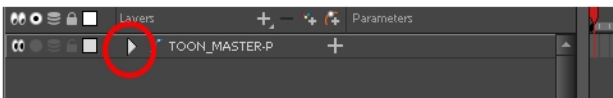
2. In the Timeline view, select the first cell.
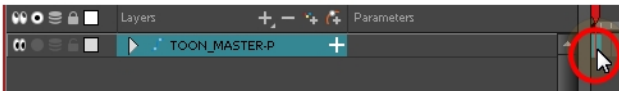
3. Do one of the following:

   ‣ From the top menu, select **Insert > Keyframe**.

   ‣ In the Timeline View toolbar, click the Add Keyframe button.

   ‣ Press F6.

> **NOTE:** If you use the F6 shortcut when working Flash keyboard shortcuts flavour, this not only creates a keyframe but also duplicates a drawing.

Masking
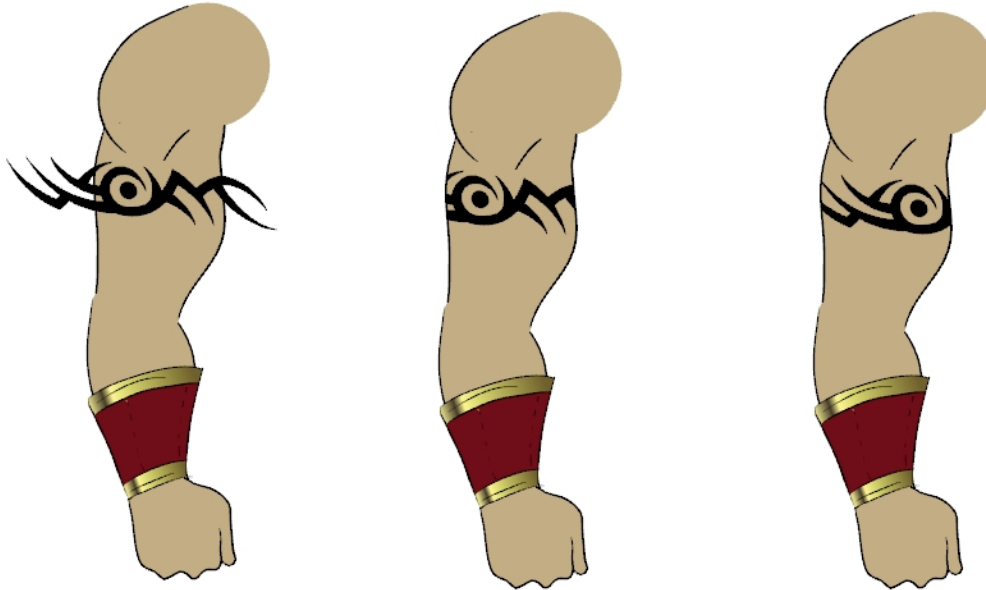
When rigging a character, there may be instances when you want to have the ability to move a particular piece to give the illusion of a rotation or move the pupil within the white of an eye without having the extra bit of the drawing sticking out of the character or eyeball. To do so, you can use masks to cut anything you don't want to be visible.

How to mask an object in the Timeline view

1. In the Timeline view, make sure the keyframe is added on the object that will be masking the piece to cut.
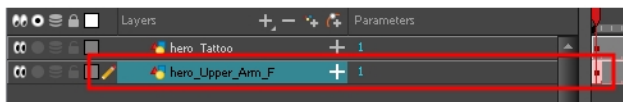
2. Select the layer that will act as the mask.

3. In the Timeline view, right-click on the layer and select **Clone Selected Layers: Drawings and Timing**.

Cloned Layer linked to the same motion paths as the original layer.
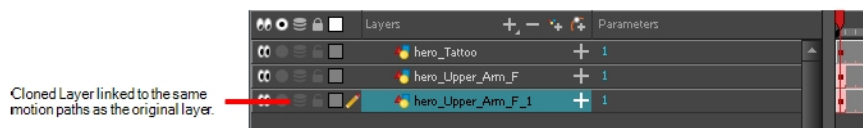
4. Select the layer to be masked.

5. In the Layer toolbar, click the Add Layer button and select **Effects > Cutter**.

6. Click the Expand Parameters ➕ button to display the Cutter properties.
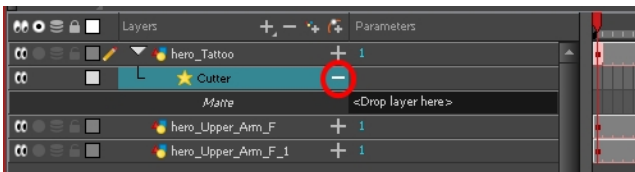
7. Drag the cloned layer **ONTO** the Matte parameter connection area.

   The masking layer name appears in the Matte parameter area and the masking layer is repositionned above the effect.
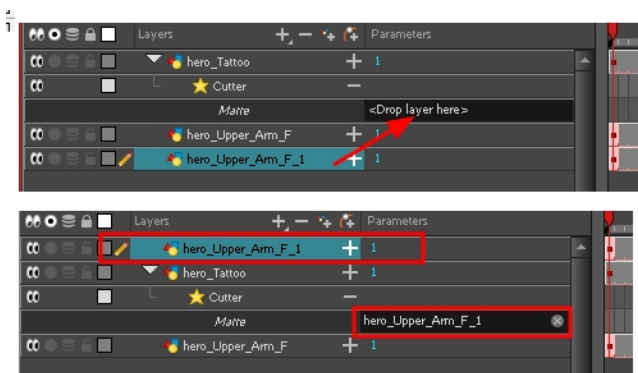
   The masking layer is no longer visible in the Camera view. You can see that the masking layer is connected to the Cutter effect by clicking the Show/Hide Additional Links ➡ button to display the Additional Links section.

8. Your masking effect is most likely inverted and what you want to cut is probably showing. Double-click on the Mask layer to open the Layer Properties window. In the Layer Properties window, enable the **Inverted** option.
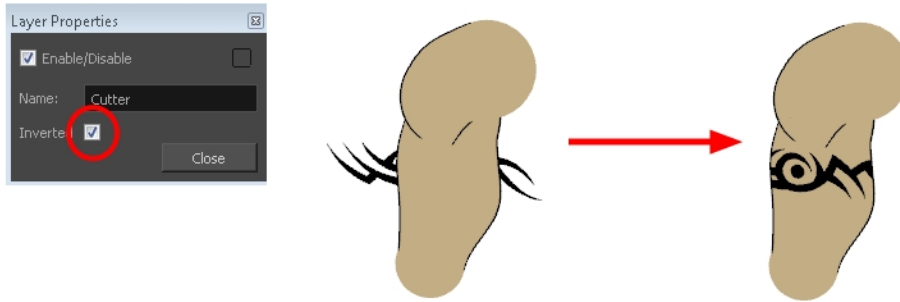
9. In the Tools toolbar, select the Transform ⊡ tool and move the cut object within the masking zone.
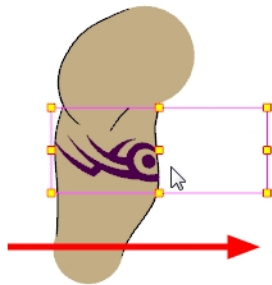
Adding Extra Drawings

Your break down is now complete. You can move on to adding the extra drawings your character needs, such as principal hand positions and mouth shapes. If you ever forget to add extra drawings in your main character's template, you can easily add them later.

> NOTE: Add your extra drawings in the layer corresponding to the part you are drawing. You should see the layers as containers for the different pieces. Each body part has its own container in which you can add more drawings of the same part.

If you want to use the auto lip-sync detection feature to animate your dialog, you should create the following mouths for your puppet.

The mouth shapes used by Harmony are based on the conventional mouth chart used in the animation industry.

> NOTE: The letters used to represent the shapes do **NOT** correspond to an actual sound.

NOTE: If you are doing cut-out animation, refer to the Cut-out Animation Guide, Character Building chapter, "Adding Extra Drawings" topic to learn how to add extra drawings to your character.

Extra mouth
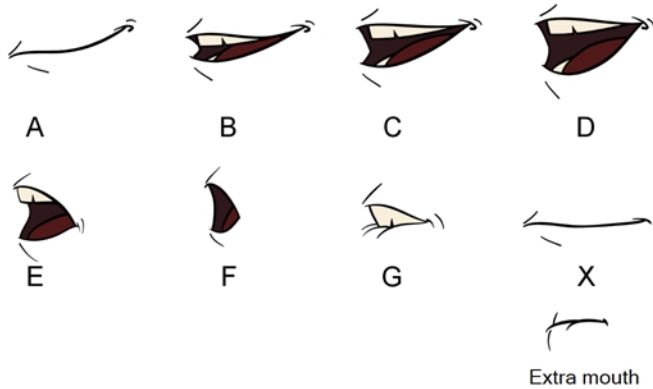
Here is an approximation of the sound each mouth shape can produce:

- **A**: m, b, p, h
- **B**: s, d, j, i, k, t
- **C**: e, a
- **D**: A, E
- **E**: o
- **F**: u, oo
- **G**: f, ph
- **X**: Silence, undetermined sound

You can lip-sync the traditional way or let the system automatically create the basic detection.

You can refer to the mouth chart positions as you draw the shape of the character's mouth.

How to add extra drawings

1. In the Timeline view, select the cell where you want to add a new drawing. If you want to duplicate the current drawing and work from it, you can select **Drawing > Duplicate Drawings** or press Alt + Shift + D.

A new drawing is created in the selected cell and automatically extended to the next one. The new drawing is a duplicate of the one that was selected so it contains a duplicate of the art. You can modify it to create your new drawing or delete its contents in the Camera or Drawing view and start from scratch.
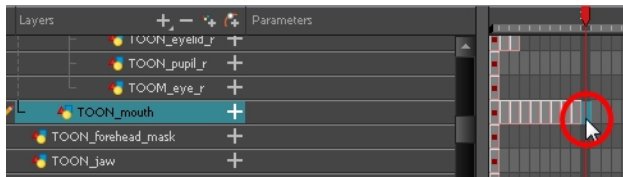
1. In the Tools toolbar, select a drawing tool for drawing your extra part.

2. In the Camera or Drawing view, draw your new drawing.

2. Using the Select ⬉ tool, select your drawing and flatten the lines by clicking the Flatten ⬌ button in the Tool Properties view.

Setting the Pivots

One of the last steps before storing the character in the library is to set the pivots for the different parts.

If you want the puppet's pieces to rotate correctly, you must set the pivot points right in the middle of an articulation, such as an elbow or a knee.

By default, your master peg pivot is placed at the centre of the Camera view, which generally equates to your character's hips. A good way to set your peg's pivot is to move it between the character's feet.

How to set the pivots with the Rotate tool

1. In the Advanced Animation toolbar, select the Rotate ⟳ tool.

2. In the Camera or Timeline view, select the layer whose pivot you want to set. In the Camera view, you can also hold down Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click on the piece whose pivot you want to set.

3. In the Camera view, drag the blue pivot to reposition it.
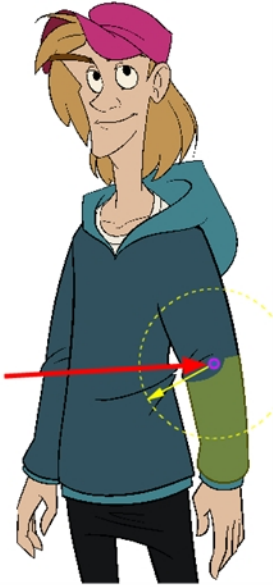
4. Repeat the previous steps for all the pieces, including the eyes, nose and mouth. If you are unsure as where to place the pivot, put it in the center of the selected piece or group of pieces.

NOTE: If you added other pegs to your rig, you must set their pivot using the same method.

Setting Anchors and Props

An anchor is an attachment point you can use to bind one or several props to a specific location that is predefined by the anchor.

A prop is a game item that will be attached to an anchor. It could be a stick held within the character's hand, a helmet attached to the character's head...the possibilities are endless. Props are easy to turn on or off, and easily swappable from within Harmony or Unity.

How to create an anchor

1. Create a new Drawing node and rename it according to the anchor you are creating.

2. Inside the Layer Properties of your drawing node, make sure that pivot option is set to **Don't Use Embedded Pivot** or **Apply Embedded Pivot on Drawing Layer**. The Apply Embedded Pivot on Parent Peg does not transition well to Unity and you will lose your pivot information.
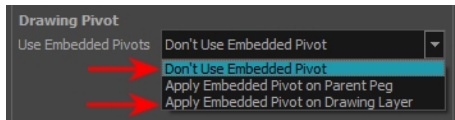
3. Once this is done, you can use any of the animation tools to reposition the pivot point of your node, such as the Rotate tool in the Advanced Animation toolbar. You should be able to see the pivot coordinates from the Layer Properties of your Drawing node. If the pivot is not repositioned, its default place will be at the centre of your Harmony scene (0,0).

4. Once this is set up, select the Drawing node and click the Toggle Anchor 🐾 button in the Game toolbar.

   The Drawing node is highlighted in red in the Timeline and Node views. Your anchor can now be used to attach a prop.

How to create a prop

1. Create a new Drawing node or take an existing prop on which you want to attach an anchor.

2. Position the Drawing Pivot of the prop node using a tool on the Advanced Animation toolbar, such as the Rotate tool. The position of the prop's pivot will align with that of the anchor. Make sure it is positioned accordingly.

3. With the prop Drawing Node selected, click the Toggle Prop 🗡 button in the Game toolbar.

   The prop Drawing node is highlighted in green in the Timeline and Node views.

4. Do one of the following:

   ‣ Connect the anchor and prop to the parent peg.
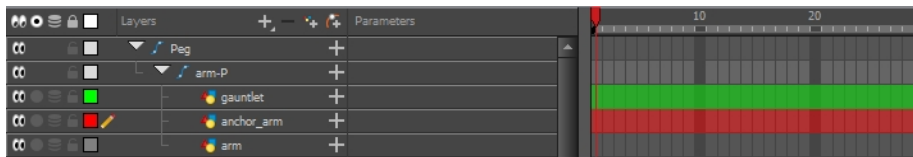
   ‣ Connect the prop under the anchor to create a parent/child hierarchy.

Metadata Editor View

The Metadata Editor view lets you access the information of the props and anchors to be exported to Unity.

NOTE: Because the Unity game engine does not support Unicode characters, it is recommended to avoid using it in scenes intended for games.

How to access the Metadata Editor view

1. In the top-right corner of a view, click the Add View ✚ button and select **Metadata Editor**.

Parameter	Description
Scene Metadata	This is a list of optional parameters you can create in a scene project to be

	exported to Unity. It will not have any incentive towards your scene assets, but can help developers know what to do with the assets contained in your Harmony scene.
	Once in Unity, scene Metadata will appear in Inspector view > Metadata when the Asset is selected in the Hierarchy view.
	Name: Name of the Scene entry. (e.g. game.Armor001)
	Value: This can be anything that describes the state of an object. You could, for example, have three different stages of armour: new, damaged and destroyed.
Node Metadata	Displays only the props and anchors held inside your selection. If nothing is selected, no information will display. Name and value appear in this box as well. Name will show you the associated .tvg name and value will be set as either On or Off, depending on whether you want the connection to be set as active or not.
	Once in Unity, scene Metadata will appear in the Hierarchy view.
	Name: Name of the selected anchor or prop. (e.g. game.isAnchor). Notice that it differs from the drawing layer name on the top-left corner of the Node Metadata section.
	Value: Can be set to be active (On) or inactive (Off).

> **NOTE:** For any anchor or prop information created within the Metadata Editor, the naming convention must always use the prefix "game.". The term "game." is recognized automatically by Unity as a metadata information. For example: *game.Armor001*.

Storing the Character in the Library

For maximum efficiency and reuse of your character in different scenes, you must store a template in the Library view. You can create different kinds of templates, such as templates that include all the layers, a template for a body, key pose or even some containing only the head.

When you create a template from the Timeline view's right side, you must first import your master template in order for everything to work properly when you reimport it into a scene. Once the master template is imported, you can import the key pose (action) template's content into the right side of the Timeline view.

How to create a template from the Timeline view

1. In the Library view, right-click on the desired library folder and select **Right To Modify**.

2. In the Timeline view, collapse the master peg layer.
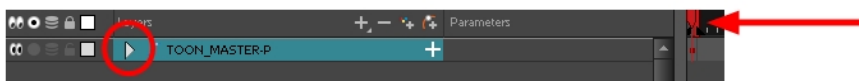
3. If your scene has a series of blank cells, they will also be included in the template if you drag the layer to the Library view. Reduce the scene length to have no empty cells before creating your template.

4. In the Timeline view, select your master peg and drag it to the Library view.
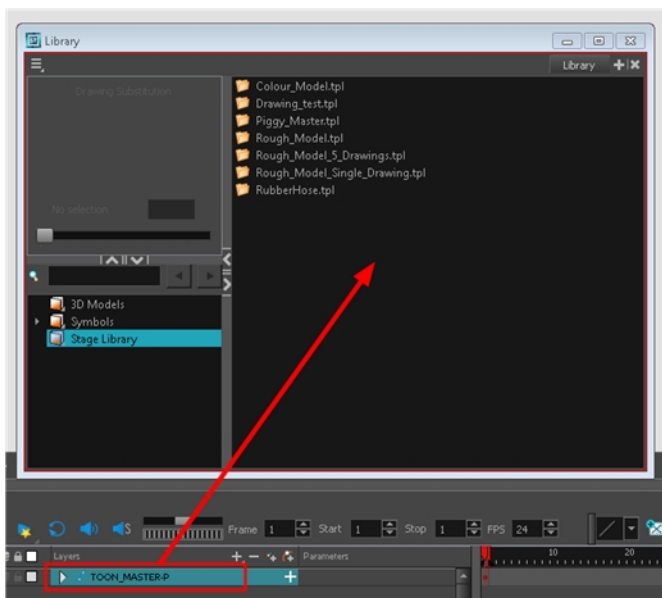
The Rename dialog box opens.
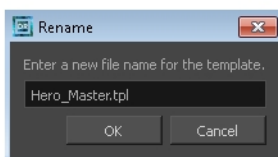
5. In the Name field, name the new template.

6. Click **OK**.

How to create a key pose (action template)

1. In the Library view, right-click on the desired library folder and select **Right To Modify**.

2. In the Timeline view, collapse the master peg layer.
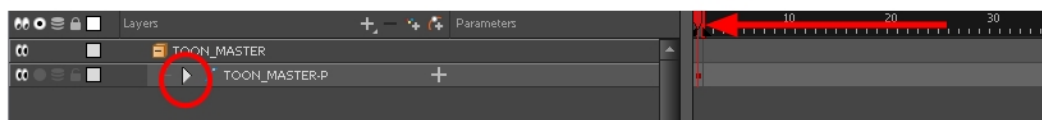
3. Select the cell containing the desired view and drag it into the desired library folder.

The Rename dialog box opens.
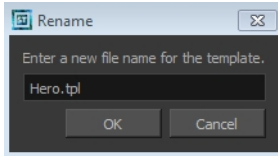
4. In the Name field, type in a name for the template.

5. Click **OK**.

Appendix

The many options and animation techniques available for building a puppet make it impossible to determine only one method to break down a character. Here are some advanced tips on breaking down puppets. As you become more familiar with the software, you will find more ways to improve the construction of your puppet.

This section is divided as follows:

Converting the Layers into Symbols

NOTE: Converting your layers into symbols is optional. When animating, you will need to enter the symbol to create a new drawing. If you want to use morphing when animating, keep your layers as drawings. Do NOT use symbols.

Once the breakdown is completed, you can create symbols out of each drawing. The symbol will encapsulate each drawing of the layer. Later on, even if you only expose the first frame, such as the front head, you will still have access to all of the head drawings you placed in the symbol. This will also allow you to add more drawings, as your characters' master templates will evolve throughout the production of your movie or series.

All your layers should be stored in the library as symbols. Before building your puppet, remove all the current layers in your scene. All of your work is saved in the library.

If you are not sure that you put everything in your library, you can always perform a Save As on your scene and work on a new version.

How to create a symbol

1. Create a symbol by doing one of the following:

   ‣ From the Timeline view, drag the layer to the Symbols library folder.
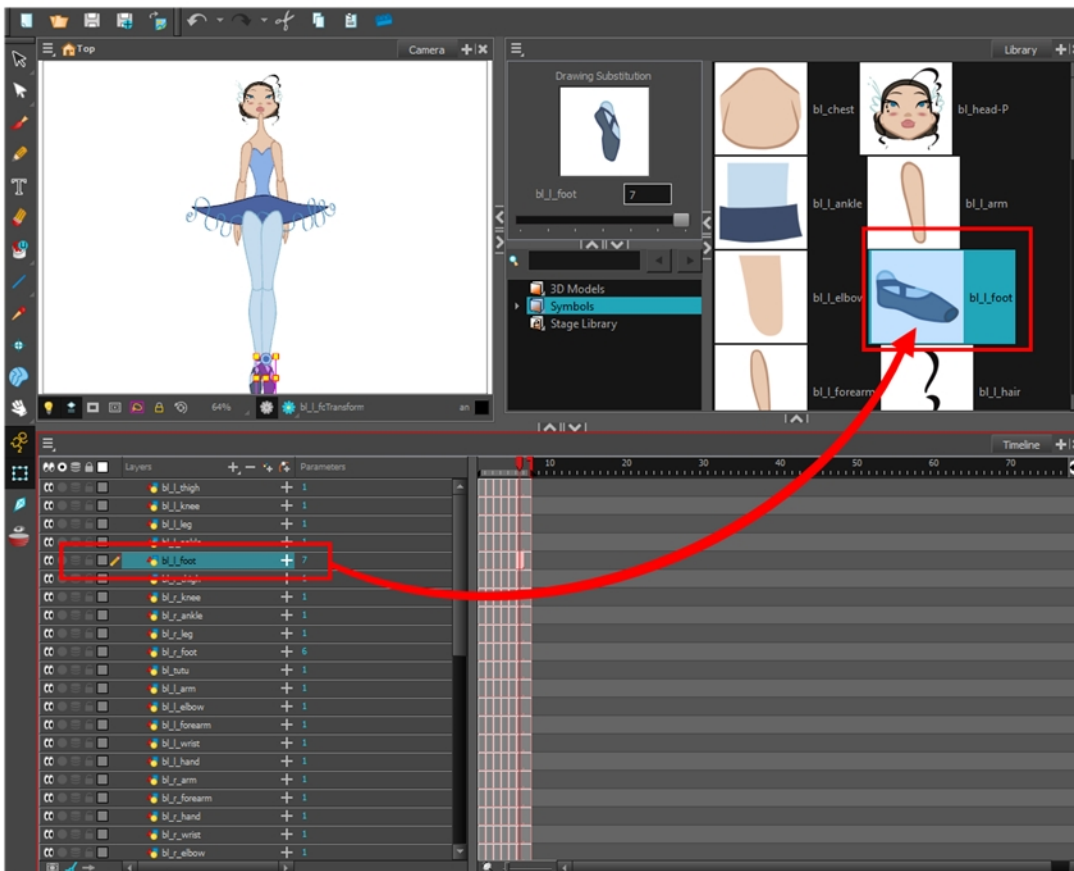
   ‣ In the Timeline view, select the layer to convert to a symbol. From the top menu, select **Edit > Create Symbol** or press F8. You can also click on the Create Symbol button available in the Edit toolbar.

   The Create Symbol dialog box opens.
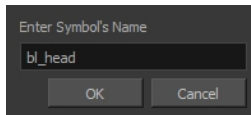
2. In the Enter Symbol's Name field, type the new symbol's name. It is recommended that you keep your original layer's name.

3. Click **OK**.

4. Repeat this process for each layer in the Timeline view.

> **NOTE:** Make sure all your layers are stored in the symbol library.

How to save your scene as a new version

▸ From the top menu, select **File > Save As**. You can also click the Save As 🖫 button available in the File toolbar.

How to clean the Timeline view

1. In the Timeline view, select all of your layers.

2. In the Timeline's Layer toolbar, click the Delete Layers — button.

3. In the Confirm Delete dialog box, click **OK**.

Your timeline is now ready to receive the body part symbols for the rigging process.
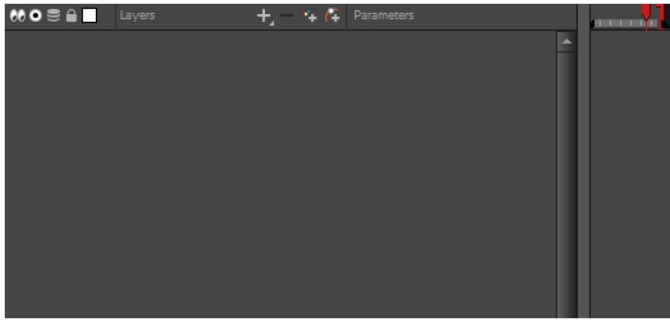
Patch Articulation

The Harmony advanced rigging can use an articulation fixing technique called *Patch Articulation*. This technique is a colour fill patch that is drawn on a third layer and is used to cover the joint lines. It is a simple, yet powerful method.
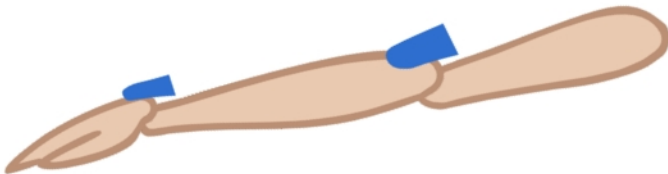
With this technique, you avoid having to create a correction layer at the end of the animation to fill the gaps in the joints. You do not need to worry about the articulations at all. Once a patch is set, the articulation is fixed for the entire length of the animation.

To make this technique even more efficient, Harmony lets you draw the patch inside the same drawing, but on a separate contained layer. The Line Art and Colour Art layers are not only useful in traditional ink and paint, but also in advanced cut-out breakdown. You can draw the patch in the Colour Art layer and extract it in the Node view. The

advantage of doing it this way is that when animating and using the drawing substitution, the patch drawing will change at the same time as the main drawing.

How to create a patch articulation

1. In the Tools toolbar, select the Transform ⬚ tool or press Shift + T.

2. If you plan to create your patch on an independent layer, do the following. If not, go the next step.

   ‣ In the Timeline view, add a new drawing layer by clicking the Add Drawing Layer ⬚ button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).
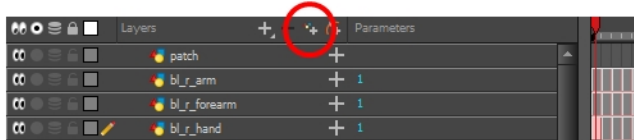
3. In the Camera view, select the part for which you want to create a patch. For example, if you are fixing the elbow articulation, select the arm or forearm drawing to edit it.
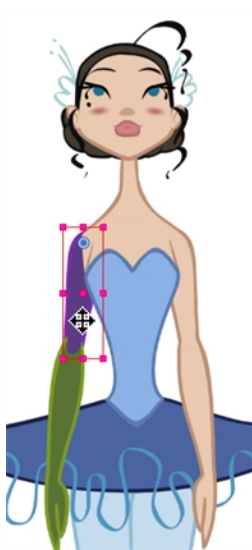
4. In the Tools toolbar, select the Select ➘ tool or press Alt + S.

5. If you drew your lines with pencil lines, it is recommended to convert them to brush lines (fill shapes):

‣ In the Camera view, select the pencil lines.
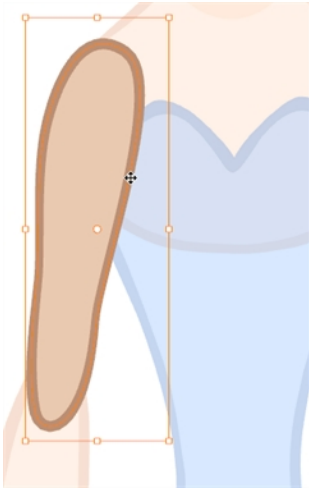
‣ In the Tools Properties view, click the Convert Brush Strokes to Pencil Lines ⟿ button.

‣ In the Camera view, select the piece's outline and fill.

‣ In the Tool Properties view, click the Flatten ≡ button to remove the excess colour fill located under the contour stroke.
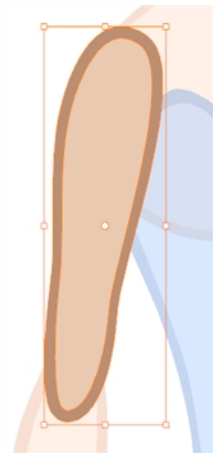
6. In the Camera view, select the fill zone of the part's drawing.
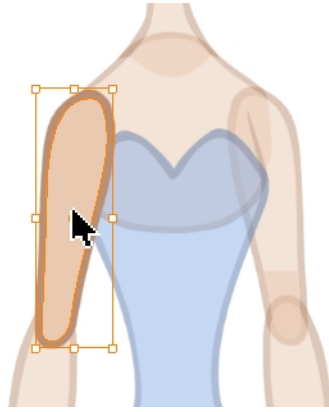
7. In the Camera view, right-click and select **Copy**.

8. Select the cell in which you want to create the patch.
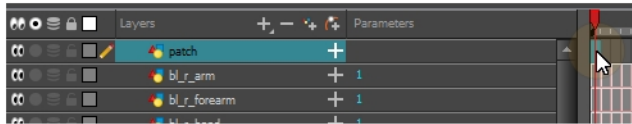
9. In the Camera view, right-click and select **Paste**.

10. In the Tools toolbar, select the Cutter ◢ tool.

11. In the Camera view, make a selection around the pasted zone to cut everything out but a small overlapping zone to cover the articulation.
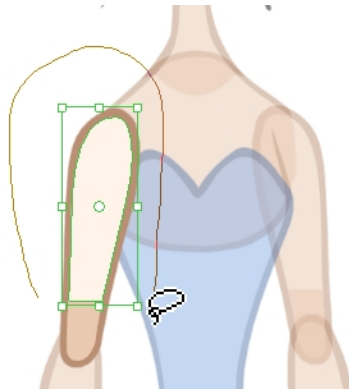
1. Repeat the process for each articulation which requires fixing.
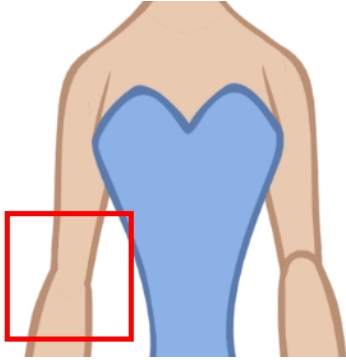
Adding New Drawings to an Existing Template

How to add new drawings to an existing drawing template

1. In the Library view, right-click on the library folder containing the template to modify and select **Right To Modify**.

2. In the Library view's right side, right-click on the extra drawings template to modify and select **Edit Template**.

   A new instance of Harmony opens.

3. In the Tools toolbar, select a drawing tool.

4. In the Colour view, select a colour.

5. In the template's timeline, select the blank cell where you want to draw your new piece.

6. In the Camera or Drawing view, draw the new pieces.
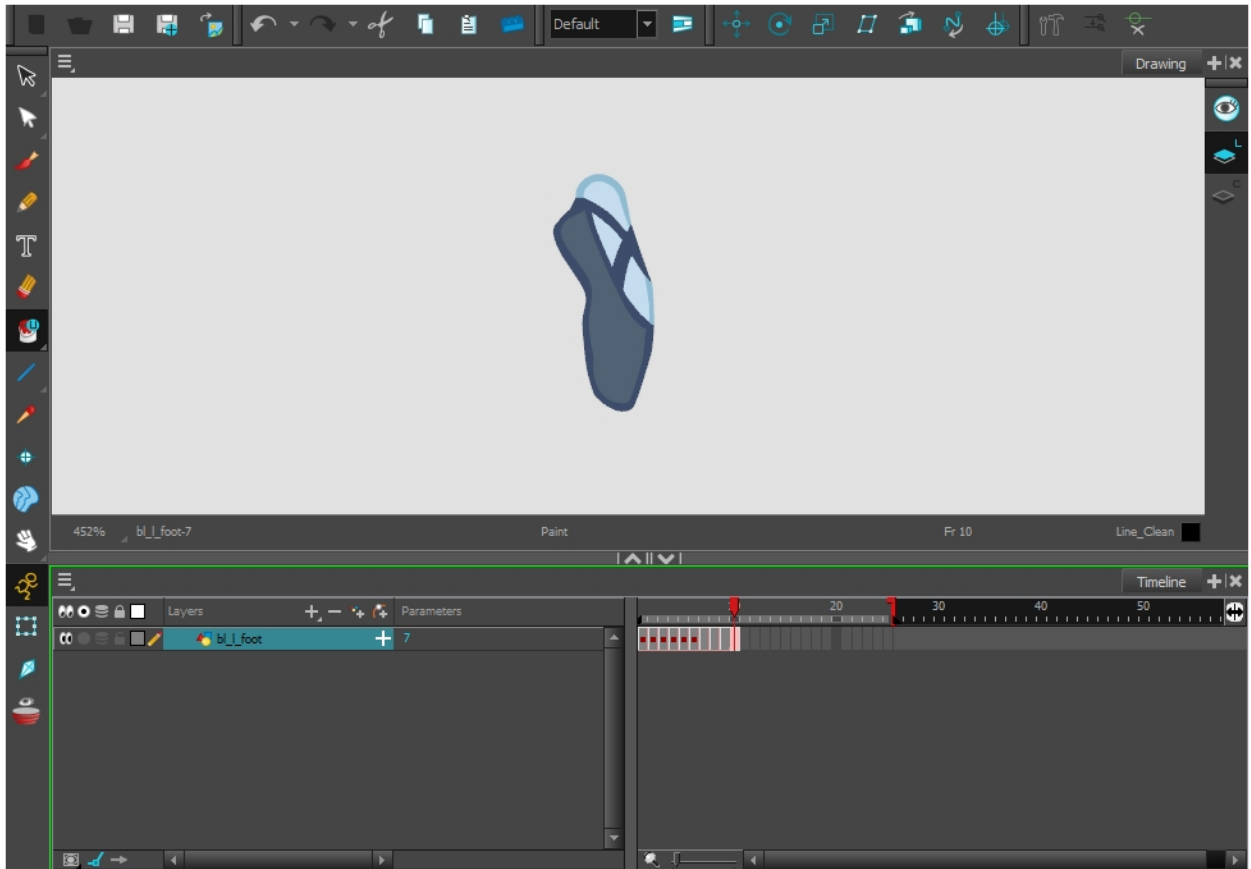
7. From the top menu, select **File > Save** or press Ctrl + S (Windows/Linux) or ⌘ + S (Mac OS X).

8. From the top menu, select **File > Quit** (Windows/Linux) or **Stage Essentials > Quit Toon Boom Stage** (Mac OS X).

Chapter 8: Gaming Deformation

Harmony provides you with the deformation technology for producing light, high-quality animations for your 2D games. You can use Harmony's Game Bone deformer to rig your characters and export your animations in spreadsheets to game engines like Unity.

Harmony provides even more advanced deformation features, but they are not supported by game engines. This chapters will only cover the features supported by the gaming export. For additional information on the Harmony deformation features, refer to the Cut-out Animation Guide.

This chapter is divided as follows:

About Game Bone Deformations

Deformations let you animate bitmap or vector-based graphics, including gradients and textures. Deformations act as a skeleton with limbs and articulations you can bend, reshape, and curve. You can deform a character made out of one, or many, drawing or image layers and make it move as if it were a cut-out puppet. A deformation skeleton is composed of deformation nodes, which are the various pieces (here represented as layers or nodes) required to articulate or deform your drawings, such as a series of bones or game bones.
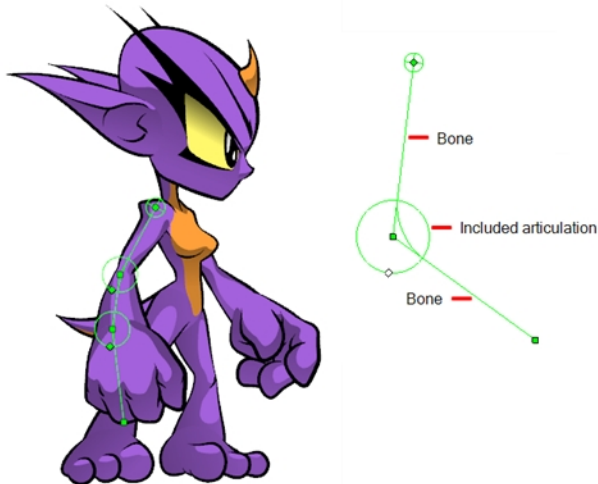
The Game Bone deformation is very similar to the Bone deformation and allows you to create a skeleton structure in which the parent bone moves the child bone. The difference is that the Game Bone deformation is optimized to export to game engines, mainly Unity.

The Game Bone deformation is mostly used when animating the extremities of a character, such as the arms or legs, adding fluidity and a natural feel to the animation. The Game Bone deformation can be manipulated to rotate a limb at an articulation joint and to shorten or elongate the extremities of a limb. It's also quite useful for bending the torso.

The main difference between the Bone and Game Bone deformations is that the Game Bone deformation doesn't have the Bias parameter. The rendered result is also different for the articulation folds. They are slightly rounded.

Creating a Basic Deformation Rig

Using the Rigging tool, you can quickly create a basic deformation rig.

As you create your chains, the controls will be showing. However, whenever you close your project, the deformation controls display is turned off. When you reopen the project, you can display all controls or only some of them—see *Displaying the Deformation Controls* on page 255.

How to select an element on which to add deformation

1. From the Deformation toolbar, click the Rigging 🕎 tool.

2. In the Camera or Timeline view, select the element on which you want to add a deformation. When selecting a drawing node, the deformation components will be automatically added on top of the drawing node. When selecting a peg node, the deformation components will be added below the peg.
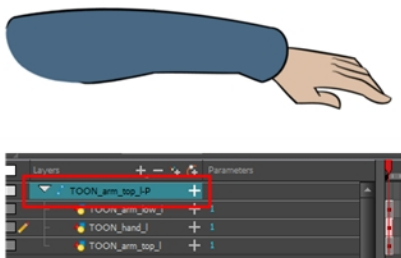
> **NOTE:** Never place a deformation node above a peg node. Having a peg below a deformation node (Bone, Game Bone, etc.) will cause unexpected result. The animation on the peg will move the image out of the defined deformation zone. The same applies to animations created on the drawing layer itself. A drawing layer has an embedded peg.

3. In the Camera view, create your rig. See the following procedures to learn how to add a specific deformation type.

How to add a Bone or Game Bone deformation chain

1. Once your element and the Rigging tool selected, in the Tool Properties view, enable the Bone ⚒ mode or the Game Bone mode depending on your purpose—see Main Types of Deformations.

2. Place the cursor at the root of your drawing or group of drawings, click once and release. For example, on the shoulder.
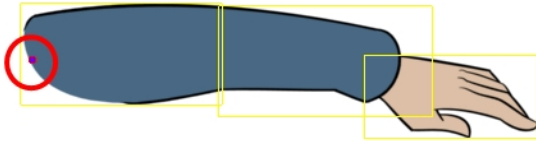
3. Click again at the location where you want your first bone to finish and your second bone to start. An articulation control point will automatically be inserted between each bone you create. Note that the articulation parameters are part of the Bone and Game Bone nodes since Harmony 12.
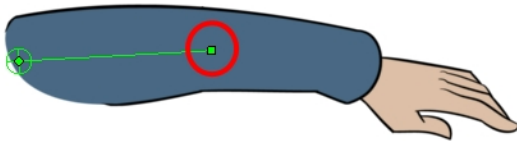
4. Repeat this until you are finished creating the Bone chain.
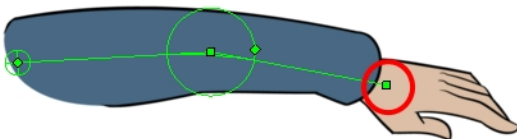
5. If you need to insert a bone between existing ones, hold down the Alt key. When the Insert Bone cursor is displayed, click on the existing bone segment at the location where you want to add an additional bone.
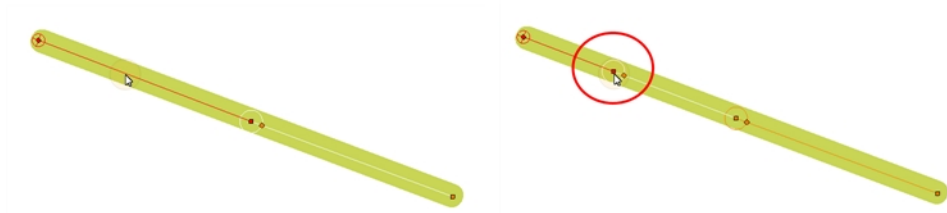
- Note that you can click on any Bone articulation point to start a new bone chain from that point. Once the articulation point is selected (white), click on the location where you want to add a bone and a new bone chain will be created, parented to the previous one.
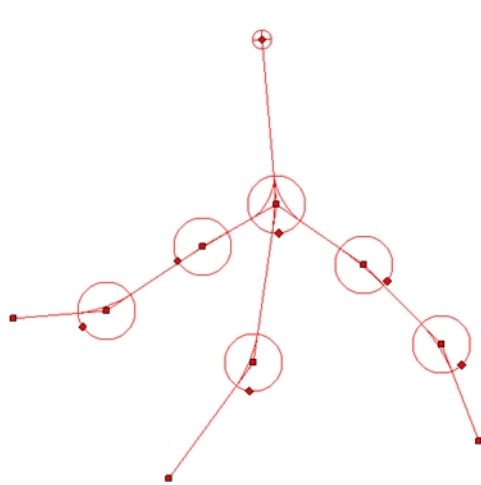
- When you have several chains controlling the same drawing or group of drawings, a Deformation Composite node is automatically be created and appears in the Timeline view. In the Additional Links section of the Timeline view, you can see which nodes are connected to the Deformation Composite.
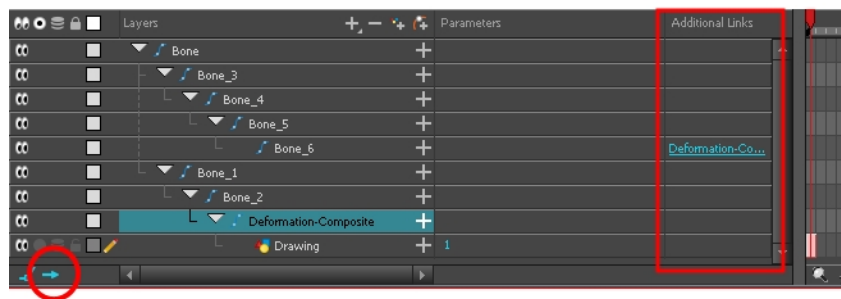
6. With the deformation nodes still selected, in the Deformation toolbar, click the Reset Current Keyframe button. This will set the current resting position as the current frame one.

Setting Up the Resting Position

Once you have a deformation chain created, you can optimize its positioning to fit the element it will deform.

A deformation rig has a resting position and an animated position. The resting position is the original pose the character is in when not animated with keyframes. You can always revert your animated character to its resting position to recover the initial scale, angle, and shape. You can revert the entire character or only certain deformation chains, such as the arm or leg. Just make sure your resting position is fully set before deploying the character in production.

How to set up Bone and Game Bone deformation chains

1. In the Timeline view, select the deformation nodes you want to set.

2. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others ⊕ button to display the deformer controls in the Camera view. This also hides all the deformer controls that were displayed.

3. In the Deformation toolbar, click the Rigging ⫙T tool.

   The chain turns from green to red. A green chain indicates the puppet is in animation mode. A red chain indicates the puppet is in a resting position. Make sure your chain is red.
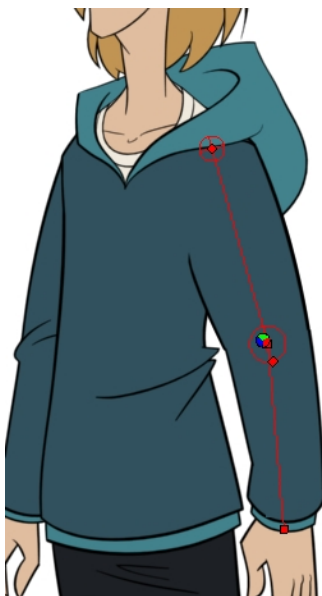
4. In the Camera view, set up the deformation chain.

   ‣ Rotate the first bone to change the angle of the chain.
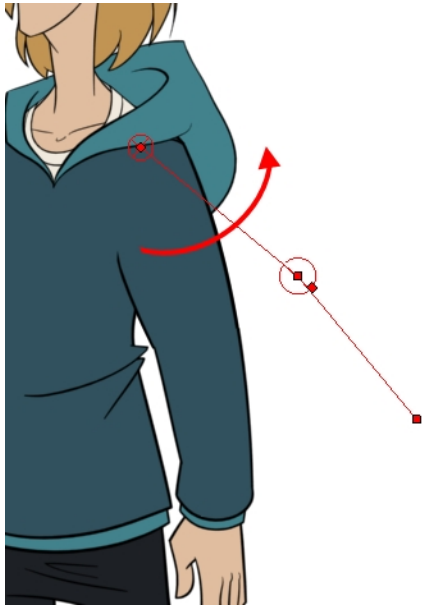
‣ Use the root control to reposition (offset) the entire chain.
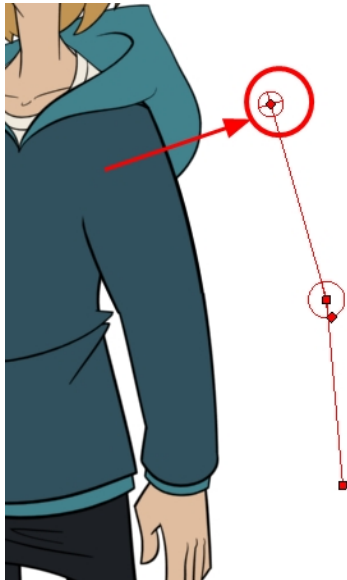
‣ Use the control points to reposition the articulations. This will elongate, shorten or change the direction of the bone and offset the subsequent children.
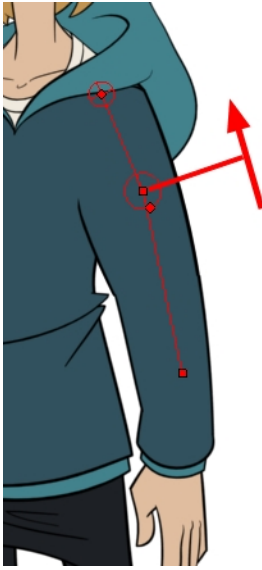
‣ Use the articulation's control (square) to change the size of the articulation. For quality purposes, it is recommended to have an articulation which fits the diameter of the part it controls.
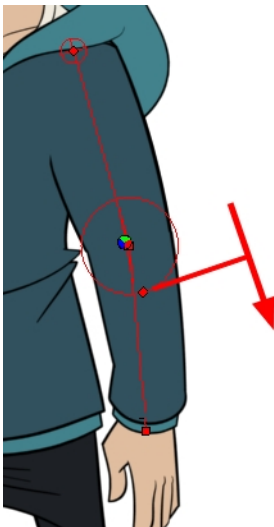
5. Repeat until all the articulations and bones of the chain are correctly aligned to the element to which it is linked. You can also set additional parameters in the Layer Properties window.

6. With the deformation nodes still selected, in the Deformation toolbar, click the Reset Current Keyframe button. This will set the current resting position as the current frame one.

7. Use the Transform tool. For optimal results, make sure the size of the articulation is approximately the same size as the drawing.

8. If you need to insert a bone between existing ones, hold down the Alt key. When the Insert Bone cursor is displayed, click on the existing bone segment at the location where you want to add an additional bone.
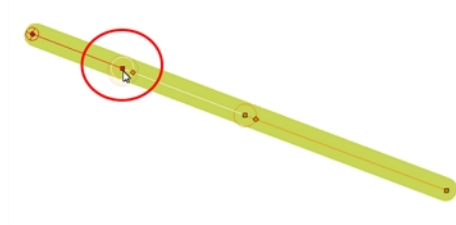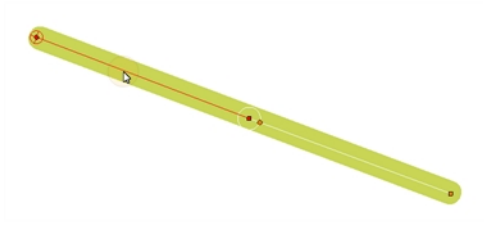
Displaying the Deformation Controls

Before you can manipulate the deformer outside of the Rigging mode, you must display the deformation controls.

If you just created the deformation rig, the controls will still be showing. However, when you close your project, the deformers are turned off. When reopening a project, you must display the controls so you can you see the ones you need while animating.

How to display the selected deformation controls

1. In the Camera, Timeline view, select the drawing layer or deformation nodes you want to display.

2. Do one of the following:

   ‣ In the Camera toolbar, click the Show Control   button.

   ‣ From the top menu, select **View > Show > Control.**

   ‣ Press Shift + F11.

How to display the selected deformation controls and hide all the others

1. In the Camera, Timeline view, select the drawing layer or deformation nodes you want to display.

2. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others   button.

   The selected deformation controls appear in the Camera view and all the others are hidden.

How to display all the deformer controls at the same time

1. In the Timeline view, select **Edit > Select All** from the top menu to select all the nodes or press Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).

2. In the Camera toolbar, click the **Show Control**   button or press Shift + F11.

   All deformation controls in scene are displayed.

How to hide the deformer controls

1. Do one of the following:

   ‣ In the Camera toolbar, click the Hide All Controls   button.

   ‣ From the top menu, select **View > Hide All Controls.**

   ‣ Press Shift + C.

Assembling Pieces

After you have created all the deformation chains for your character, you will need to assemble these separate body parts into a puppet. Your pieces should be properly overlapping and not set apart.
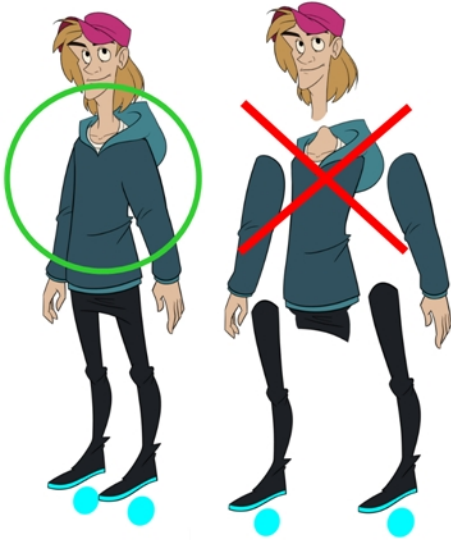
To avoid problems such as having the head stretched by the neck deformers or a hand modified by the body deformers, you can use the Kinematic Output node to assemble your pieces without propagating the deformations down the hierarchy chains.

The Kinematic Output node lets you hook a separate element that you want to be linked to the deformation chain but not be part of the deformation, such as a hand to an arm or an arm to the body. These elements will follow the movement of the chain just like a regular cut-out character hierarchy piece without being influenced by the deformation of the arm. If you don't use the Kinematic Output, the piece's pivot will not follow the deformation.

When building a cut-out puppet with deformations, each part controlled by a deformation chain will automatically rotate from the chain root point, which acts like a pivot. Because it is unlikely that every piece of your character will be rigged with a deformation chain, you must set pivot points for the pieces that are not using deformations—see *Setting the Pivots* on page 230.
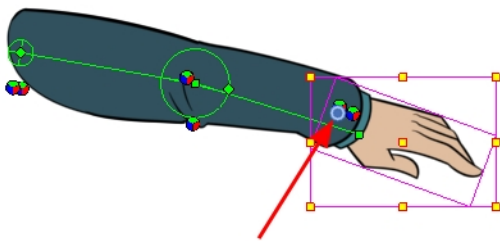
Assembling Guidelines

When assembling a puppet with deformers, there are some guidelines to keep in mind:

- You cannot parent deformers directly because deformers are not designed to be used on other deformers. To assemble deformers, you must insert a Kinematic Output node.

- Your peg must be placed above the deformer.

How to assemble a puppet using the Kinematic Output node in the Timeline view

1. Select the element to attach to the Kinematic Output node, such as the hand or head peg.
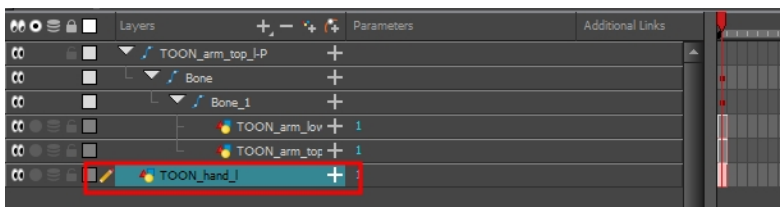
2. From the top menu, select **Insert > Kinematic Output**.

   The node appears in the Timeline view as a parent of your selection.
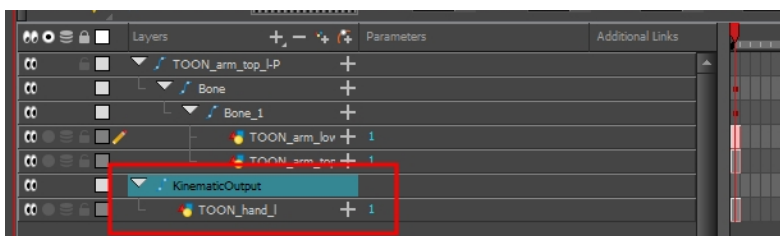
3. In the Timeline view, drag and drop the Kinematic Output layer ONTO the deformation layer you want your limb or piece to follow. For example, onto the neck deformer if you want your head to follow it without being deformed or onto the arm deformer if you want your hand to follow.
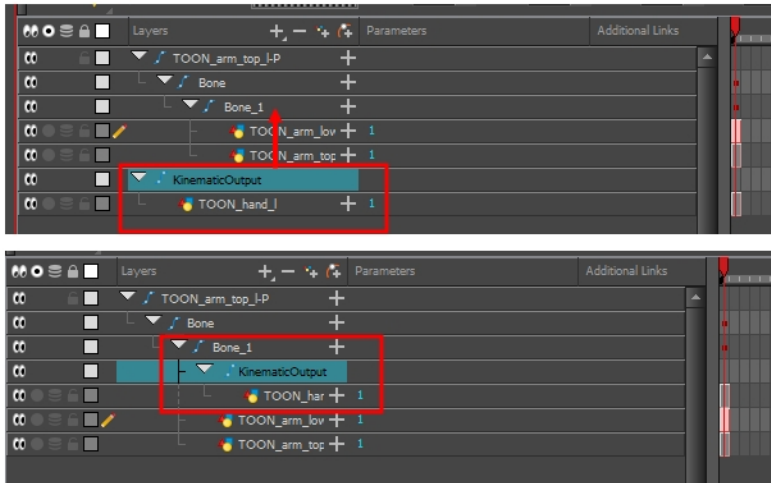
- If your pieces are no longer ordered properly, use the Z-nudging feature to reorder them—see *Nudging Parts Backwards and Forwards* on page 213.

- It's good practice to rename the Kinematic Output layer to reflect which deformer it is assigned to as the Timeline view can become very large and layers can be positioned far apart. Select the Kinematic Output node and in the Layer Properties window, rename the node. You can also double-click on the layer's name.
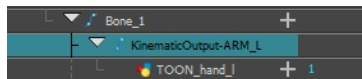
Animating Deformations

The controls to animate deformations work the same as those for setting up the chains. You simply need to create keyframes and position the control points.

How to animate Bone and Game Bone deformations

1. In the Timeline view, go the frame on which you want to create the first animation pose.

2. In the Tools toolbar, select the Transform ⊡ tool.

3. If you want to create animation keyframes, enable the Animate ⚘ mode in the Tools toolbar.

4. Do one of the following:

   - In the Timeline toolbar, click the Add Keyframe 🔑 button.
   - Right-click and select **Add Keyframe.**
   - Press F6.

   A keyframe is added on the current frame.

5. In the Timeline view, select the deformation nodes you want to animate—see *Displaying the Deformation Controls* on page 255.

6. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others ⊖ button to display the deformer of the selected piece.

7. In the Camera view, do the following:

- Rotate the first bone to rotate the limb.

- Rotate the subsequent bones to bend the limb.

- Use the root control to reposition (offset) the entire chain.

- Use the control points to reposition the articulations. This will elongate, shorten, or change the direction of the bone and offset the subsequent children.
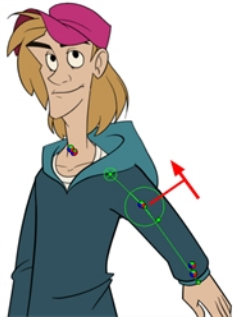
- Use the articulation's control (square) to change the size of the articulation. For quality pur-
poses, it is recommended to have an articulation which fits the diameter of the part it con-
trols.

8. In the Timeline view, go the frame on which you want to set the next key pose. You will need to expend the
exposure to see your drawings further down the Timeline view.

9. Add a keyframe on the current frame by doing one of the following:

- In the Timeline toolbar, click the Add Keyframe ⚬ button.
- Right-click and select **Add Keyframe.**
- Press F6.

10. Repeat the previous steps to animate your character.

You can also manipulate the deformer by typing values directly in the Layer Properties of the deformation
effect nodes.
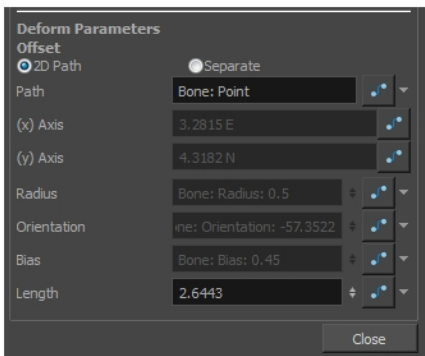
Bone layer properties
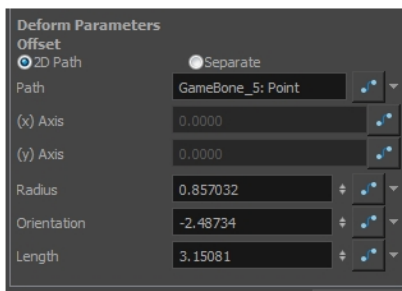
Game Bone layer properties (no Bias)

Deformation Toolbar

The Deformation toolbar contains the various tools and options used to create a deformation rig. This toolbar is displayed in the default interface.

By default, the Deformation toolbar only contains the essential options. If you right-click on the toolbar and select **Customize**, you can add additional buttons.
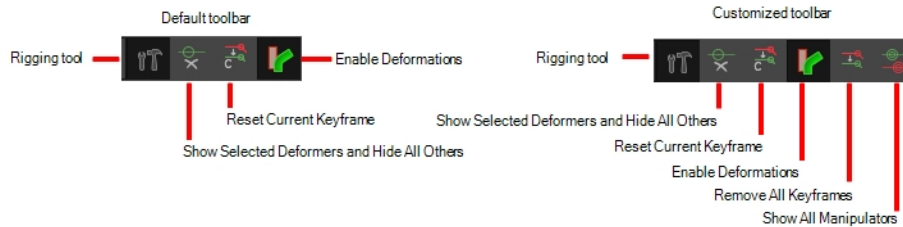
Icon	Tool Name	Description
⫙T	Rigging Tool	The Rigging tool is used to create a Bone deformation chain. You also use it to set up the resting position. To learn more about the Rigging tool's properties, see *Rigging Tool Properties* on page 1.
	Show Selected Manipulators and Hide All Others	The Show Selected Manipulators and Hide All Others button hides all manipulators displayed in the Camera view. Only the manipulators of the selected deformation node are displayed—see *Displaying the Deformation Controls* on page 255 to learn how to make the manipulators visible in the Camera view.
	Reset Current Keyframe	The Reset Current Keyframe copies the resting position, the original setup of your skeleton before undergoing any deformation, to your current frame. Once you have created a deformation chain, you can use the Rigging tool to adjust the position and appearance of the rig to fit the element. When the skeleton is in place, you can use the Reset Current Keyframe button to reset the current frame position to the resting position.
	Enable Deformations	The Enable Deformations button allows you to display your drawings in their original state or with deformations while creating additional drawings. Depending on the artwork you need to create, you might need to refer to the other images either deformed or in their original position. Note that this will not affect the exported images. It's only a display mode. You can see the result in OpenGL and Render modes in the Camera view, but the exported images will always be deformed.
	Remove All Keyframes	The Remove All Keyframes option removes all keyframes on the selected deformation chain.

		The Show All Controls button lets you visualize the resting position in red (Setup mode) and the active position (Animation) in green at the same time—see *Displaying the Deformation Controls* on page 255 to learn how to make the manipulators visible in the Camera view.
	Show All Controls	
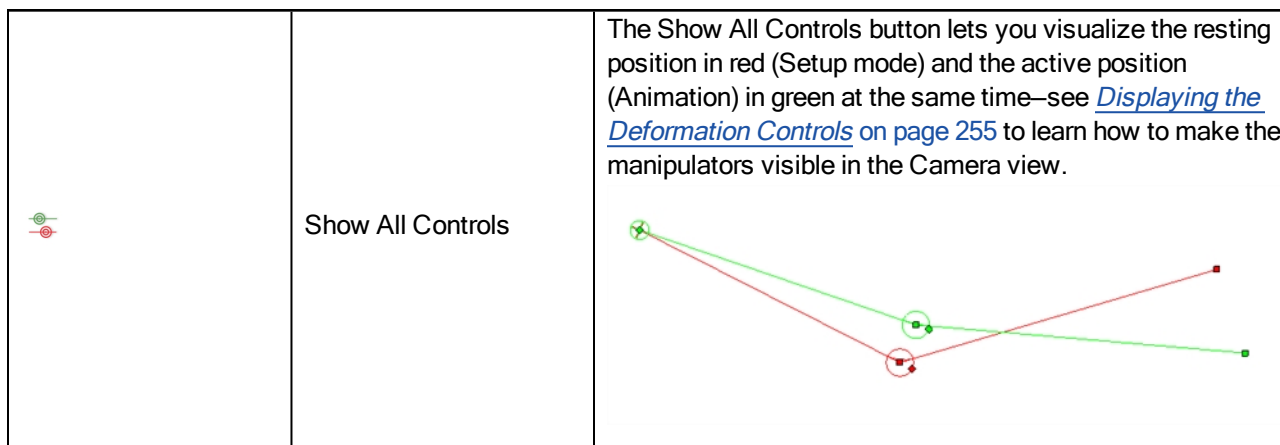
Deformation Nodes

The deformation rigs are composed of several different types of nodes. Additional ones such as the Kinematic Output can be used to enhanced the results. Not all deformation nodes are compatible with the Game export. Only the compatible nodes are listed here.

This section is divided as follows:

- *Adding Deformation Nodes* on page 263
- *Deformation Nodes* on page 263

Adding Deformation Nodes

How to add a deformation node

1. In the top menu, select **Insert > *desired deformation node***.

Deformation Nodes

From the Insert menu, you can insert the following nodes.

Game Bone

The Bone node is one of the main node used to build a deformation rig. Each Bone node consists of a bone and an articulation. Chaining Bone nodes will create a skeleton chain for your character. The Rigging tool can be used to create and connect those nodes automatically.
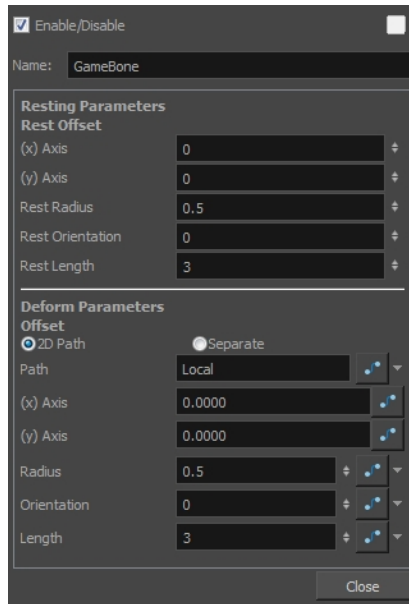
Parameter	Descriptions
Resting Parameters Rest Offset	
(x) Axis	This is the bone X-axis (horizontal) coordinates for the resting position.
(y) Axis	This is the bone Y-axis (vertical) coordinates for the resting position.
Rest Radius	This is the articulation's radius value (articulation size) for the resting position.
Rest Orientation	This is the bone's orientation angle for the resting position.
Rest Length	This is the bone's length for the resting position.
Deform Parameters Offset	
2D Path	When this option is enabled, the X and Y axis parameters are controlled by the same 2D path function.
Separate	When this option is enabled, the X and Y axis parameters are individual from each other.
Path	When using a 2D Path, this field displays the name of the function curve.
(x) Axis	This is the bone X-axis (horizontal) coordinates for the animation position. This parameter can be linked to a function curve to be animated over time.
(y) Axis	This is the bone Y-axis (vertical) coordinates for the animation position. This parameter can be linked to a function curve to be animated over time.
Radius	This is the articulation's radius value (articulation size) for the animation position. This parameter can be linked to a function curve to be animated over time.
Orientation	This is the bone's orientation angle for the animation position. This parameter can be linked to a function curve to be animated over time.
Length	This is the bone's length for the animation position. This parameter can be linked to a function curve to be animated over time.

Kinematic Output

The Kinematic Output node lets you hook a separate element that you want to be linked to the deformation chain but not be part of the deformation, such as a hand to an arm or an arm to the body. These elements will follow the movement of the chain just like a regular cut-out character hierarchy piece without being influenced by the deformation of the arm. If you don't use the Kinematic Output, the piece's pivot will not follow the deformation.

Connect a Kinematic Output node below the deformation node you want your drawing to follow.
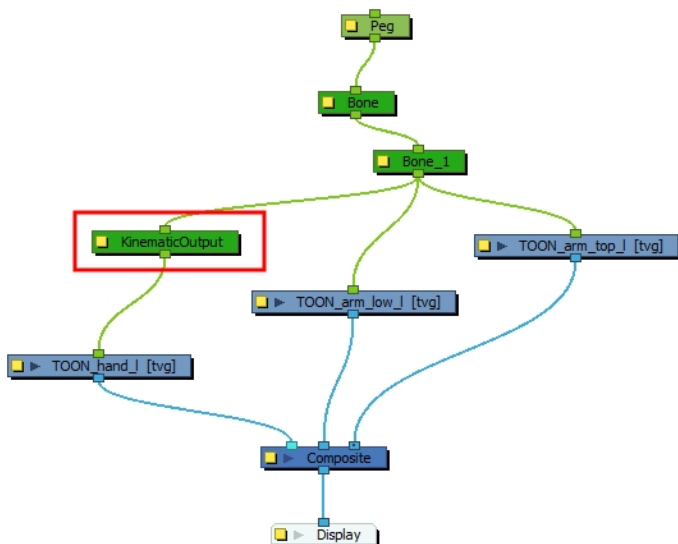
Chapter 9: Library
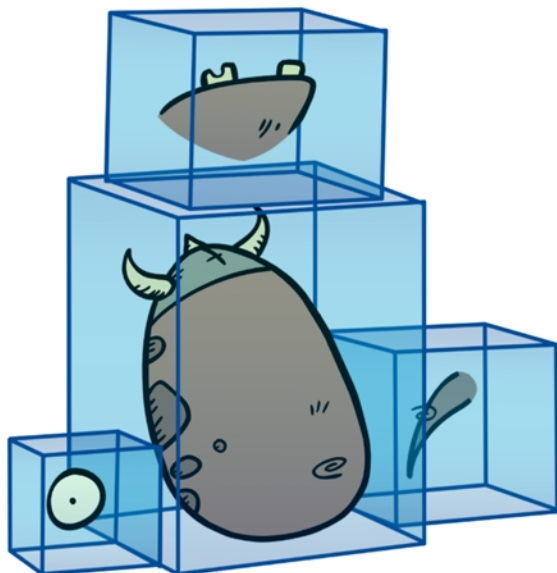
Using templates and symbols , you can share and reuse any elements you create in Harmony. The Harmony library lets you store several different elements such as puppets, backgrounds, animations and key poses. In fact, anything you create in Harmony can be stored in the library.

This chapter contains the following topics:

Understanding the Library Concept

The Library view is where you can store and reuse your artwork and animation in other scenes or build props and puppets.

What is a Library?

The library is a storage centre for all production assets; the elements stored in the library are called *templates*. Although it is mainly used for cut-out animation, the library is also useful for paperless and traditional animation processes. The library can contain any asset used in a Toon Boom Harmony production.

Using the library is as simple as dragging the content into the library to store your artwork and then dragging it to the Timeline or Camera view when you want to reuse it.

You can organize your library using several different subfolders and store them on your hard drive or network.

What is a Template?
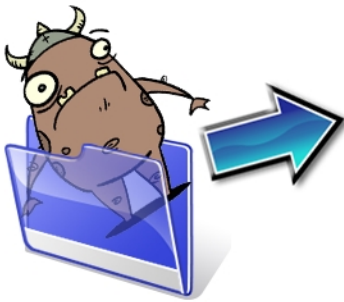
A template is an individual copy of the artwork stored in the library which you can reuse in different scenes. Once a template is stored in the library, you can access it from any project.

Dragging a template into your scene copies the content in your Timeline and does not link it to the original. You can modify this individual copy at any time.

What is a Symbol?

A symbol is a container used to build your props, puppets and looping clips. You can use symbols to contain artwork and animation and manipulate them as a single object. You can also use symbols as a placeholder in which you place a series of different drawings for each body part of your puppets or when you have a repeating cycle. However, symbols are not necessary for creating characters.

To create a symbol, drag your artwork to the Symbol library. When you drag a symbol from the Symbol library into your scene, it will be linked to the original symbol. If you drag a symbol into your scene several times in the Timeline view, they will all be linked to the original symbol. If you modify one, they will all be modified.

A symbol is local to the project and cannot be accessed directly from other scenes. To reuse a symbol's content in another scene, you must create a template out of it.

When a symbol is exposed in the Timeline view, the symbol's cells are represented as a movie strip.
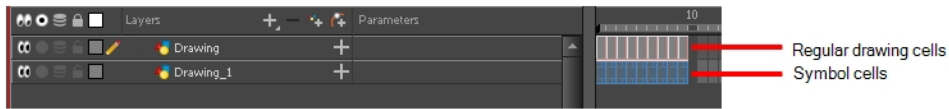
Libraries in Harmony Server

When working on the database, the structure of the library differs from when working on Harmony Server.
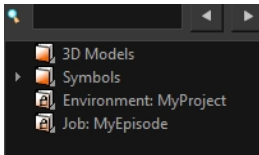
Harmony provides three default library folders:

- **Symbols:** The only library folder containing symbols for your project. You can organize the symbols library folder using subfolders, but you cannot create a second library for your symbols. This library is local to your project.

- **Environment:** A folder located inside the Environment folder. Every asset stored in this folder is accessible from any job and scene contained within this environment.

- **Job:** A folder located inside the Job folder. Every asset stored in this folder is accessible from any scene contained within this job.

NOTE: You can create a folder called "library" in the `usa_db` folder on the server to create a global library. Once the Harmonyapplication is restarted, a "Global" library folder will automatically appear in every user's library. Every asset stored in this folder is accessible from any scene, job and environment.

Library View
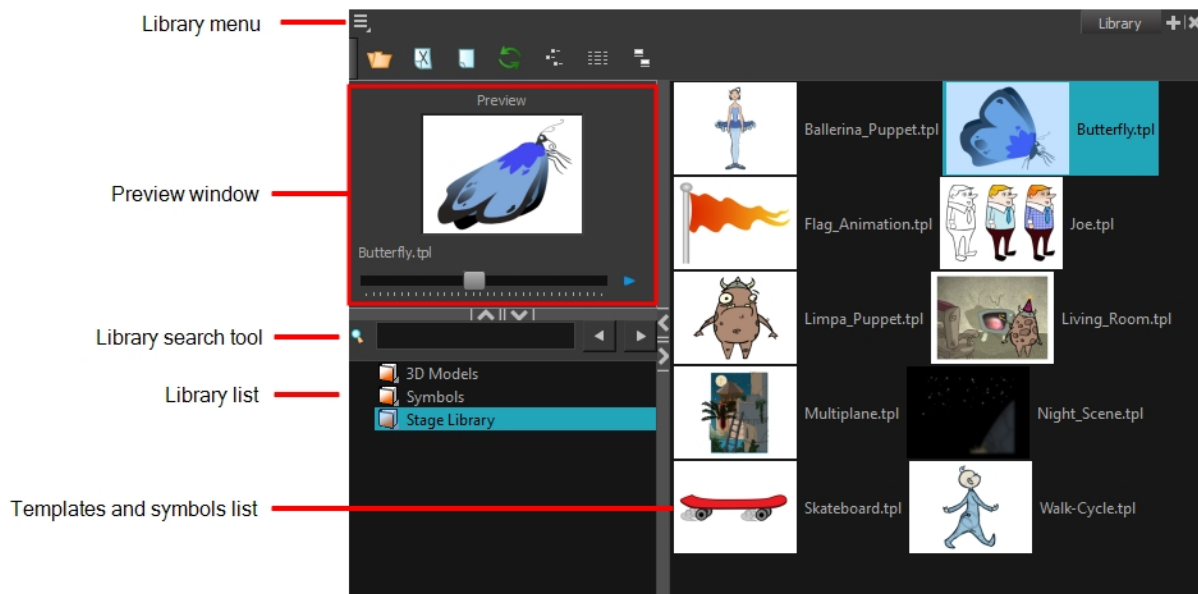
You use the Library view to create and manage your symbols and templates, display the folders and manage and all of the content.

Library View Menu

The Library menu lets you access commands specific to the Library view, such as opening a Library or getting the rights to modify a library folder.

Preview Window

The Preview window lets you preview the content of a symbol or template, and swap between drawings and symbol cells in the Timeline view. This window is also used as the Drawing Substitution window.

How to preview a template or symbol's content

1. In the Library view's right side, click or double-click on the symbol or template to preview.

2. In the Preview window, click the Play ▶ button or drag the slider to scrub through the frames.

Library Search Tool

When working on a movie or series, you will probably end up with many templates and symbols in your library. Using the Search tool, you can quickly find the templates and symbols in your folders.

How to use the Library Search tool

1. From the left side of the Library view, select the library in which you want to search.
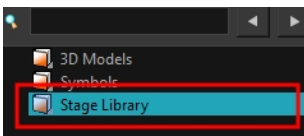
2. In the Search field, type the name or partial name of the symbol or template you are looking for.
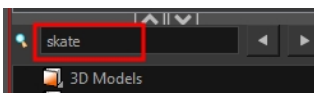
3. Click the left ◄ and right ► arrows to see the previous and next results. The Search engine will look for results within the library master folder and its subfolders. It will not look in other libraries.
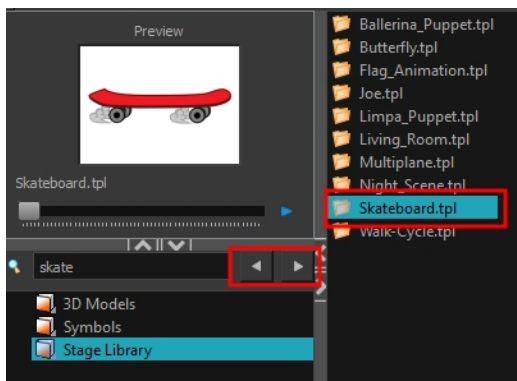
Library List
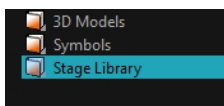
The Library list lets you navigate through the different libraries and subfolders. You can also open, close and create new libraries from here.

The Library folders have these default libraries:

- **Symbols:** The only library folder containing symbols for your project. You can organize the symbols library folder using subfolders, but you cannot create a second library for your symbols. This library is local to your project.

- **Harmony Library:** This folder contains templates and is stored on your hard drive. You can organize the Harmony library folder using subfolders. This folder does not contain symbols.

Templates and Symbols List

s
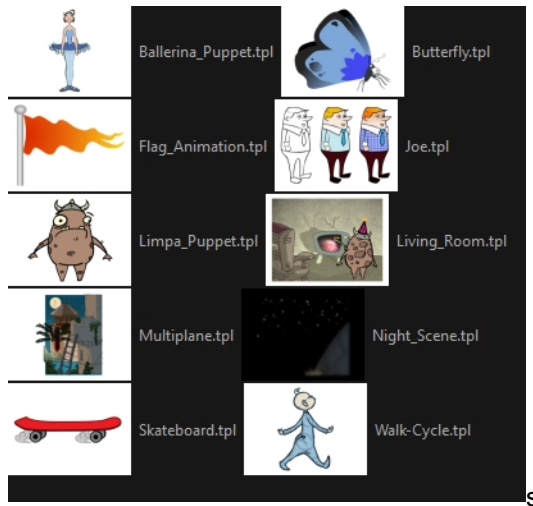
The symbols and templates contained in the selected Library list can be displayed on the right side of the Library view as thumbnails, in a list or as details.

How to access the templates and symbols list display options

‣ In the Library view's right side, right-click and select **View > List**, **Thumbnails** or **Details**.

‣ In the Library View toolbar, you can click the following buttons:

      Thumbnails

      List

      Details

Organizing the Library

As you will probably create a large number of symbols and templates, you will soon realize they need to be organized. You can create different libraries and subfolders to easily access your assets. For example, you can create a different library for each project and divide it into several categories, such as:

• Characters

• Props

• Backgrounds

Although you can only have one symbol library folder, you can organize it by creating subfolders.

There are two ways to create library folders.

• Directly through your operating system

• Using Harmony's interface

Folders can be opened in Harmony when you require it. You can open any folder on your hard drive or network as a library. Opening a library means linking the folder to your Library view. You only need to open the library once. The library folder is available every time you open the application until you decide to close the library and unlink it.

You may not always require all the library folders in the Library List. If so, you can close the ones you do not need. Closing a folder does not delete it; it only unlinks it from the Library view. If you want to reopen it, locate it on your hard drive or network and open it in the Library view.

Symbol and template libraries need to be organized. You can create different subfolders on your hard drive or in the Harmony Library view, so you can easily access assets. By default, any new library you link to your Library view is locked to prevent accidental deletion or modification of symbols and templates. You must obtain the right to modify it before being able to add a new folder to it.

You can delete a folder from the library if its contents are no longer needed.

NOTE: Warning: All templates and symbols in the folder will be deleted from your hard drive. Once deleted, the data cannot be retrieved.

Once you add a folder, you can rename it. This also renames the folder on your hard drive.

If you update the content of your libraries through your operating system, you will need to refresh your library folders in the Library view.

When you display thumbnails in the Library view, the system generates a series of small images (thumbnails) for you. You can generate template thumbnails yourself, if they do not display or if the process has been stopped.

You can also delete thumbnails if you want to send a template to another user or studio and keep your packages small.

How to create a library folder through your operating system

1. On your computer, create a new folder with a relevant name in the location where you want the library to be stored.

How to create a library folder in Harmony

1. In the Library View menu, select **Folders > Open Library**.

    The Browser window opens.

2. Browse for the location where you want to store your new library folder.

3. Click the New Folder button.

    A new folder appears.

4. Name the new library folder with a relevant name and click **OK**.

    The new library appears in the Library List section.
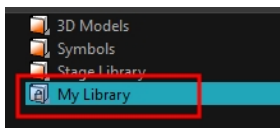
How to open a library

1. In the Library View menu, select **Folders > Open Library**.

   The Browser window opens.

2. Browse to the location of the library folder.

3. Select the folder and click **OK**.

   The new library appears in the Library Folders section.
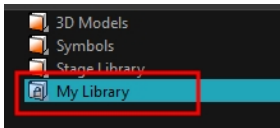
How to close a library

1. On the right side of the Library view, select the library folder to close.

2. In the Library View menu, select **Folders > Close Library**.

   The library closes.

How to create a folder

1. On the left side of the Library view, select the library folder to which you want to add a subfolder.

2. In the Library View menu, select **Edit > Right to Modify**.

3. In the Library View menu, select **Folders > New Folder**.

   The new folder appears in the Library. Click on the library containing the new folder and click the plus [+] sign to expand it.
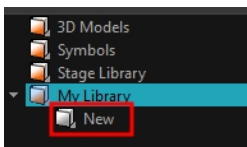
How to delete a folder

1. In the Library view's left side, select the folder to delete.

2. In the Library View menu, select **Edit > Right to Modify** or right-click on the selected library and select **Right to Modify**.

3. In the Library View menu, select **Folders > Delete Folder** or press Delete.

How to rename a folder

1. In the Library view's left side, select the folder to rename.

2. In the Library View menu, select **Edit > Right to Modify** or right-click on the selected library and select **Right to Modify**.

3. In the Library View menu, select **Folders > Rename Folder**.

4. Rename the selected folder.
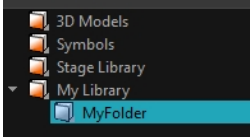
5. Press Enter/Return to validate the operation.

How to refresh a library

1. In the Library view's left side, select the folder to refresh.

2. In the Library View menu, select **Folders > Refresh** or press F5.

   The library displays the new content.

How to generate thumbnails

1. In the Library view's right side, select the template in which you want to generate thumbnails.
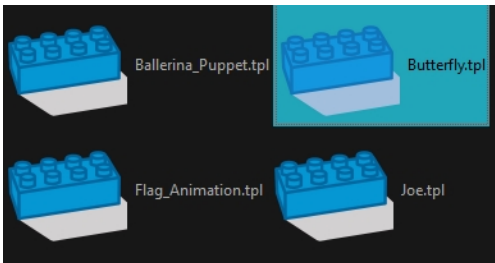
2. In the Library View menu, select **View > Generate Thumbnails**.

   The progress bar appears.

How to delete thumbnails

1. In the Library View menu, select **Edit > Delete Thumbnails**.

   All the thumbnails contained in the library are removed.

Templates
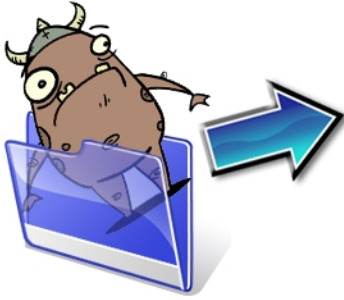
When you want to reuse artwork and animation from your project in other scenes, you must create a template from it. A template can be seen as a portable scene or package that you can drag inside your project. You can open a template and edit it just like any other project. If you want modify your templates, you can edit them using the Edit Template command.

You can create a template using the Timeline view.

To delete templates from your library, use the Library view. Harmony lets you undo the action if necessary.

How to create a template from the Timeline view

1. In the Timeline view, select some cells or layers.

2. In the Library view, select a folder to store the template.

3. If a library folder is locked, right-click and select **Right to Modify**.

4. Drag the selection to the Stage Essentials Library folder or any other library folder.
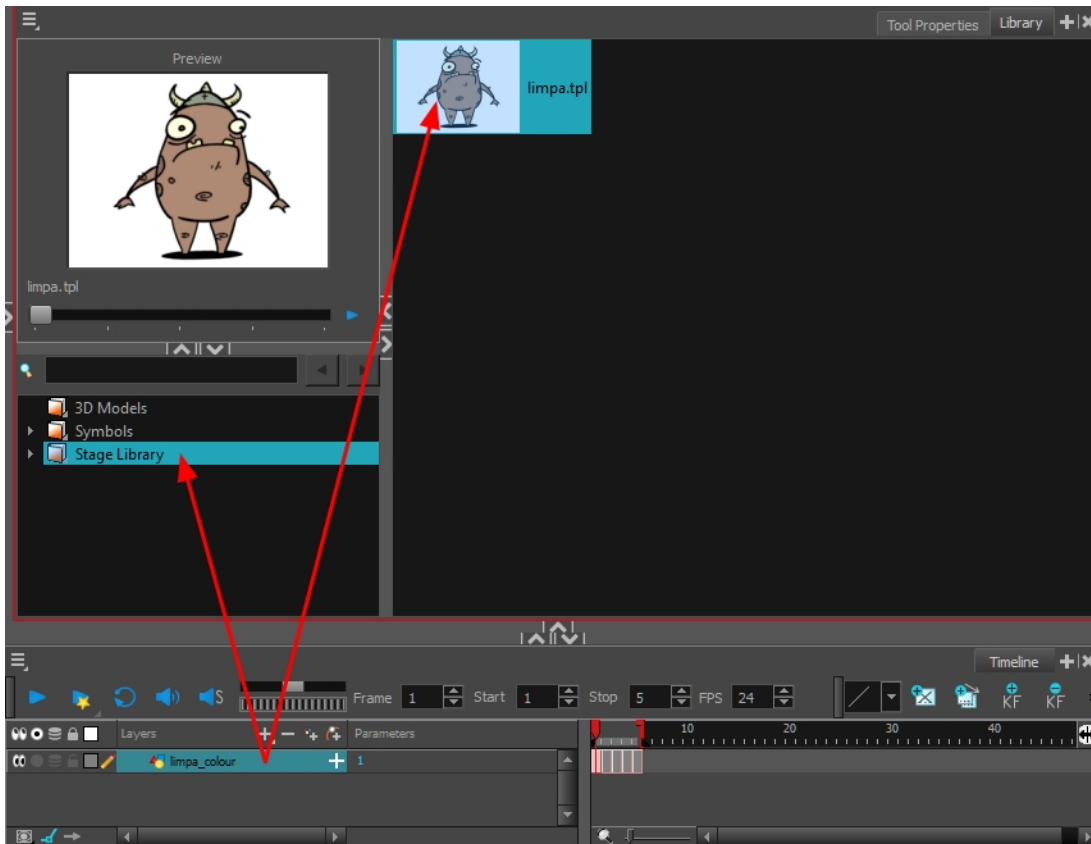
5. In the Rename dialog box, give the new template a name.

   To rename a template once it is created, right-click on the symbol and select **Rename**.

6. Click **OK**.

How to delete a template

1. In the Library view, select the folder containing the template to delete.

   NOTE: If the library folder is locked, right-click on the folder and select **Right to Modify**.

2. Right-click on the selection and select **Delete** or press Delete.

How to edit a template

1. In the Library view, select the folder containing the template to edit.

   NOTE: If the library folder is locked, right-click on the folder and select **Right to Modify**.

2. Right-click on the selection and select **Edit Template**.

   A new Harmony application opens.

3. Edit the template.

4. From the top menu, select **File > Save**.

5. In the top menu, select **File > Quit** (Windows/Linux) or **Stage Essentials > Quit** (Mac OS X).

Symbols

A symbol combines animation, artwork or layers into a single object that you can control in one layer. You can also create symbols out of each body part in your cut-out puppets.

You do not need to create symbols in order to create drawings or characters in Toon Boom Harmony.

When you delete a symbol, it will be deleted from your hard drive. You can use the Undo function to retrieve the data. The symbol cannot be retrieved once you close the application.

When you import a symbol from the library to the Timeline view it is linked to the original symbol in the library. If you import a symbol into your scene several times in the Timeline view, they will all be linked to the original symbol. If you modify one, they will all be modified.

If you want to edit a symbol without modifying the other instances, you must duplicate the symbol first. If other symbols are nested inside the new symbol, they are not duplicated. If you modify them, the original and other instances will also be modified.

You can either edit a symbol from the Timeline view or from the Library view.

When you edit a symbol, the drawings contained in it are not placed at the centre of the stage, but are located in the position where they were created. The pivot is translated at the centre of the symbol.

When you enter a symbol to edit it, you are entering another scene with an independent timeline. You can nest many symbols one inside the other. To help you follow the hierarchy of your nested symbol, take note of the Editing stack at the top of the Camera view which displays the path to your symbol's location. You can click on the symbol's name to move up the chain.

You can share a symbol and use its contents (the drawings) in another scene. To do this, you must first convert your symbol into a template. This conversion breaks the drawing's link with both the original scene and symbol. It then becomes a separate entity that you can import into other projects.

How to create a symbol from a drawing selection

1. In the Tools toolbar, select the Select ▸ or Cutter ◿ tool.

2. In the Camera view, select the drawing elements to create a symbol.
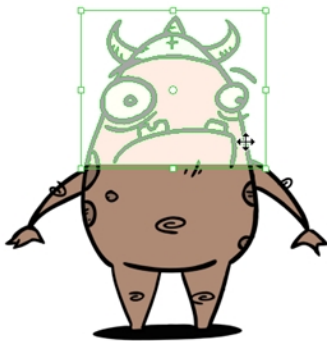
3. From the top menu, select **Edit > Create Symbol** or press F8.

   ‣ Clicking the Create Symbol ▦ button in the Edit toolbar will create a symbol from the entire layer.

   The Create Symbol from Drawing Selection dialog box opens.
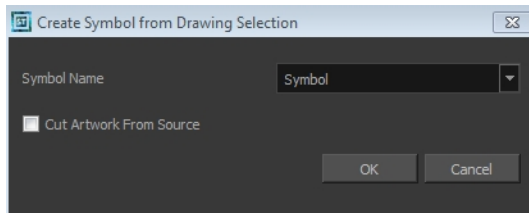
4. In the Symbol Name field, type the name of the symbol.

   ‣ You can also select an existing layer from the Symbol Name drop-down menu. It will add your symbol on the layer's current cell. If there is already an exposure on that cell, the symbol will be added to a new layer.

5. You can choose to place the current selected artwork in the drawing or remove it:

   ‣ To remove currently selected artwork from the drawing and place it in the new symbol, select the **Cut Artwork From Source Drawing** option.

   ‣ To keep currently selected artwork in both the drawing and in the new symbol, deselect the **Cut Artwork From Source Drawing** option.

6. Click **OK**.

   The new symbol appears in the Library view's symbol folder and in the Timeline view as a new layer.
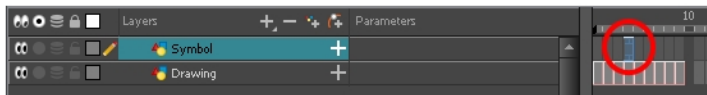
How to create a symbol from the Timeline view

1. In the Timeline view, select the layer or cells from which your want to create a symbol.

2. Do one of the following:

   ‣ From the top menu, select **Edit > Create Symbol**.

   ‣ In the Edit toolbar, click the Create Symbol 🧱 button.

   ‣ Press F8.

   ‣ Drag your selection to the Symbol folder in the Library view.
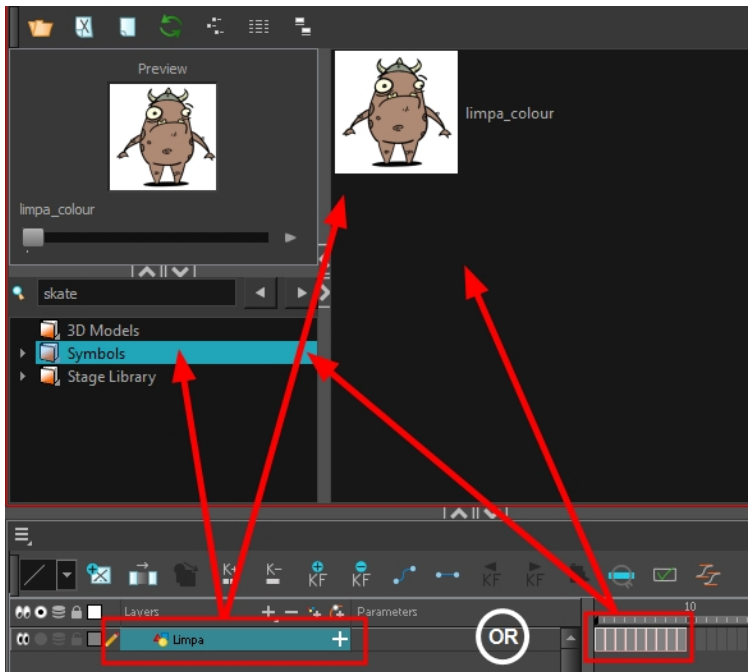
The Create Symbol dialog box opens
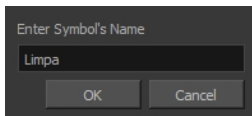
3. In the Enter Symbol's Name field, type the new symbol's name.

   To rename a symbol once it is created, right-click on the symbol and select **Rename**.

4. Click **OK**.

   The new symbol appears in the Library view's Symbol folder. The current selection is not replaced by the new symbol. The new symbol only appears in the library. You must drag it into your scene to use it.

How to create an empty symbol

1. In the Library view, select the **Symbol** folder.

2. Do one of the following:

   ‣ In the Library view's right side, right-click and select **New Symbol**.
   ‣ From the top menu, select **Insert > Create Empty Symbol in Library**.

   The new empty symbol appears in the Library view.
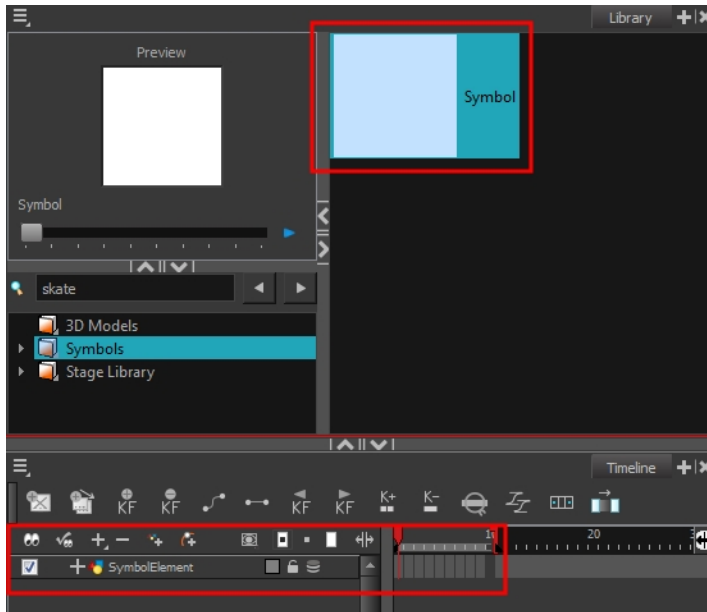
The symbol is ready for you to edit (add content to). To go back to the root timeline, click the Top 🏠 button in the Camera view.

To rename a symbol once it is created, right-click on the symbol and select **Rename**.

How to delete a symbol

1. In the Library view, select the symbol to delete.

2. Right-click and select **Delete** or press Delete.

   ‣ If the symbol is currently in use in the scene, a warning message displays. Click **OK** to delete the symbol from the library and scene.
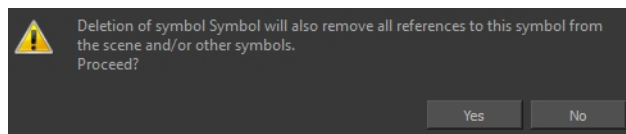
How to edit a symbol from the Timeline view

1. Do one of the following:

   ‣ In the Timeline view, double-click on the symbol's cell to edit the symbol.

   ‣ In the Camera view, double-click on the symbol or press Ctrl + E (Windows/Linux) or ⌘ + E (Mac OS X)).

   ‣ Click the Edit Selected Symbol 🖱 button in the Camera View toolbar's extra buttons.
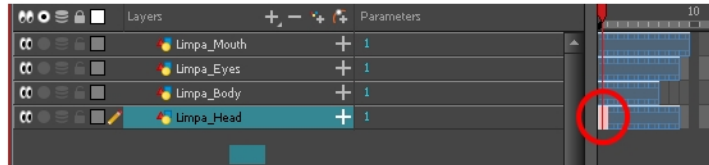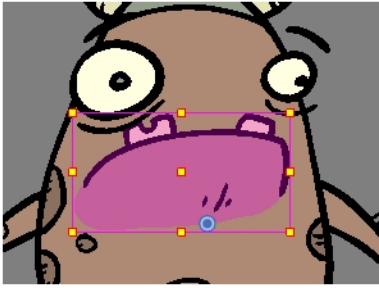
You are now inside the symbol and you are able to edit it.

2. Do one of the following:

To return to the project's timeline, click the Top 🏠 button in the Camera view's top-left corner, press Ctrl + Shift + E (Windows/Linux) or ⌘ + Shift + E (Mac OS X).

▸ In the Timeline view's right side, right-click and select **Symbols > Leave Current Symbol**.

How to edit a symbol from the Library view

1. In the Library view, select the symbol to edit.

2. Right-click and select **Edit > Edit Symbol** or double-click on the symbol.

    You are now inside the symbol and you are able to edit it.
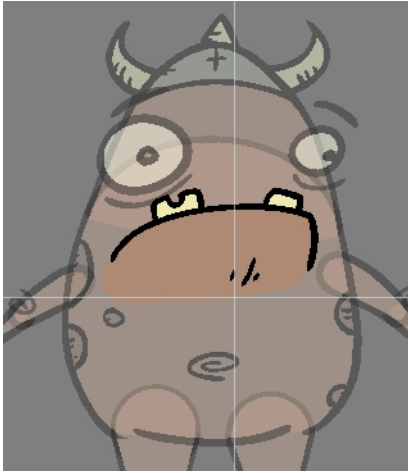
To return to the project's timeline, click the Top 🏠 button in the Camera view's top-left corner, press Ctrl + Shift + E (Windows/Linux) or ⌘ + Shift + E (Mac OS X).

How to duplicate a symbol

1. In the Timeline view, go to the frame where you want to duplicate the symbol.

2. Select the symbol's cell.

3. From the top menu, select **Edit > Duplicate Selected Symbol**.

   In the Library view, the symbol is duplicated and in the Timeline view, the current cell and its held exposure is replaced with the new symbol. You can now modify the symbol's content.
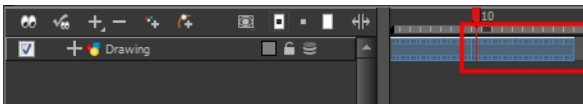
How to convert a symbol into a template

1. From the Library view, select the symbol to convert into a template and drag it to the Camera or Timeline view. If you drop your symbol into the Camera view instead of the Timeline view, it will not be placed in the centre of your camera frame, but rather wherever your cursor drops it within the camera frame.
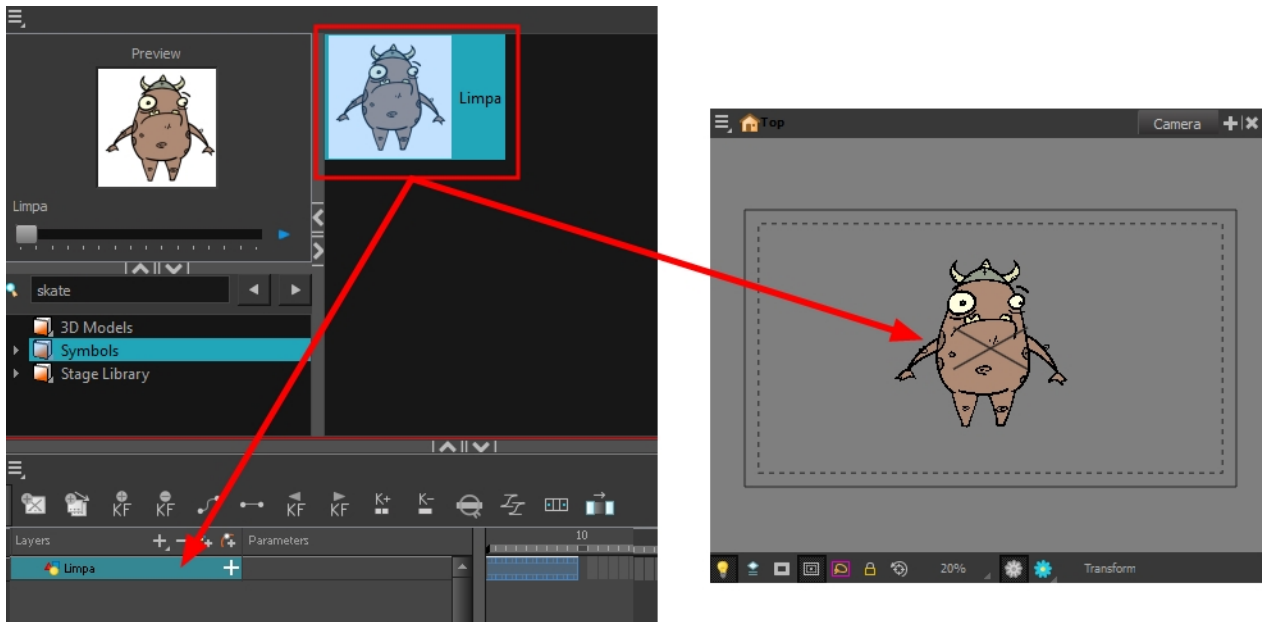
2. In the Timeline view, select the symbol's cells or layer and drag it to the Stage Library folder or to any other library folder. Make sure you have the right to modify the library folder.
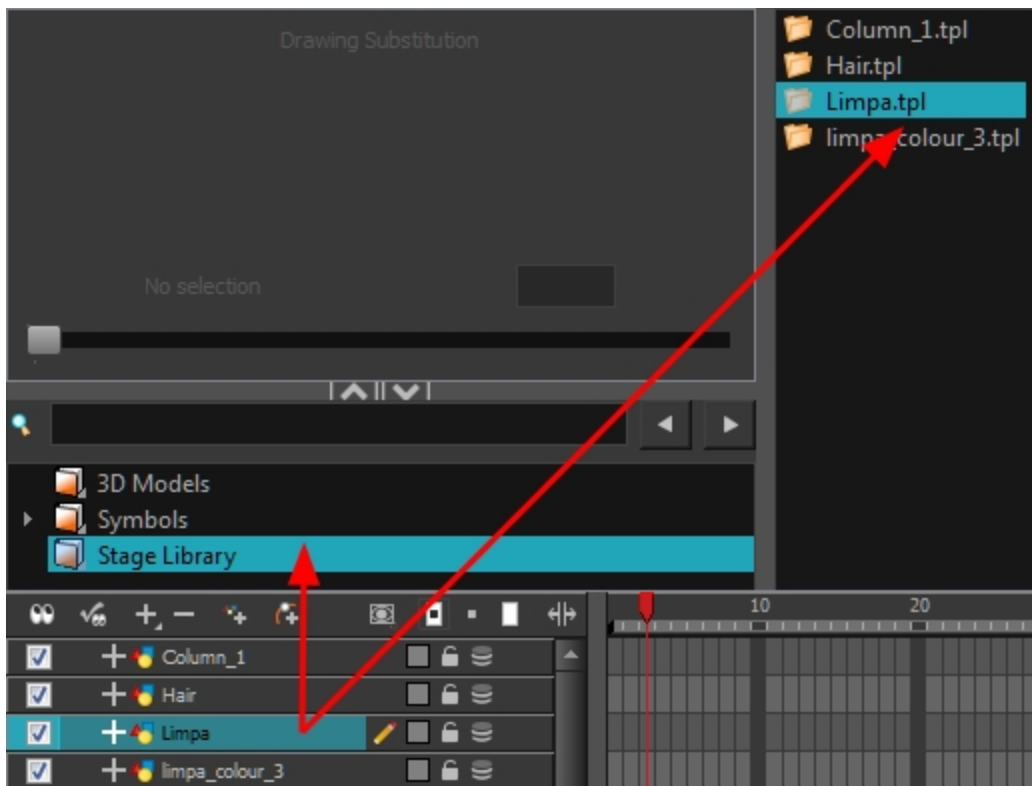
3. In the Rename dialog box, rename the new template.
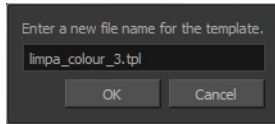
4. Click **OK**.

Importing Symbols and Templates

There are several ways you can import symbols and templates in your scene.

Sometimes a character rig is not a straightforward matter. Rigs, which are usually saved as templates, can contain symbols such as a leg that was made with a patch. However, a symbol does not work in the same way as an action template. In the Timeline view, you can add an action template into another template of the same structure. When working on a layer on the right side of the Timeline view and you place a symbol into a symbol of the same structure, instead of being added to the previous symbol, the new symbol becomes a copy.

For greater control over how the action template behaves when brought into the Timeline view, you can use the Paste Special feature–see *Using Paste Special* on page 290.

Since a template is like a scene, you can open the template's folder and select elements inside it such as drawings.

Instead of importing the entire contents of a template, you may only want to import a few drawings or a palette. In this case, use the Open As Folder command to import the items you want.

If you want to import a palette, simply drag the palette file into the Palette list section of the Colour view.

You can use the Expand Symbol command to extract a symbol's contents and place it on the root timeline. The symbol will not be removed from the Timeline view. Its contents will be copied and inserted into the root timeline. The symbol's layers will be parented to it in case you created motions and transformations on the drawing layer that contains the symbol. Breaking the hierarchy could result in the loss of any scaling and animation you may have created.

You can also expand a symbol within a group to avoid crowding the timeline with a series of layers. When you expand the symbols, the layers will be contained in a group node that you can expand to see the content.

How to import a template into the Timeline or Camera view

1. In the Library view, select the template you want to import.

2. Drag the selected template to the Camera view or to the left side of the Timeline view.
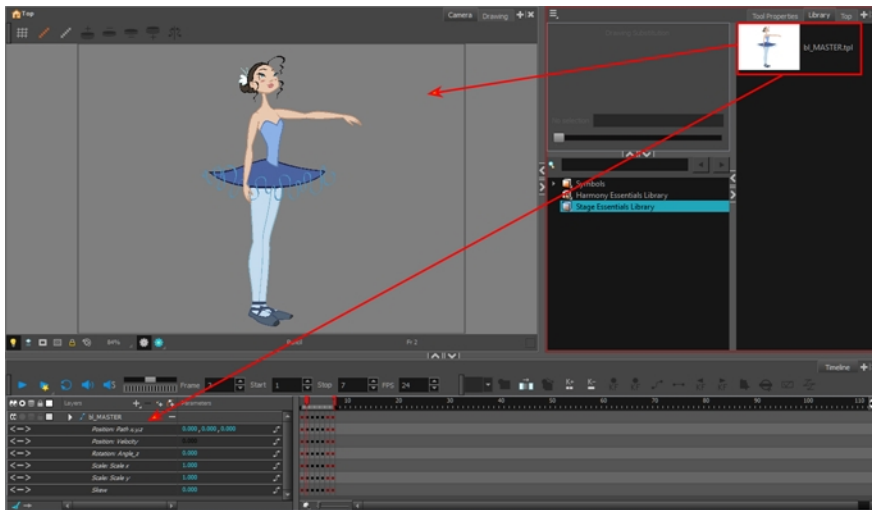
3. You can also drag a template to the right side of the Timeline view and into existing layers if the layer structure is the same as the existing one.
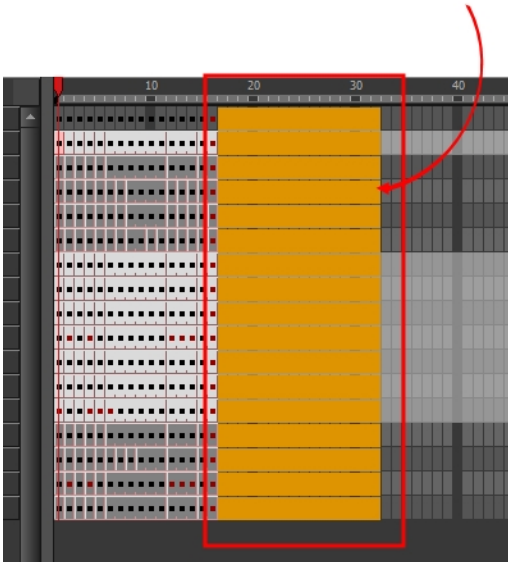
How to import a symbol in the Timeline view

1. In the Library view, select the symbol you want to import.

2. Drag the selected symbol to one of the following:

   ‣ The Timeline view's left side to import it into the centre of the camera frame.
   ‣ The Camera view to place it at the location where you release your cursor.

> **NOTE:** This may be useful if you saved a character's body parts as separate symbols. If you dropped them into the Timeline view, then they would all appear in the centre, haphazardly one on top of the other. It would be more efficient to arrange them into their correct places as you bring them into the scene.

How to import a template with symbols

1. From the right side of the Library view, select the action template that contains symbols.

2. Hold down Alt (Windows/Linux) or ⌘ (Mac OS X) as you drag it from the Library view to the right side of the Timeline view and drop it next to a template with the exact same rig.

   The Paste Special window opens.
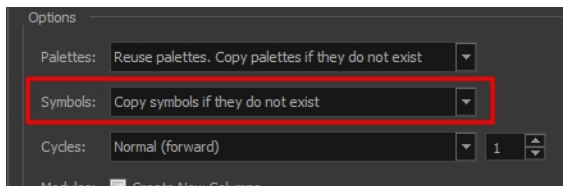
3. Select the **Advanced** tab.

4. Select one of the following options from the Symbols menu:
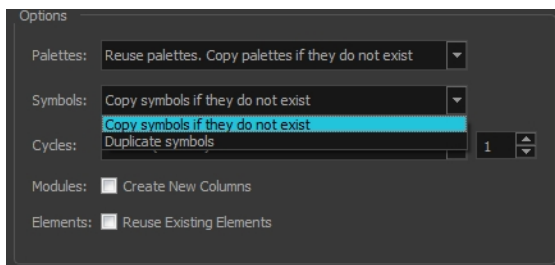
   ▸ **Copy symbols if they do not exist**: This is the default setting for this operation and will prevent symbols in an action template from being copied.

   ▸ **Duplicate symbols**: Makes copies of the symbols in your template.

How to open a template as a folder

1. In the Library view, select the folder that contains the template to open. If the library folder is locked, right-click on the folder and select **Right to Modify**.

2. Right-click on the selection and select **Open As Folder**.

3. In the library list section, click on the template's folder to display its content.
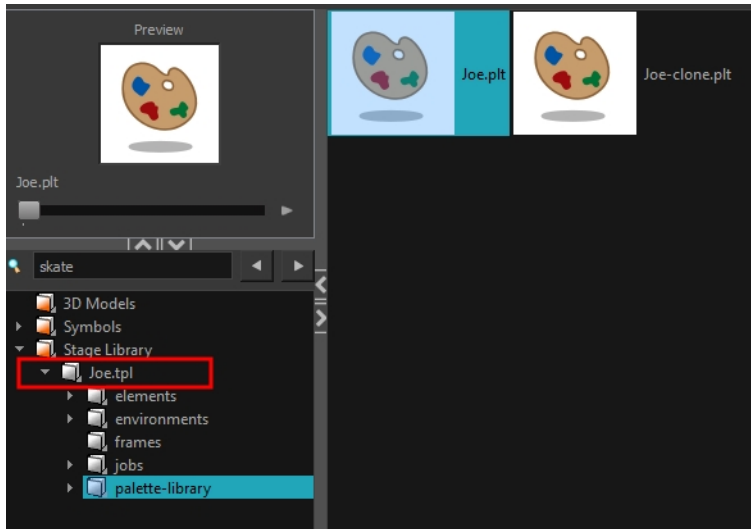
4. Drag the content to the Timeline or Colour view.

How to expand a symbol

1. In the Timeline view, select the symbol to expand.
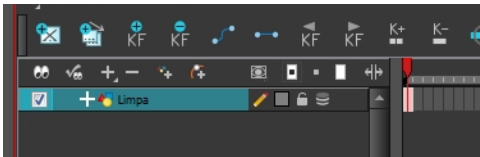
2. From the top menu, select **Edit > Expand Symbol** or press Shift + F8.
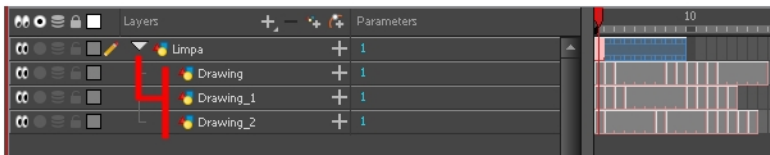
How to expand a symbol in a group

1. In the Timeline or Node view, select the symbol cell or symbol node you want to expand.
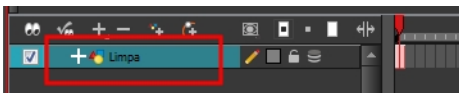
2. From the top menu, select **Edit > Expand Selected Symbol in a Group**.

3. In the Timeline view, click the plus sign (+) to see the group content. In the Node view, click the **Expand Arrow** to enter the group.
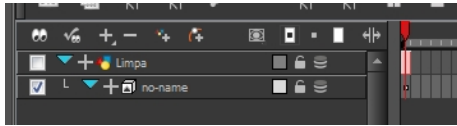
Importing Files Through the Library

Harmony lets you import sound files and images directly through the library. Simply open the folder containing your files in the Library view and drag them directly from there.

How to open a file through the Library

1. In the Library View menu, select **Folders > Open Library**.

2. Browse for the folder containing the files you want to import.

3. Click **Open**.

4. From the Library's template list, drag the file you want to import in the Timeline or Camera view.
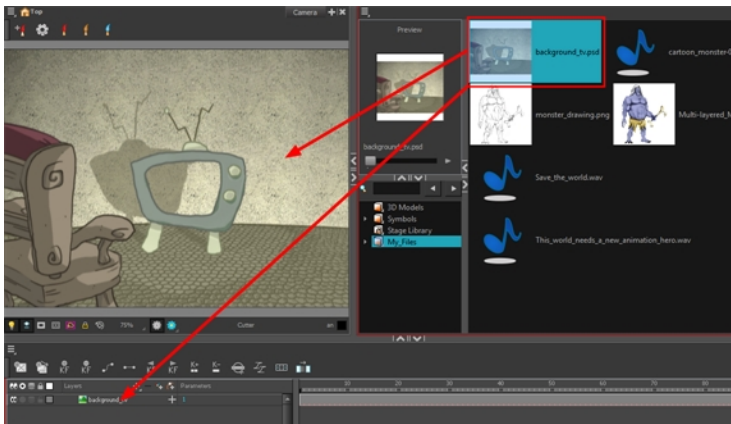
Using Paste Special

When you import a template in the Timeline view, all layers are created as well as drawings and keyframes. You can choose to import only the keyframes without the drawings or import only the drawings that are not already in your layers. You can adjust the behaviour using the Paste Special dialog box.When you import a symbol in your scene, its full length is exposed by default. If you import a symbol in the Timeline view's left side, all the frames will be exposed. However, if you import it into an existing layer, you can use the Paste Special dialog box to adjust the import behaviour to fit your requirements.Once you set the parameters, Harmony will reuse them each time you import a symbol in the Timeline view's right side until you set new parameters.

How to open the Paste Special dialog box

1. In the Library view, select the symbol or template to import.

2. Press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X) and drag the selection to the Timeline view.

NOTE: Drop the selection in the Timeline view before releasing the keyboard shortcut key.

The Paste Special dialog box opens.

3. Set the parameters and click **OK**.

Chapter 10: Cut-out Animation

Harmony provides some great tools for animating puppets. You can create simple animation using the Transform tool, as well as create advanced animation using both forward and inverse kinematics. Harmony has advanced onion skinning and image swapping features to help you animate efficiently and quickly. For animation freedom, you have the ability to mix several different techniques of animation, such as simple rigging, hierarchy and symbol animation.

Getting the Character

The first step in animating your character is to import a master template from the library.

In Harmony, you can create your character template from the Node view.

NOTE: If the template you are importing was created in the Node view, make sure to import it first and drop it into the Node view or the left side of the Timeline view. Otherwise, some network connections may be broken.

How to import a character from the library

1. Create a new Harmony project.

2. In the Library view, select a character master template to animate.
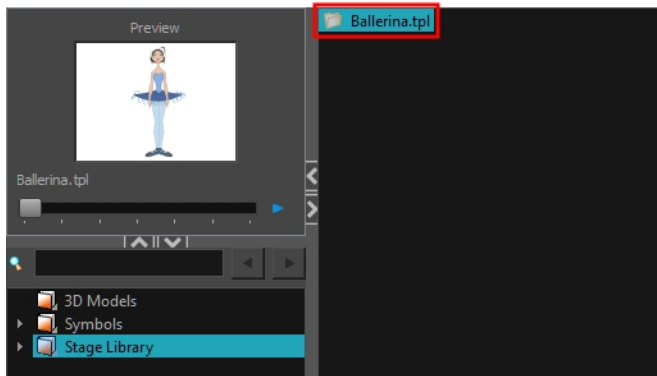
3. Drag the selected template to the Camera or Timeline view's left side. You can also import a template directly in the Node view.
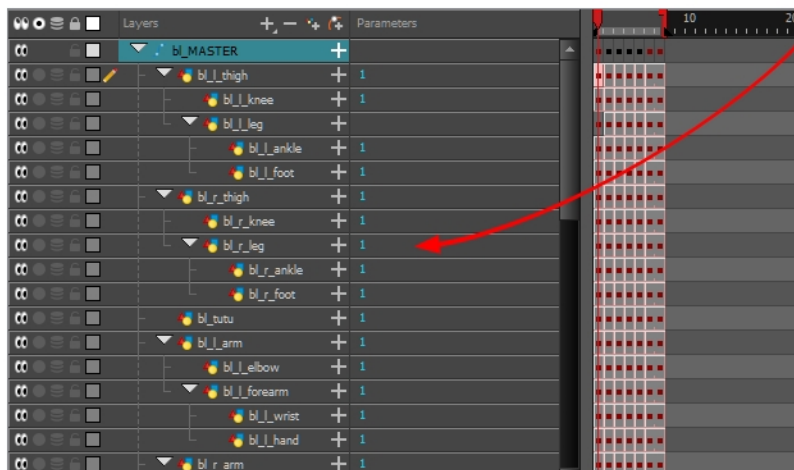
4. In the Timeline view, drag the red scene length bracket to extend or shorten the scene length.
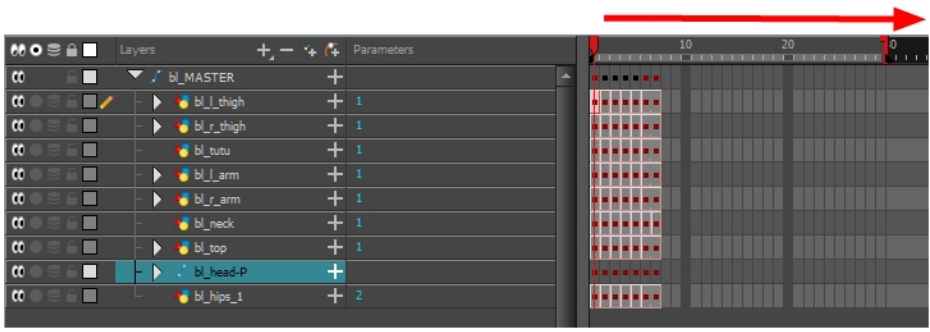
How to import a network template

1. In the Library view, select the template or symbol you want to import.

2. Drag the selected template to the Network or Camera view or the left side of the Timeline view.
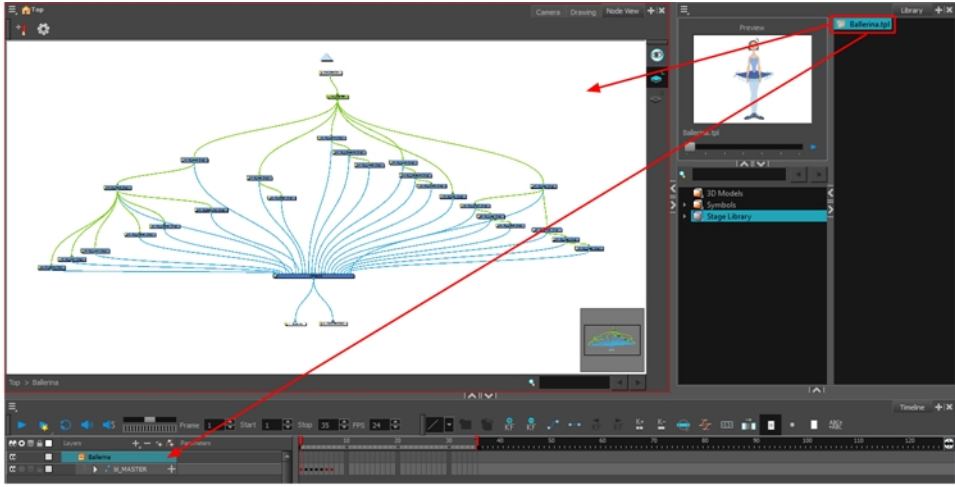
3. If necessary, in the Node view, connect your template to the Composite node. To do this, click its out-port and drag the connection to the Composite node until an in-port appears.
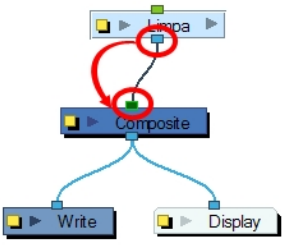
NOTE: If the template you are importing was created in the Node view, make sure to drop it in the Node view or on the left side of the Timeline view. Otherwise, some network connections may be broken. If you are importing a

template containing the exact same connections as a template you imported previously, you can drop it on the Timeline view's right side over the existing layer. This will combine both templates and keep the existing layers.

How to import a network template (master template)

1. Create a new Harmony project.

2. In the Library view, select the character's master template you want to animate.
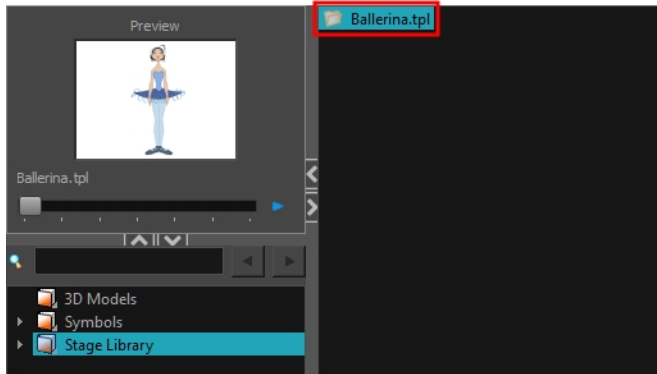
3. Drag the selected template in the Node view.
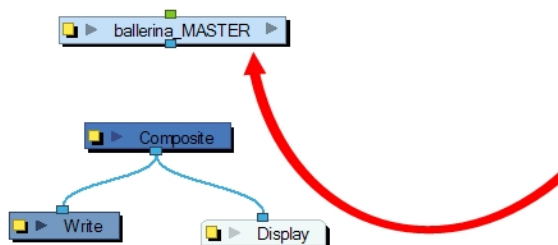
4. In the Node view, connect the template's group node to the Composite node by clicking its out-port and dragging the connection to the Composite node until an in-port appears.
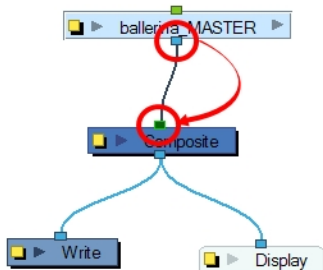
5. In the Timeline view, extend or shorten the scene length by dragging the scene length bracket.
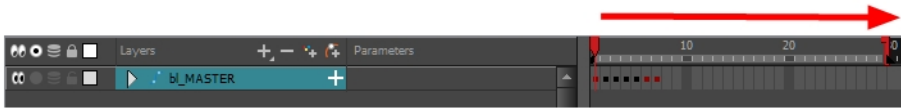
Extending the Exposure

Once you have chosen a pose, all that's left to do is extend the exposure of the character to the end of the scene.

How to extend the exposure of the character

1. In the Timeline view, collapse the character.
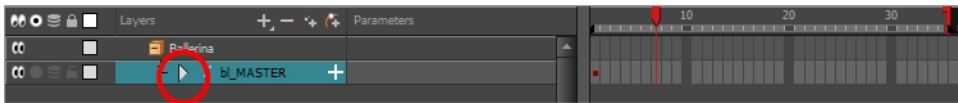
2. In the Timeline view's right side, select the last cell of the character.
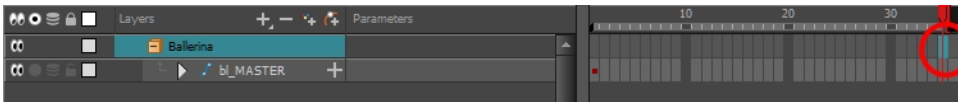
3. Right-click and select **Extend Exposure** or press F5. You can also copy the first pose and paste it in the last cell.

   The drawing exposure is extended to the end. You will not see any changes in the Timeline view when the master peg is collapsed.
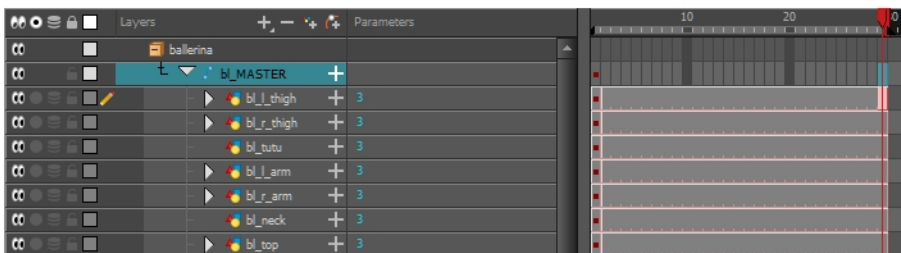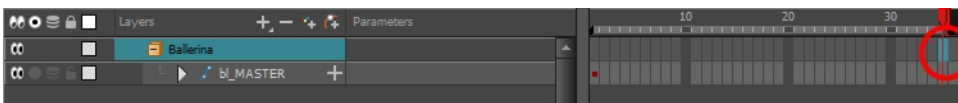
Keyframes and Drawing Blocks

When you extend the exposure of a drawing, it is represented by a grey block in the Timeline view. When you expose a second drawing, a second grey block is displayed.

You can consider these blocks as drawing blocks.
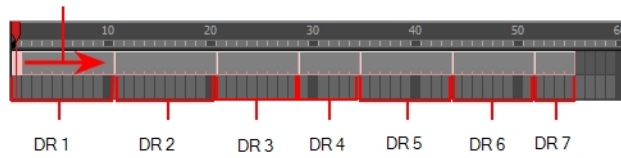
To animate the position of a block over time, you don't need to create a second block, just add a position keyframe. The position keyframes are coordinates indicating the position of your drawing on a particular frame. These appear as black squares in the Timeline view.

In the example below, notice that the keyframes are positioned on frames independently from the beginning and end of each drawing block.
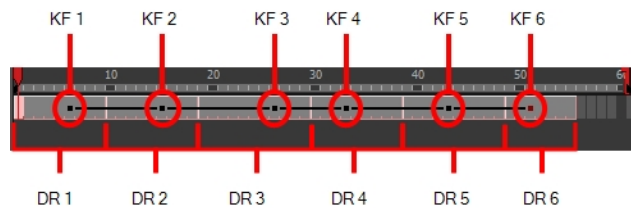
You can keyframe three different positions for a drawing in the same drawing block and create a motion path between them.

Creating Keyframes and Drawings in the Timeline View

You can see how the Timeline view behaves differently depending on whether you create a new drawing, a new keyframe, or both at the same time.

How to create a drawing in the Timeline view

1. Do one of the following:

    ‣ From the top menu, select **Drawing > Create Empty Drawing.**
    ‣ In the Timeline toolbar, click the Create Empty Drawing 🗙 button.
    ‣ Press Alt + Shift + R.

    A new drawing block is inserted.
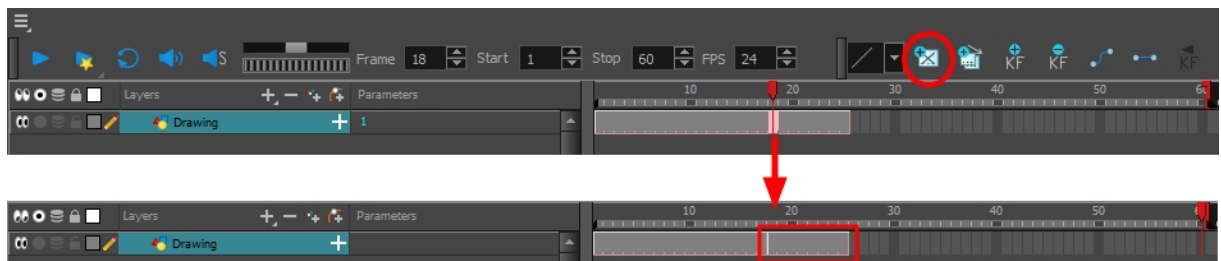
How to create a keyframe in the Timeline view

1. Do one of the following:

   ‣ From the top menu, select **Insert > Keyframe**

   ‣ In the Timeline toolbar, click the Add Keyframe button.

   ‣ Press F6.

   A keyframe is created in the layer.
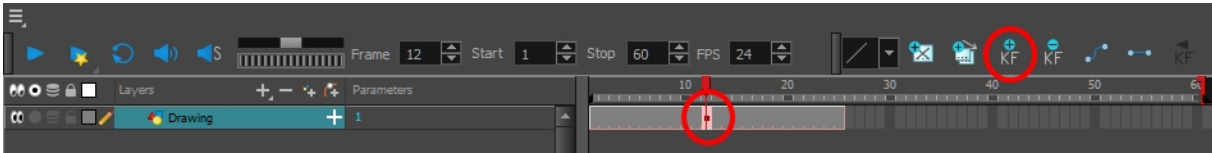
How to create a drawing and a keyframe simultaneously in the Timeline view

1. From the top menu, select **Insert > Keyframe and Duplicate Drawing**.

   A drawing block is created which contains copies of the selected drawing and a keyframe.
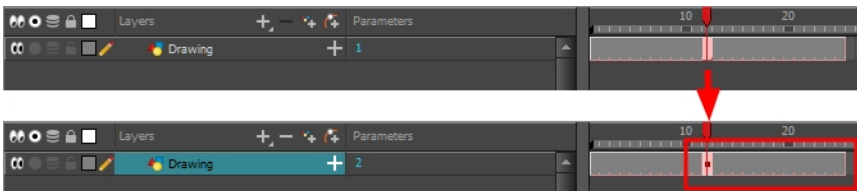
Creating a Simple Cut-out Animation

Here is how you can create a simple cut-out animation. Follow these steps so you can try the animation tools you'll be learning in the next topics.

How to create a simple cut-out animation

1. In the Tools toolbar, select the Transform ⬚ tool or press Shift + T.

2. In the Tools toolbar, enable the Animate 🐾 mode so everything you move will be keyframed automatically.

3. From the top menu, select **Animation > Stop-Motion Keyframe** so the interpolation is not created automatically between keyframes.

4. In the Timeline view, collapse your character.
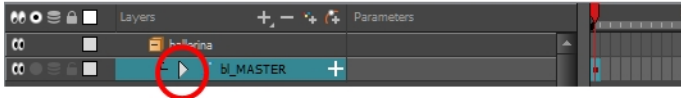
5. In the Timeline view, go to the frame where you want to set the first pose.
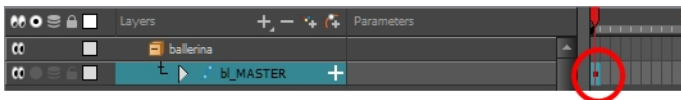
6. To ensure that nothing moves on the new pose, in the Timeline view, select the frame corresponding to the pose, right-click and select **Add Keyframe** or press F6.

7. In the Camera view, select the parts to animate.

8. Use the Transform ⬚ tool to rotate, skew, scale or translate the selection to its new position. To rotate the piece, place your cursor slightly outside of a corner until you see the rotation cursor.
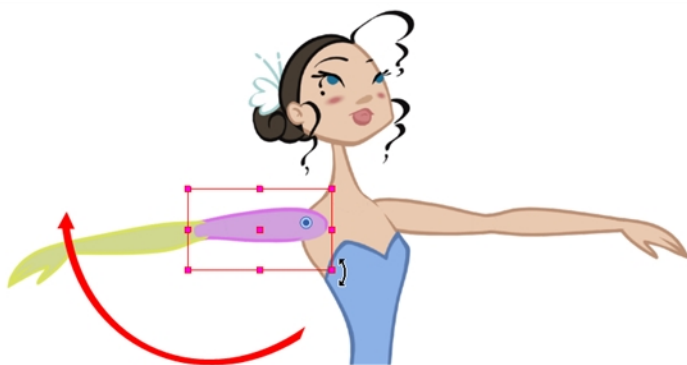
A new keyframe appears in the Timeline view if you did not create one previously. Always create your keyframe first.

9. In the Tools toolbar, enable the Onion Skin 🝏 feature.

10. In the Timeline view, go to the frame where you want to set the second keyframe. You will need to expend the exposure to see your drawings further down the Timeline view.
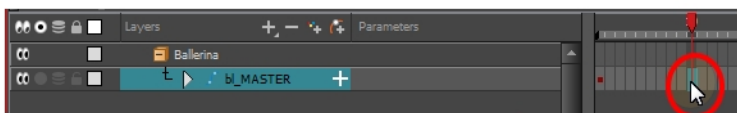
11. To ensure that nothing moves on the new pose, in the Timeline view, select the frame corresponding to the pose, right-click and select **Add Keyframe** or press F6.

12. In the Camera view, animate your character.
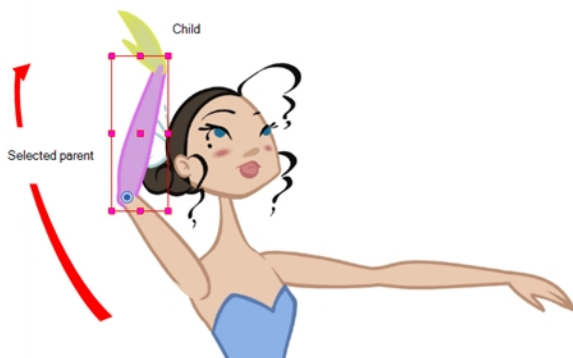
13. Repeat this process for all the poses.

Selecting Layers to Animate or Position
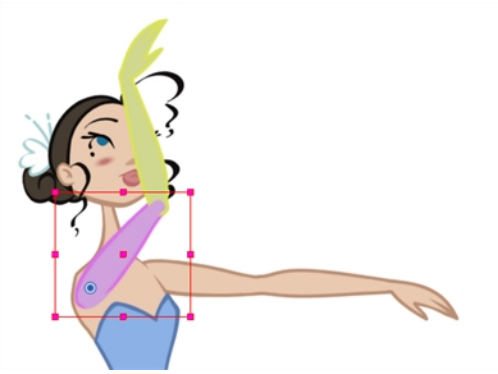
When you're animating characters, it's important to understand how the Animate mode allows you to create keyframes on the current frame or reposition the entire layer.

Animate Mode

The Animate ⚲ button, in the Tools toolbar, turns keyframing on or off. With this mode enabled, as soon as you move an element in the Camera view, a keyframe is positioned on the current frame in the Timeline view to indicate the new position.

When you turn off the Animate mode, and you select and move an element, the entire animation in the layer will be offset.
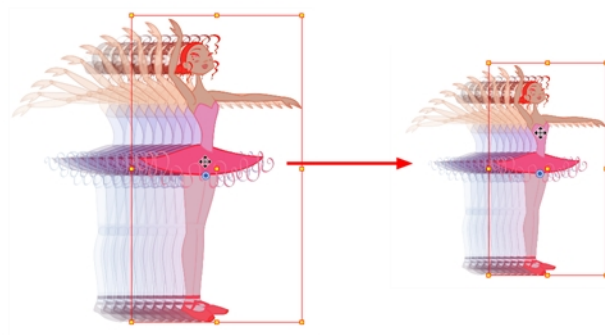
This means that when you are animating a character, you must enable the Animate mode. If you are scaling down your puppet to fit the scene composition and want to resize the entire animation, you must disable the Animate mode.

How to turn the Animate mode on or off

1. In the Tools toolbar, click the Animate ⚲ button or select **Animation > Animate**.

Selecting Drawing Layers Using the Transform Tool

To manipulate the drawing layers in order to animate them, you must use the Transform ⠿ tool. The Select tool is used to modify the drawing strokes and not the actual drawing layer.

When selecting the drawing layers with the Transform tool, make sure the Peg Selection Mode option is turned off in the Transform Tool Properties view. Otherwise, if it's left on, it will limit the selection in the Camera view to pegs only.

How to select using the Transform tool

1. Do one of the following:

   ‣ In the Tools toolbar, click the Transform ⠿ tool.

   ‣ From the top menu, select **Animation > Tools > Transform**.

   ‣ Press Shift + T.

2. In the Transform Tool Properties view, make sure the Peg Selection ⟋ mode is deselected.

3. In the Camera view, select the element to animate.
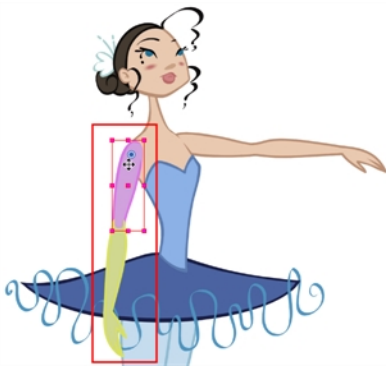
Selecting an Element in the Camera View Using the Transform Tool

When you select an element in the Camera view using the Transform tool, make sure the Peg Selection ⟋ mode is disabled in the Transform Tool Properties view. The element selected is the actual drawing layer corresponding to the selected element. If you have a layer parented to a peg, you must use the keyboard shortcuts to go up the hierarchy chain, select it in the Timeline view, or enable the Peg Selection ⟋ mode option in the Transform Tool Properties view. This will limit the selection in the Camera view to pegs only.
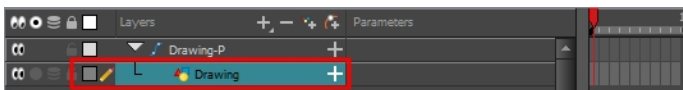
If the layer has child layers, they will also be highlighted. Depending on whether you're using pegs or only drawing layers in your rig, the selection can be magenta, yellow or both.

Selecting a Layer in the Timeline View

When you select a layer in the Timeline view, the corresponding element is highlighted in the Camera view. If the selected layer has child layers, they are also highlighted.
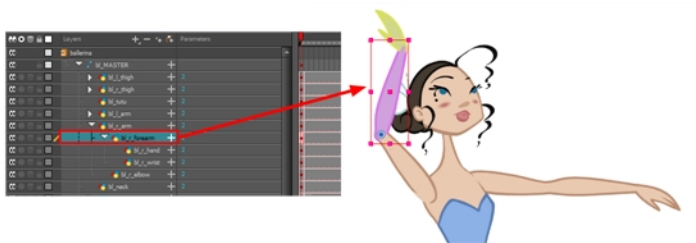
Selecting in the Network View

As with the Timeline view, when you select a node in the Node view, the corresponding element will be highlighted in the Camera view. If the selected node has child layers, they will also be highlighted.
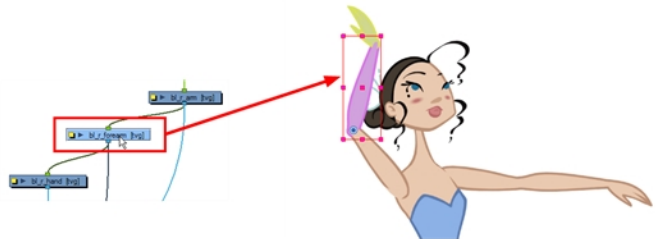
Navigating the Hierarchy

If there is a layer hierarchy in the puppet you built, use the keyboard shortcuts to travel up and down the parent-child chain. You can also navigate between the children of the same parent.

How to select the parent or child layer

1. In the Tools toolbar, select the Transform ⬚ tool.

2. In the Transform Tool Properties view, make sure the Peg Selection ⬚ mode is deselected.

3. In the Camera or Timeline view, select a layer attached to a hierarchy.

4. From the top menu, select **Animation > Select Parent** or press B to select the parent layer. Select **Animation > Select Child** or press Shift + B to select the child layer.
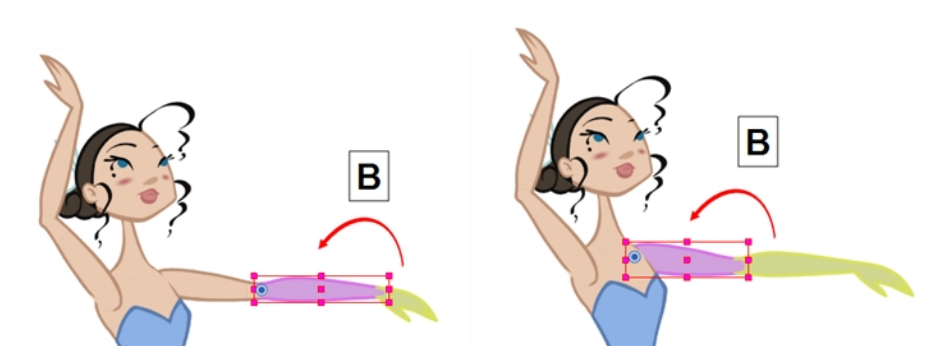
How to select the children layers

1. In the Tools toolbar, select the Transform ⬚ tool.

2. In the Camera or Timeline view, select a layer attached to a parent layer with several children or not parented at all.

3. From the top menu, select:

   ‣ **Animation > Select Previous Sibling** or press / to select the previous child layer.

   ‣ **Animation Select Next Sibling** or press ? to select the next child layer.

   ‣ **Animation > Select Children** to select all child layers at the same time.
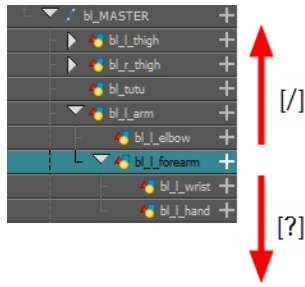
Animating Using the Transform Tool

The Transform tool is the main tool to use when working with a cut-out character. The Transform tool has many useful functions:
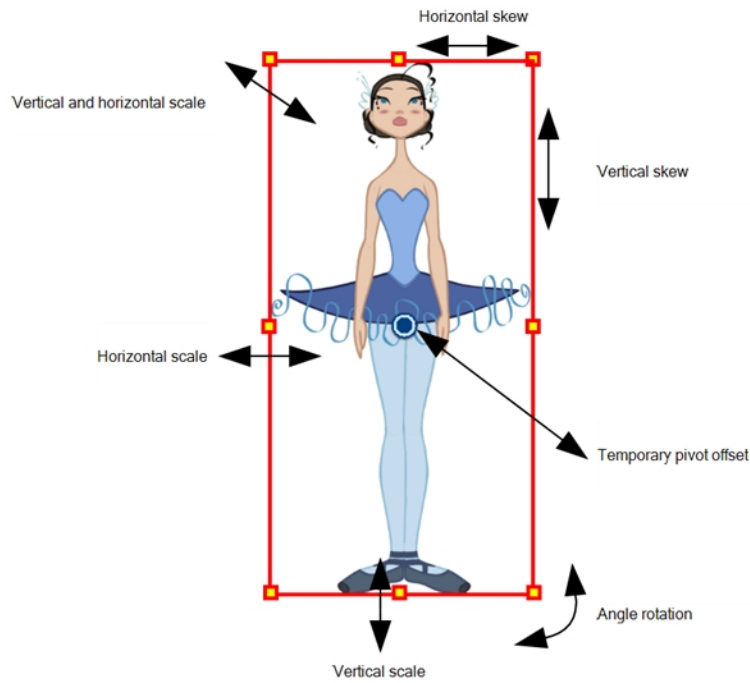
Using the individual Rotate, Translate, Scale and Skew tools is not recommended, as they move each piece from their own pivot point. They are compositing tools. The Transform tool creates a global selection, so when many parts are selected, you can move them as one unit. The Transform tool is highly recommended for cut-out animation.

When animating with the Transform tool, make sure to select the right selection mode. In this example, make sure that the Peg Selection ⬚ Mode is disabled in the Tool Properties view or it will limit the selection in the Camera view to pegs only.

Rotate tool
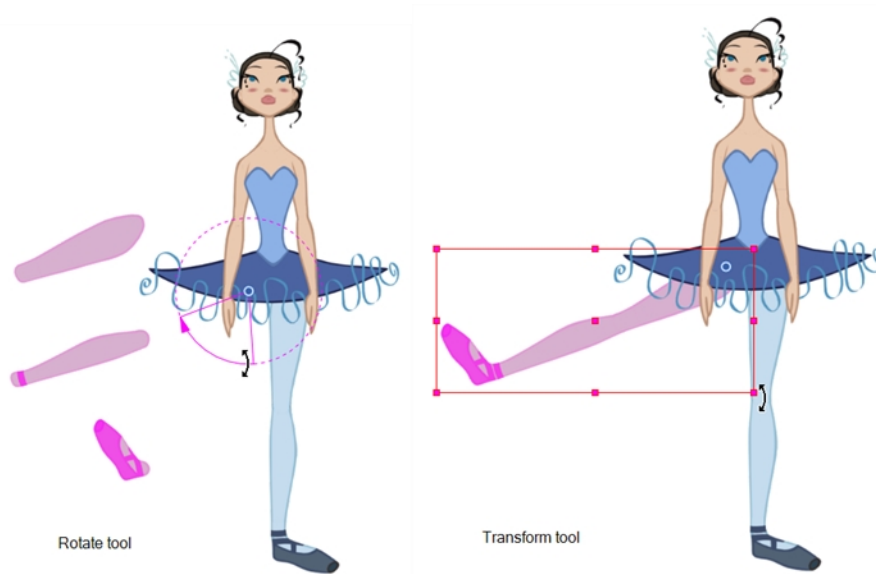
Transform tool

If there are hierarchy connections in the cut-out character, the Transform tool will also be used as the Forward Kinematics equivalent.

The Transform tool can be used on any kind of rigging.

When many parts are selected with the Transform tool, the first selected part's pivot will be used as the global selection's pivot. This pivot can be moved temporarily for the animation. When you offset the pivot, the permanent pivot is displayed as a ghost.

NOTE: The interpolation of the animation poses is always calculated from each individual part's permanent pivot. If there's a parent peg on a limb, make sure to select it instead of making a selection of each part to avoid setting individual keyframes.

How to use the Transform tool

1. In the Tools toolbar, click the Transform ⬚ tool or press Shift + T.

2. In the Transform Tool Properties view, make sure the Peg Selection 🔧 mode is deselected.

3. In the Timeline view, go to the frame on which you want to set the first position.

4. In the Timeline toolbar, click the Add Keyframe ⚬ button or press F6. It is recommended to add a keyframe before moving the character. Moving a character's part without setting a keyframe will create keyframes only on certain parameters of the animation. You could run into issues later on when setting poses between existing ones. Creating a keyframe on all layers and parameters will ensure your pose is set and will not be modified by other poses later on.

5. In the Camera view, select the element to animate and move it.
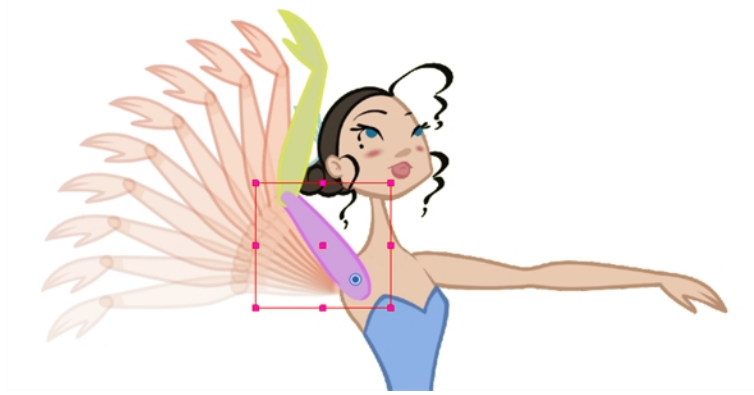
6. In the Timeline view, go to the frame where you want to set the next position.
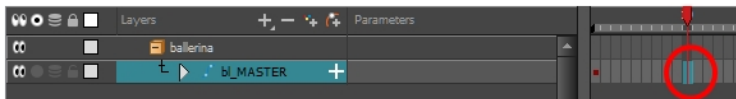
7. In the Timeline toolbar, click the Add Keyframe button or press F6.

8. In the Camera view, animate the character.

Animating in Stop-motion

To start animating your character, start by doing your key poses. In fact, most of your time will be spent doing key poses. It is better to work with stop-motion keyframes so Harmony does not automatically create the interpolation between your keyframes.

When using stop-motion keyframes, also known as *step keyframes*, the segment between two keyframes is constant. There is no animation generated by the computer between the poses. The drawing remains in position until the next keyframe, then moves to its new position.
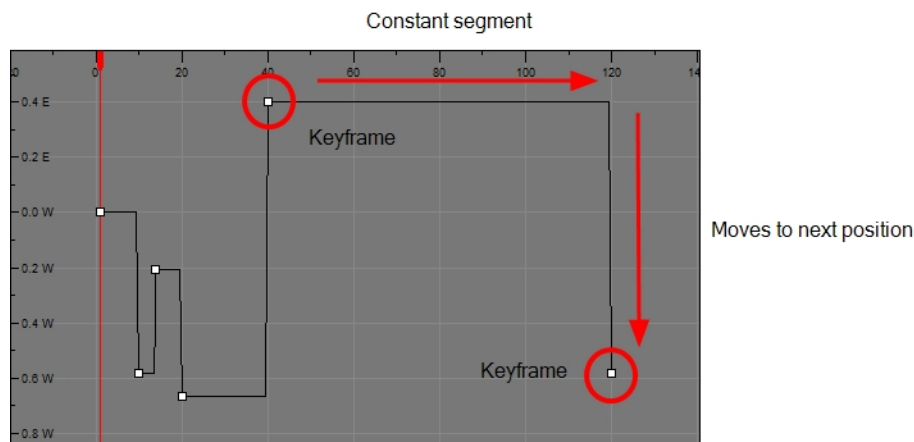
Creating a Stop-motion Keyframe

You can create a stop-motion keyframe in several different ways. You can have Harmony create it automatically, transform a motion keyframe into a stop-motion keyframe, or even switch your preferences to get Harmony to always create stop-motion keyframes by default.

How to automatically create stop-motion keyframes

1. In the top menu, make sure the **Animation > Stop-motion Keyframe** option is selected.

2. In the Timeline view, select the cell on which you want to add a keyframe.
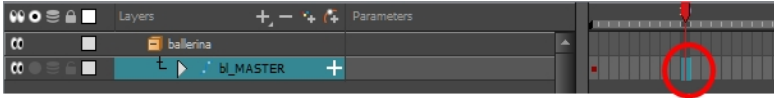
3. Do one of the following:

   ‣ Right-click and select **Insert Keyframe**.
   ‣ In the Timeline toolbar, click the Add Keyframe button.
   ‣ Press F6.

   In the Camera view, if the Animate mode is enabled, as soon as you move the selected element, a keyframe is automatically created on the current frame.
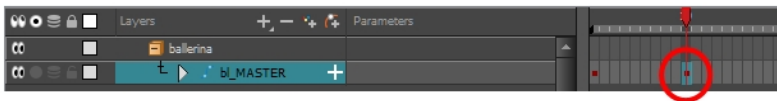
How to convert a motion keyframe into a stop-motion keyframe

1. In the Timeline view, select the motion keyframes to convert into stop-motion keyframes or press S.
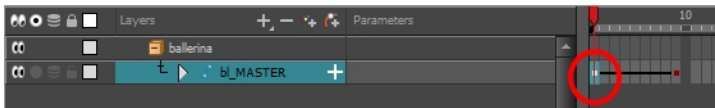
2. Do one of the following:

   ‣ Right-click and select **Set Stop-Motion Keyframes**.
   ‣ In the Timeline toolbar, click the Stop-Motion Keyframe button.
   ‣ Press Ctrl + L (Windows/Linux) or ⌘ + L (Mac OS X).
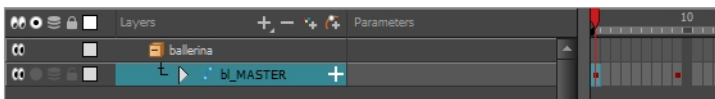
Animating Using Computer-generated Interpolation

After you have created the key poses, you can animate the in-between poses yourself or let Harmony do it using motion keyframes. When you use motion keyframes, the drawings gradually move to the next position instead of staying on the spot until the next keyframe.
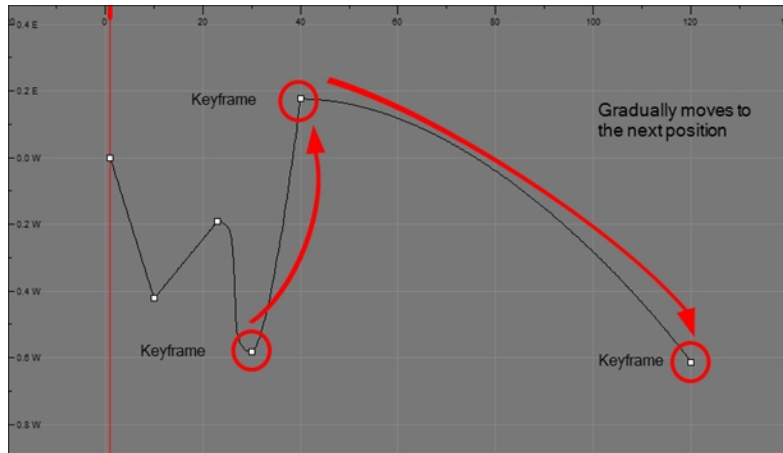
Creating a Motion Keyframe

You can create a motion keyframe in several different ways. You can have Harmony create it automatically, transform a stop-motion keyframe into a motion keyframe and even switch your preferences to have Harmony always create motion keyframes by default.

How to automatically create motion keyframes

1. In the top menu, make sure the **Animation > Stop-Motion Keyframe** option is disabled.

2. In the Timeline view, select the cell on which you want to add a keyframe.
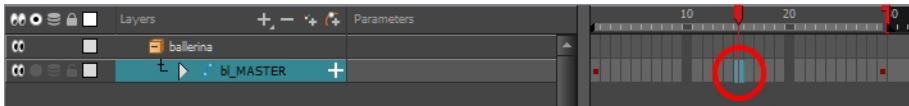
3. Do one of the following:

    ‣ Right-click on the selection and select **Insert Keyframe**.

    ‣ Click the Add Keyframe button in the Timeline toolbar.

    ‣ Press F6.

    In the Camera view, if the Animate mode is enabled, as soon as you move the selected element, a keyframe will be automatically created on the current frame.
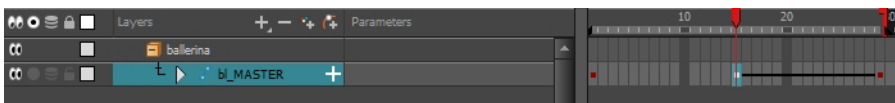
How to convert a stop-motion keyframe into a motion keyframe

1. In the Timeline view, select the stop-motion keyframes to convert into motion keyframes.
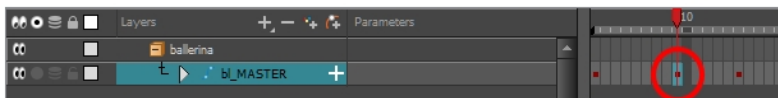
2. Do one of the following:

    ‣   Right-click on the selection and select **Set Motion Keyframe**.

    ‣   Click the Motion Keyframe ⌇ button in the Timeline View toolbar.

    ‣   Press Ctrl + K (Windows/Linux) or ⌘ + K (Mac OS X).
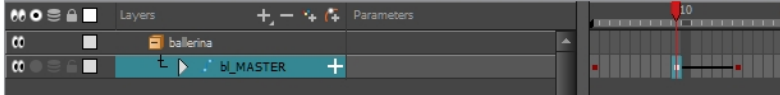
Adjusting the Ease

To add ease in and ease out on motion paths, you can display the function curve and modify the Bezier or Ease curve. To apply an ease to multiple functions and keyframes, use the Set Ease for Multiple Parameters feature and set the amount desired.

The velocity, or ease, is used on motion keyframes. The velocity must be adjusted directly on the function curve in the Function view or Function editor. When a keyframe is selected, easing values appear in the right handle and left handle fields, as well as the Bezier handle or Ease wheel controls on each selected keyframe. You can pull on them to adjust the ease in and ease out, or type values in the fields.

If there are several functions whose velocity you want to adjust at the same time, such as the hand, forearm and arm of a cut-out character, you can apply the same velocity parameters to all the selected keyframes in one frame.

How to adjust the velocity in the Function view

1. In the Timeline view, click the Expand Function ➕ button to display all the layer's functions.
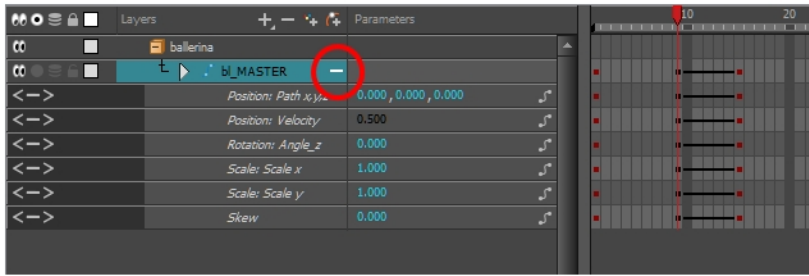
2. Double-click on a function.
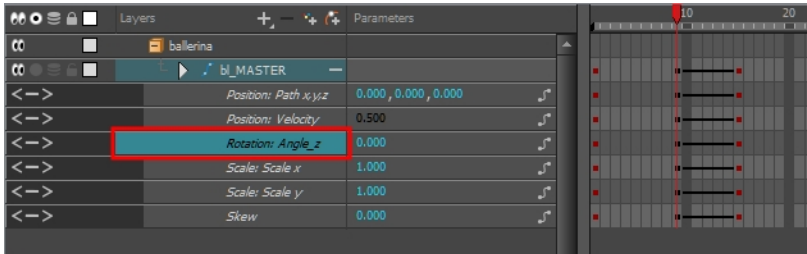
The Function Editor opens.
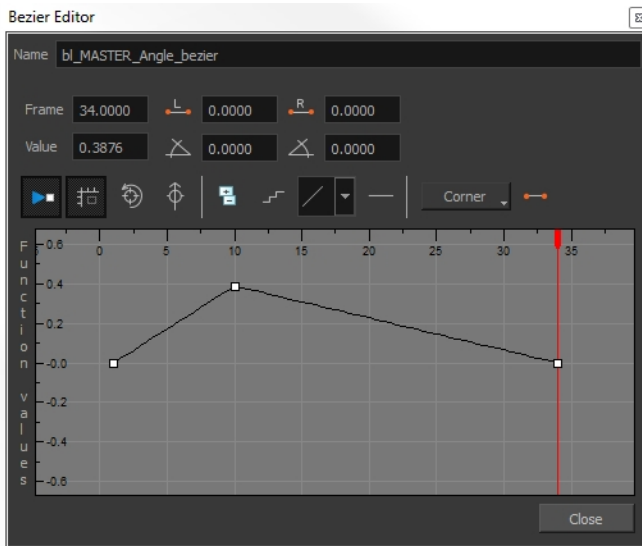
NOTE: The Function editor will not display if the function does not already exist. Add a keyframe to create the function.

3. Select a keyframe and pull on its Bezier handles or Ease wheel to adjust the velocity. Refer to the Compositing and Effects Guide to learn how to create Ease curves instead of Bezier curves.
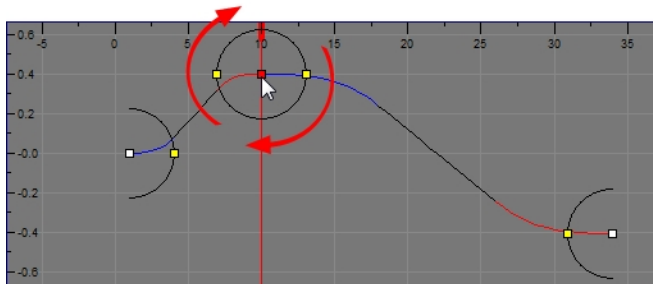
How to set ease on multiple parameters

1. In the Timeline view, select a keyframe from one or more layers.
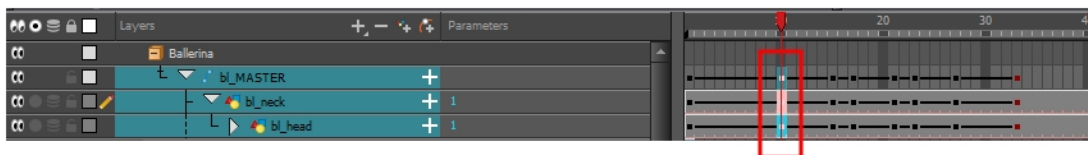
NOTE: Only the first keyframe selected on each layer is considered when using the Set Ease for Multiple Parameter function. If many keyframes are selected on the same layer, the ease values will be applied only to the first one and the rest will be ignored.

2. Do one of the following:

   ▸ In the Timeline view, right-click and select **Set Ease For Multiple Parameters**.

   ▸ In the Timeline toolbar, you can click the Set Ease For Multiple Parameters button. If the button is not in the toolbar, you can add it through the Toolbar Manager. Right-click on the toolbar and select **Customize**.

   The Set Ease For Multiple Parameters dialog box opens.
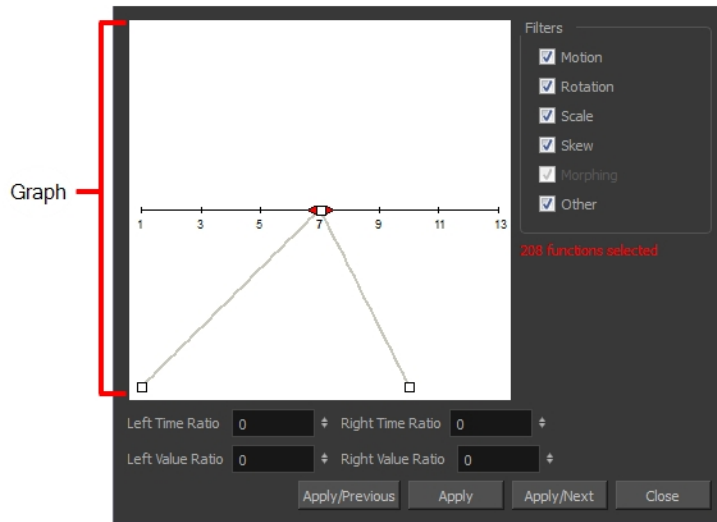
3. In the graph, pull on the Bezier handle to adjust the velocity for all the selected functions.
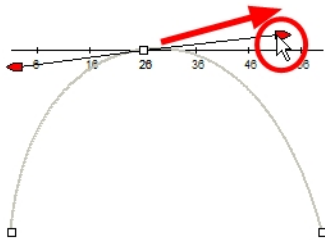
4. To apply these easing parameters to a certain type of function only, such as Rotation or Scale, in the Filters section, deselect the function types you do not want to affect.

   ‣ **Motion**: Applies the easing parameters to the selected Position X, Position Y, Position Z and 3D Path functions

   ‣ **Rotation**: Applies the easing parameters to the selected Angle functions.

   ‣ **Scale**: Applies the easing parameters to the selected Scale functions.

   ‣ **Skew**: Applies the easing parameters to the selected Skew functions.

   ‣ **Morphing**: Applies the easing parameters to the selected Morphing Velocity functions. Note that it is applied to the Morphing Velocity function in the Layer Properties window, not to the basic Morphing ease in the Tool Properties view.

   ‣ **Other**: Applies the easing parameters to all the other selected functions, such as all functions created to animate effect parameters.

5. You can also adjust the easing by typing values in the Time Ratio and Value Ratio fields. The values are calculated in percentage.

   ‣ In the Left Time Ratio and Right Time Ratio fields, type the percentage value corresponding to the length of time you want the easing to last. The value must be between 0% and 100%.

   ‣ In the Left Value Ratio and Right Value Ratio fields, type the percentage value of how strong you want the easing out. The value must be between 0% and 100%.

   ‣ If your Time Ratio and Value Ratio values are equal, you will have a linear motion.

6.   Click one of the following buttons:

▸   **Apply**: Applies the easing parameters to the selected keyframes.

▸   **Apply/Previous**: Applies the easing parameters to the selected keyframes and then selects the previous keyframe in the timeline.

▸   **Apply/Next**: Applies the easing parameters to the selected keyframes and then selects the next keyframe in the timeline.

▸   **Close**: Closes the dialog box. If you did not apply the modifications, they will be cancelled.

Marking the Timeline

As you animate, the Timeline view will contain many layers and keyframes. You might want to identify them using coloured layers and scene markers.

Scene markers are visual indicators displayed at the top of the Timeline view in the frame counter area. You can use it to denote anything relevant to your work. You can indicate the frames you want to clean up, a change in action, an impact, or where you intend to apply an effect. You can also add a note to a scene marker, which is displayed when you hover over the scene marker.

There are two ways to add a scene marker. You can mark the current frame or make a frame range selection and mark the whole section.

How to modify a layer's colour

1.   Click the Change Track Colour ▢ button of a layer.
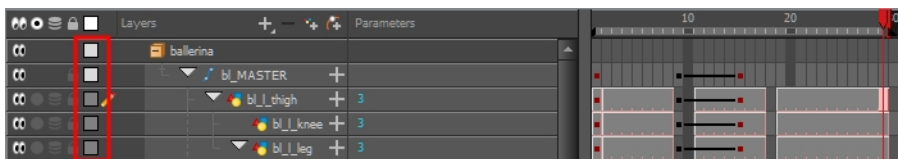
Change Track Colour

The Select Colour dialog box opens.
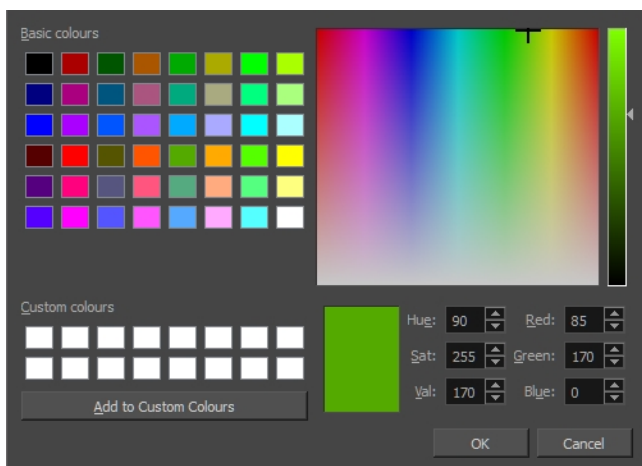
2.   Select a colour for the layer. You can modify the colour for any type of layer, such as group, peg, drawing and effects.

Change Track Colour

Flipping Through Poses

When animating, it is useful to flip through poses to see the flow of your animation without going through each frame in the Timeline view. Harmony lets you flip between the selected element's keyframes.

How to flip through poses

1. In the Camera or Timeline view, select a layer that contains the poses you want to view.
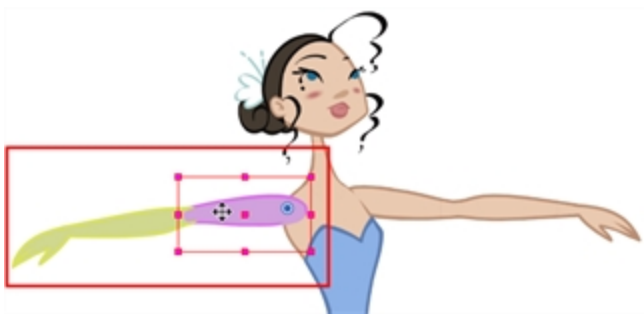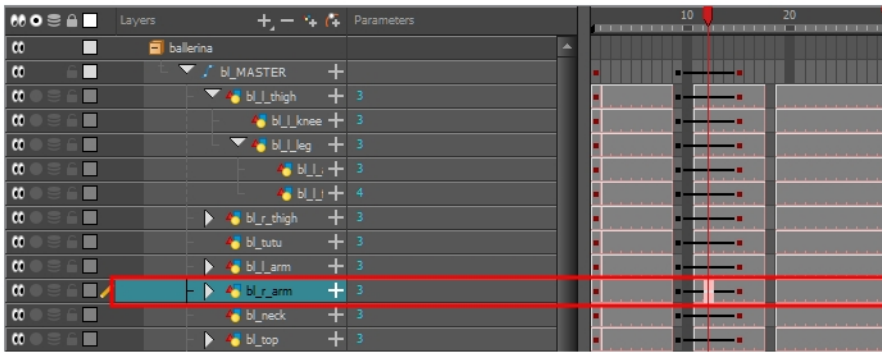
2. Do one of the following:

   ▸ From the top menu, select **Animation > Go to Previous Keyframe** or **Go to Next Keyframe**

   ▸ Press semicolon (;) and single quote (').

Using the Onion Skin in Cut-out Animation
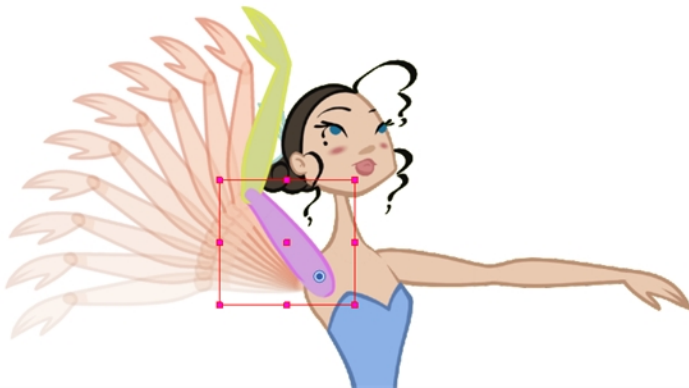
When animating cut-out characters, it is useful to see the previous and next frames on the animation. However, it can sometimes be confusing to see the onion skin for every part of the character. You will often only want to see the onion skin on a single part or a few parts, such as the arm that is currently being animated. Harmony offers that possibility.

While animating in the Camera view, there is a series of different onion skin options. You can enable these options in the menu or manually in the Timeline view using the layer's Show Onion Skin ⬢ button. Unless you change the onion skin options when you display the onion skin, only the selected layers will be displayed in the onion skin preview.

How to use the onion skin

1. In the Tools toolbar, click the Onion Skin ⬢ button or press Alt + O.

2. In the Tools toolbar, click the Transform ⬚ tool or press Shift + T.

3. In the Camera view, select one or more elements.

4. From the top menu, select **View > Onion Skin > Add to Onion Skin**, **Remove From Onion Skin**, **Remove Unselected from Onion Skin**, **Add All to Onion Skin** or **Remove All from Onion Skin**.

Add to Onion Skin
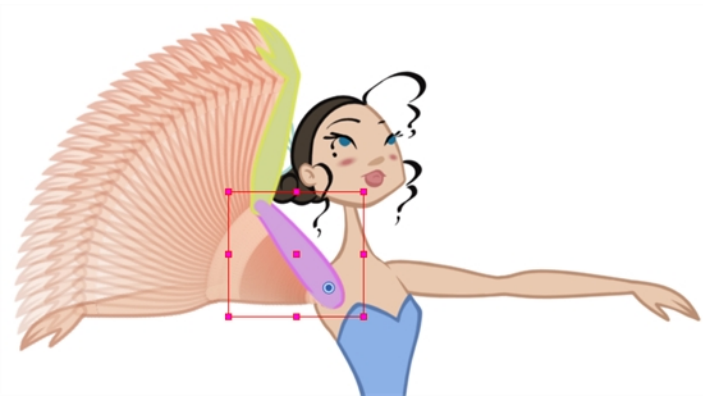
The Add to Onion Skin command is used to add a series of selected elements to the onion skin preview. The keyboard shortcut is Shift + S.

Remove from Onion Skin

The Remove From Onion Skin command is used to remove a series of selected elements from the onion skin preview.

Remove Unselected from Onion Skin

The Remove Unselected from Onion Skin command is used to remove all elements except the ones selected from the onion skin preview.

Add All to Onion Skin

The Add All to Onion Skin command is used to add all of the scene's elements to the onion skin preview. The keyboard shortcut is Alt + Shift + O.

Remove All from Onion Skin
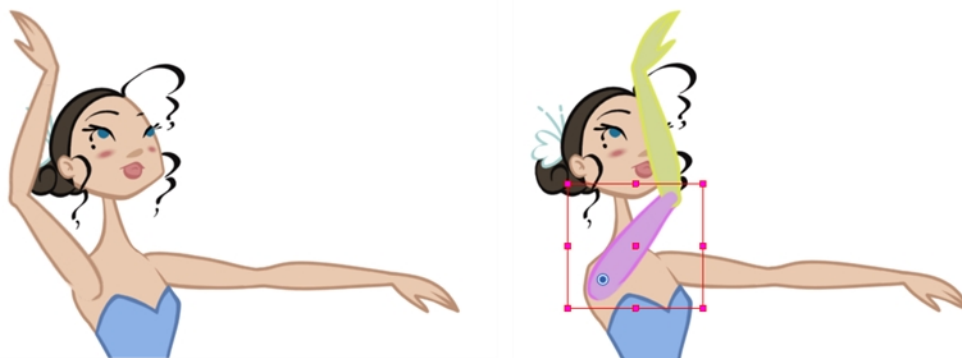
The Remove All Onion Skin command is used to remove all of the scene's elements from the onion skin preview. The keyboard shortcut is Ctrl + Shift + O (Windows/Linux) or ⌘ + Shift + O (Mac OS X).

Flipping Parts

If you want to flip a part, a limb or a whole puppet, use the Transform tool and the Flip Horizontal and Flip Vertical options. If the Scaling parameter is not set to Separate Scale, the flip is not applied to the selection.

How to flip a selection

1. In the Tools toolbar, select the Transform ⠿ tool or press Shift + T.

2. In the Tool Properties view, make sure the Peg Selection Mode ⟋ is disabled.

3. In the Camera view, select the parts to be flipped.
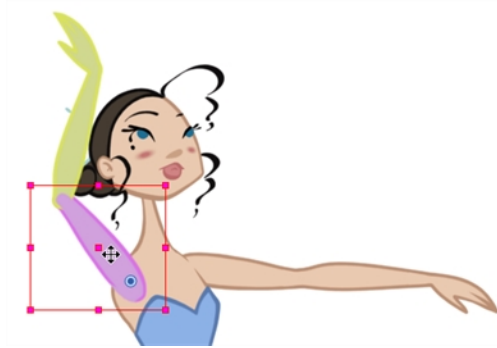
4. In the Tool Properties view, click the Flip Horizontal ⧂ or Flip Vertical ⧂ option or press 4 or 5 respectively.
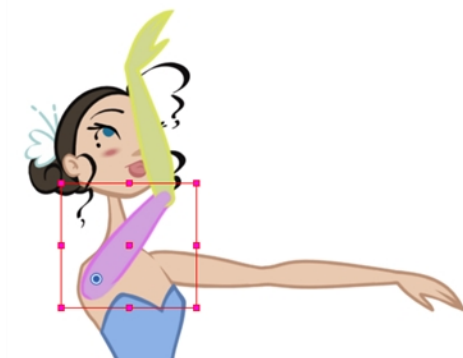
Using Action Templates
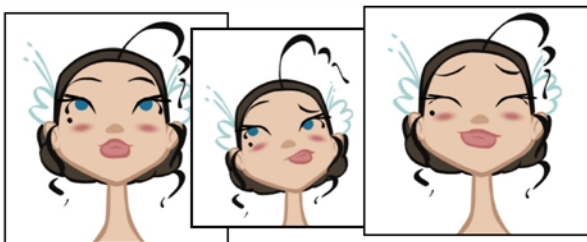
Reusing animation and assets is an important aspect of cut-out animation. This is why Harmony includes a library for storing all the reusable information.

When you created the character rig, you most likely created a master template along with some action templates

To save time, you can take an action that you've already animated, such as a walk-cycle or jump, and reuse it. You can store the initial animation's keyframes in the Library view, then drag it into a master template of a new scene.

You can import a master template into the Timeline view and start animating with it. You can import an action template into the right side of the Timeline view. An action template is composed of drawings (like a blink) or keyframes (like a walk cycle) that you can reuse in an animation sequence.

To insert an action template into a master template, the layer ordering has to be exactly the same. If it's inconsistent, the templates cannot be combined.
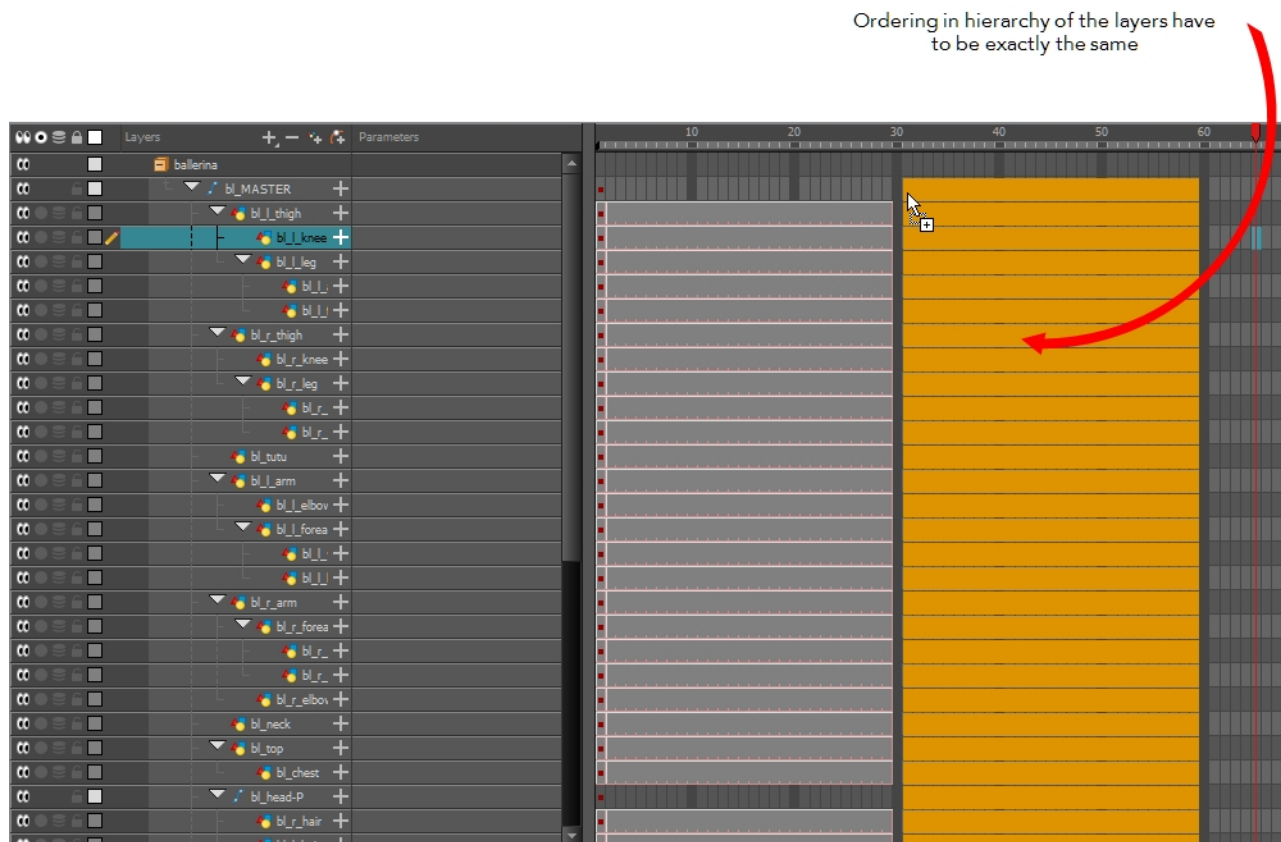
You can create a single keyframe action template of the different views (front, three-quarter or side view). Then import and insert them into the animation to turn the character. The same pattern can be created for a head, arm, full upper body, etc.

If you created templates for different body parts, you can reuse them in your scene by dragging them to your layers. You can also open a template as a folder and select a particular drawing from it and drag it onto a drawing layer.

Swapping Drawings

Cut-out animation is not only about moving parts around. It's also about swapping drawings to give the animation a more traditional animation look. You can add as many new drawings as you want in your scene and use them in your current animation. You can also add new drawings to the library and use them in other scenes. But before starting to swap drawings, it's important to understand how keyframes, exposure and key exposure work in Harmony:

- • **Keyframe**: A keyframe is a point in time where a change to the properties of the object or character occurs. In Harmony, keyframes consist of the coordinates that determine how an entire layer and its contents are moved. Keyframes include these parameters: XYZ position, skew, scale, angle and pivot.

- • **Exposure**: Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.

- • **Key Exposure**: A key exposure in Harmony is a type of exposure that forces a drawing to remain exposed on a specific frame. If a drawing is exposed before a key exposure and you swap out that drawing for another one, then the original drawing is retained. This preserves the key drawing. Note that Harmony automatically sets a key exposure when you perform a drawing swap.

When you want to swap drawings, you can do so in the Timeline or Library view. In the Timeline view, the Parameters area is where you can select a drawing to swap. In the Library view, the Drawing Substitution window lets you see the drawings before selecting one for swapping. In this view, you are actually selecting drawings in your scene layers, not drawings in the Library.

> **NOTE:** Keep in mind that when you swap a drawing, its entire exposure is replaced up to the next drawing exposure.
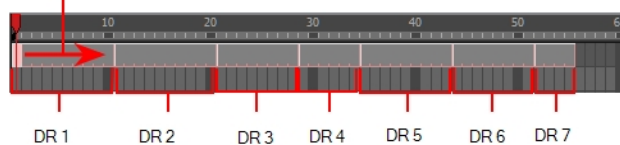
When selecting a certain frame range to be swapped, the behaviour of the Timeline and Library views is different. If you are using the Parameters area of the Timeline view to select a drawing to replace a selected frame range, the new drawing will replace the frame range and continue until the next key exposure. In the following example, drawing 2 (DR2) is replaced by a new drawing, starting at the beginning of the selected frame range and ending at the next key exposure.
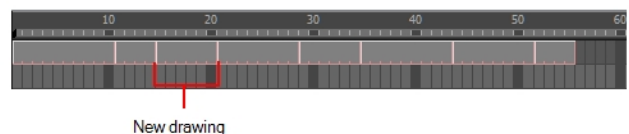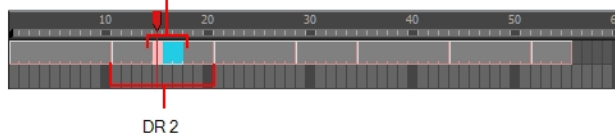
Selected frame range is replaced by a drawing selected from the Parameters area of the Timeline view. The exposure starts at the beginning of the frame range and continues until the next key exposure.

If you use the Drawing Substitution window in the Library view to select a drawing, the drawing is split in two and the exposure before and after the frame range remain the same. In the following example, drawing 2 (DR 2) is split in two and the selected frame range is filled with a new drawing.
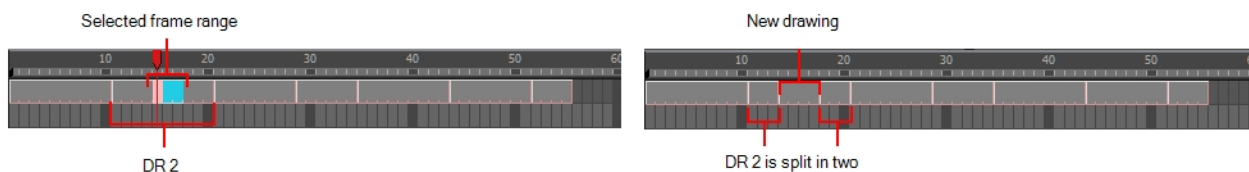
Selected frame range is replaced by a drawing selected from the Library view. The drawing is split in two. The exposure remains the same before and after the new drawing.

How to swap a drawing in the Timeline view

1. In the Timeline view's right side, select the cell containing the drawing or symbol cell to swap.
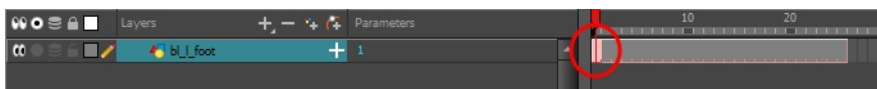
2. In the Drawing Substitution field, position the pointer over the value and drag left or right to change the cell or drawing exposed for another one. You can also type in the drawing name or symbol's cell number if you know it.
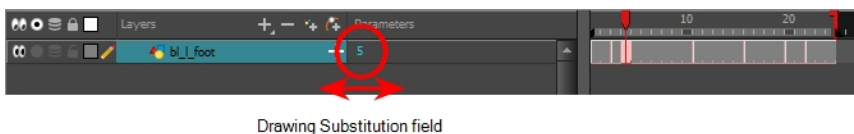
Drawing Substitution field

How to swap images in the Library view

1. In the Tools toolbar, select the Transform tool.

2. In the Transform Tool Properties view, make sure the Peg Selection button is deselected.

3. In the Camera view, use the Transform tool to select a part of the drawing to swap.

NOTE: You can swap the frames in symbols or the drawings in a layer. However, you cannot swap one symbol for another.

4. In the Timeline view, select the cell range in which you want to swap the drawing.
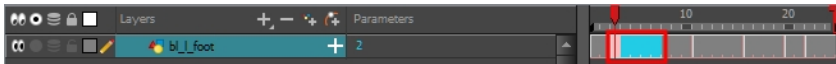
5. In the Library view, go to the Drawing Substitution window.
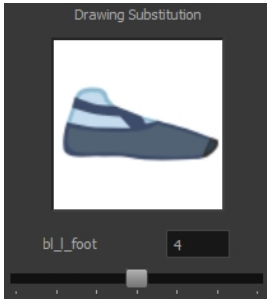
6. Scroll through the symbol's frames or drawings by doing one of the following:

   ‣ From the top menu, select **Animation > Substitute Drawing Previous** or **Substitute Drawing Next**.
   ‣ Drag the slider left or right.
   ‣ Press +.
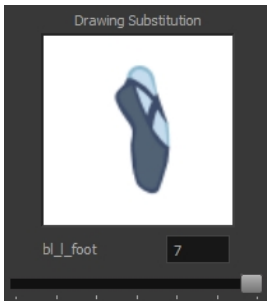
The drawing or symbol's cell on the current frame is replaced.

Adding Key Exposures

If there is a particular drawing you want to keep on a specific frame, you can set it as a key exposure. This prevents it from be overwritten by a drawing swap on a preceding frame. A key exposure is simply a property of an exposure that forces it to be exposed on a certain frame regardless of whether the previous exposure is the same drawing or not.

NOTE: Keep in mind that if you modify the artwork in a drawing, all instances of that drawing will be automatically updated even if set as a key exposure. This keeps your existing animation key poses intact. It is frequently used on a mouth or eyes layer.

Example: Swapping a drawing with no key exposure

In the following example, drawing 3 (DR 3) is selected on the timeline and it contains no key exposure.

When it is swapped for drawing 4 (DR 4), the entire duration of drawing 3 substituted for drawing 4.

Example: Swapping a drawing with a key exposure

Here's what happens when swapping a drawing with a key exposure. In the following example, the playhead is positioned in the middle of drawing 5 (DR 5) to set the position for the new key exposure. When the new key exposure is added, drawing 5 is split in two; both halves contain drawing 5. Now if you swap the first drawing 5 for drawing 1, the second drawing 5 retains its exposure.

A location is selected for a new key exposure.

DR 5

New key exposure

A key exposure is added at the location of the playhead.

DR 5   DR 5

One drawing is swapped for drawing 1 (DR 1). The second drawing retains its exposure.

DR 1   DR 5

How to add a key exposure

1. In the Timeline view, select the drawing cell to set as the key exposure.

2. Do one of the following:In the Timeline toolbar, click the Add Key Exposure button.

   ‣ In the Timeline toolbar, click the Add Key Exposure button.

   ‣ Right-click and select **Exposure > Add Key Exposure**.

   A new key exposure is added.

   If you added a key exposure at the beginning of the drawing, the entire exposure is filled with that same drawing. If you added a key exposure anywhere other than the beginning of the drawing, then the drawing is split in two and both parts contain the same drawing.

Removing Key Exposures

When you no know longer need a key exposure, you can remove it. When you do this, the existing key exposure is replaced by the preceding exposure. In the following example, a key exposure is set to drawing 1 (DR 1). When the key exposure is removed, the exposure is replaced by the preceding exposure, drawing 4 (DR 4).

Before: Key exposure is set to drawing 1.

DR 1

After: Key exposure is removed. The preceding exposure, drawing 4, replaces the exposure.

DR 4

How to remove a key exposure

1. In the Timeline view, select a key exposure to remove.

2. Do one of the following:

   ‣ In the Timeline toolbar, click the Remove Key Exposure ⬓ button.

   ‣ Right-click and select **Exposure > Remove Key Exposure**.

   The key exposure is removed and replaced by the preceding exposure.

Animating Lip-Sync

Adding a lip-sync to a project can really enhance its quality and storytelling. However, it can be difficult to shape a character's mouth to match the sound at a precise frame.

To solve this problem, Harmony provides a lip-sync feature which analyzes the contents of a sound element and generates a mouth chart (see below) based on the eight animation phonemes (A, B, C, D, E, F, G, and X for silence).

The mouth shapes used by Harmony are based on the conventional mouth chart used in the animation industry.

NOTE: The letters used to represent the shapes do **NOT** correspond to an actual sound.

NOTE: If you are doing cut-out animation, refer to the Cut-out Animation Guide, Character Building chapter, "Adding Extra Drawings" topic to learn how to add extra drawings to your character.

Extra mouth

Here is an approximation of the sound each mouth shape can produce:

- **A**: m, b, p, h

- **B**: s, d, j, i, k, t

- **C**: e, a

- **D**: A, E

- **E**: o
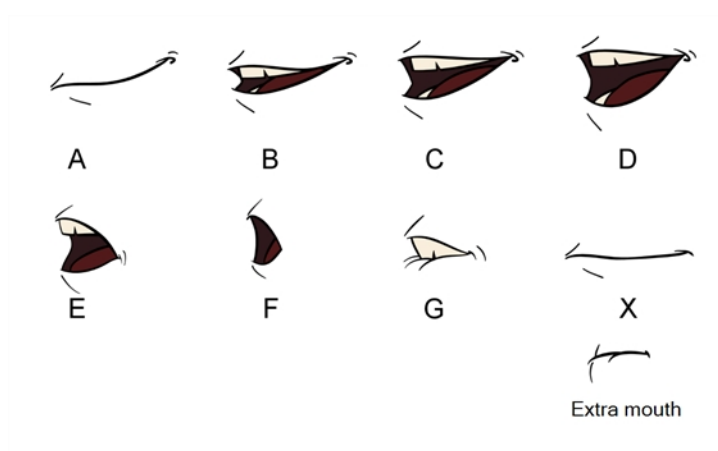
- **F**: u, oo

- **G**: f, ph

- **X**: Silence, undetermined sound

You can lip-sync the traditional way or let the system automatically create the basic detection.

You can refer to the mouth chart positions as you draw the shape of the character's mouth.

How to generate a sound detection for lip-sync using the Layer Properties view

1. In the Timeline or Xsheet view, select the sound layer.

   The options for that layer will appear in the Layer Properties view.

2. In the Layer Properties, click **Detect**.
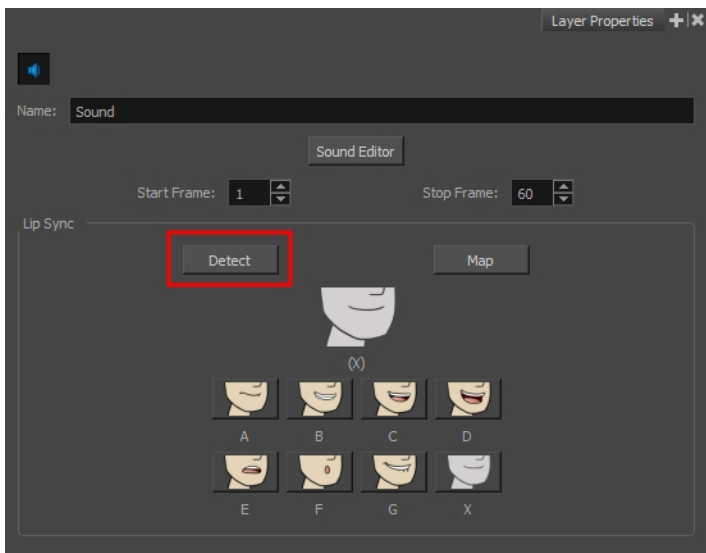
A progress bar appears while Harmony analyzes the selected sound clips and assigns a lip-sync letter to each sound cell.

3. Click the **Map** button to open the Lip-Sync Mapping dialog box.
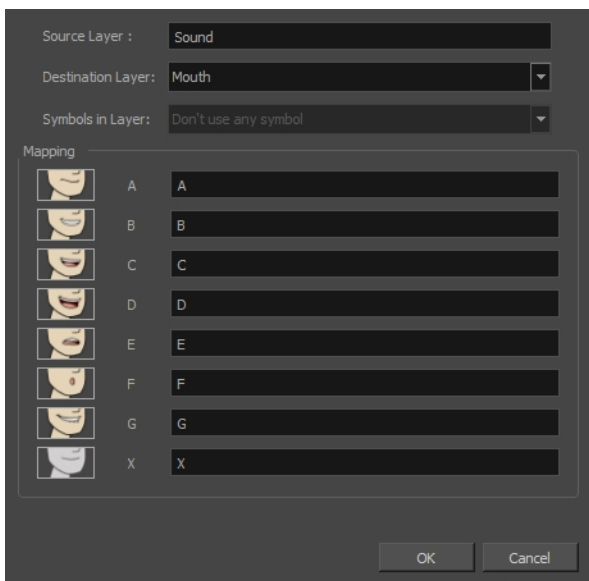
4. From the Destination Layer menu, select the layer that contains the mouth positions for the character's voice track.
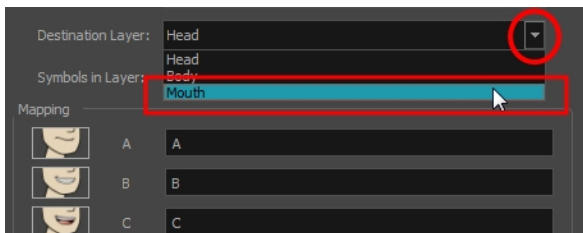
5. If the selected layer contains symbols, you can map the lip-sync using drawings located directly on the layer or use the symbol's frames. In the Symbol Layer field select **Don't Use Any Symbol** if you want to use the drawings or select the desired symbol from the drop-down menu.

6. In the Mapping section, type the drawing name or Symbol frames in the field to the right of the phoneme it represents. If your drawings are already named with the phoneme letters, you do not have to do anything.

7. Click **OK**.

8. Press the Play ▶ button in the Playback toolbar to see and hear the results in the Camera view. To play back your scene with sound, enable the Sound ◀s button in the Playback toolbar.

Harmony allows for the manual swapping of mouth position drawings to match a voice track. For this process, both sound scrubbing (listening to a sound wave broken up frame-by-frame) and drawing substitutions are used.

How to animate lip-sync using the Timeline view

1. In the Playback toolbar, enable the **Sound Scrubbing** ◀s button.

2. In the Timeline view, drag the red playhead along the sound layer waveform.

3. When you reach a frame where a mouth position should go, for example, an open mouth with rounded lips for an "oh" sound, click on that frame on your mouth shapes layer.

4. In the Parameters section, staying on your mouth shapes layer, place your cursor on top of the drawing name (often a letter) until it changes to the swapping 🖑 pointer.

5. Pull the cursor to see the list of mouth shape names and choose the one you want. The current drawing automatically changes to the new selection.

How to animate lip-sync using the Library view

1. In the Playback toolbar, click the Sound Scrubbing ◀s button.

2. In the Timeline view, drag the red playhead along the waveform of your sound layer.

3. When you reach a frame where a mouth position should go, for example, an open mouth with rounded lips for an "oh" sound, click on that frame on your mouth shapes layer.

4. In the Drawing Substitution window of the Library view, drag the slider to choose a mouth shape. The current drawing is swapped for the one in the preview window.
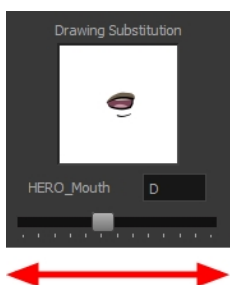
Adding a New Drawing

If you need to add a new drawing to a scene, you can do so by duplicating the existing drawing on the current frame. If you're using symbols, you can also add a new drawing inside the body part's symbol.

Duplicating a Drawing

If your character doesn't use symbols, you must duplicate the drawing on the cell on which you need to a new drawing. You could also create a new blank drawing, but duplicating the existing drawing allows you to keep the pivot you previously set (if you're using drawing pivots) and you can also reuse a portion of the existing artwork. When you create a new drawing, you get a blank cell with a pivot set at the centre of the Camera view.

How to duplicate a drawing

1. In the Timeline or Camera view, select the drawing to duplicate.

2. From the top menu, select **Drawing > Duplicate Drawing** or press Alt + Shift + D.

   The new drawing appears in the currently selected cell.

3. In the Camera view, draw the new piece.

Repositioning Drawings

When creating additional drawings for a cut-out puppet, you should generally try to create them in the same location as the original drawings (resting position) so you can scale and rotate the same pivot.

Although, when adding drawings that are specific to an animation, it may be easier to draw it in relation to the character's position and scene's composition. If you draw a series of drawings that are not in the same location, you can use the Reposition Drawing ⊕ tool to reposition the drawing strokes while simultaneously creating keyframes in the Timeline view to compensate for the repositioning. In the Camera view, the drawings will retain the location and position in which you drew them while in the Drawing view, all your drawings will be aligned.
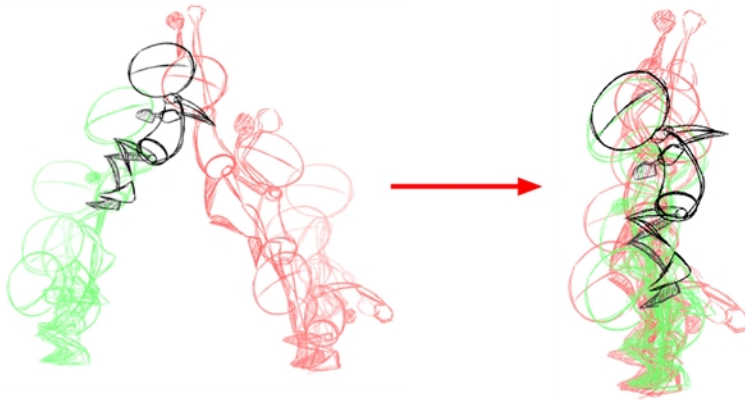
How to reposition and align drawings

1. In the Advanced Animation toolbar, select the Reposition Drawing ⊕ tool.

2. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) to select the drawing to reposition. You can also select the drawing layer or the parented peg in the Timeline view.

   The Reposition Drawing controls appear in the Camera view. They are positioned on top of each other. The source controls are represented by black lines. The destination controls are represented by dotted blue lines.

3. On your first drawing (reference drawing), position the black source controls to indicate the position at which all other drawings will be aligned.
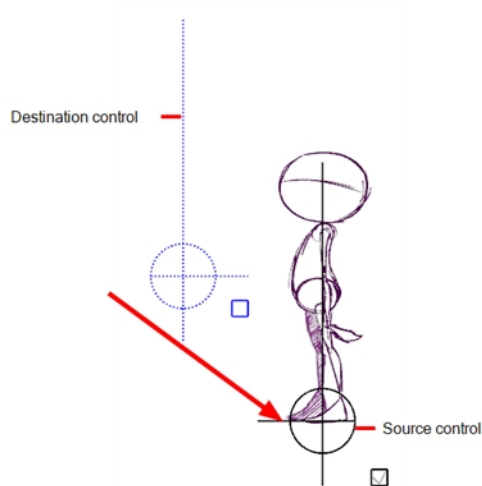
4. In the Timeline view, move to the next drawing.

5. In the Camera view, move the blue destination controls to match the reference position you set on the original drawing. You can use the long handle to rotate the position. If you rotate the control multiple times, the drawing will rotate multiple times.
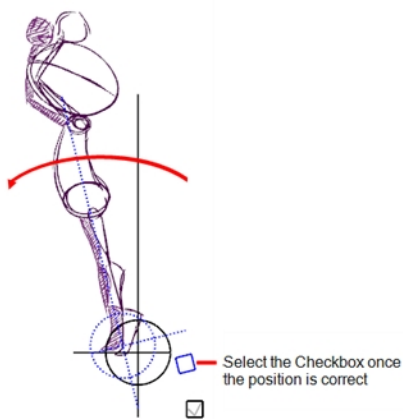
6. Select the blue checkbox once the position is correct.

7. Repeat the previous two steps for all drawings in your animation.
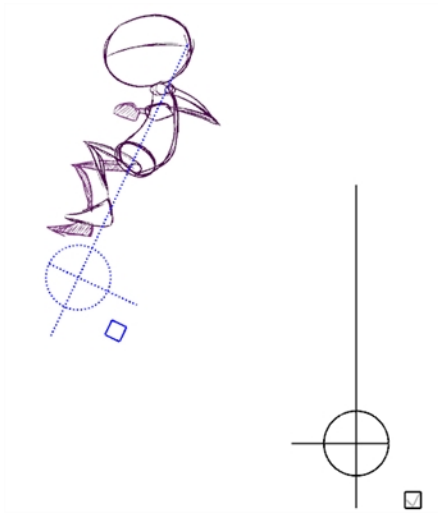
8. Once all the drawings are completed, in the Drawing view, verify that the drawing strokes are correctly aligned.

9. If necessary, delete the last keyframe if the last drawing moves back to the reference drawing's position.
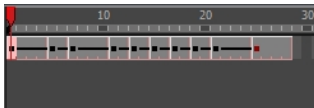
10. If the animation does not require interpolation, in the Timeline view, select the newly created keyframes. In the Timeline toolbar, click the Set Stop-Motion Keyframe ⤙ button to remove any computer-generated interpolation.
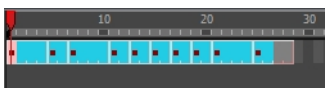
Ordering Layers Over Time

The layer ordering system in Harmony saves time and simplifies your work. There is no need to create a new layer or copy and paste artwork into other layers to change the order. The Z-axis (forward/backward) allows you to create a multiplane and move elements closer or farther from the camera. This allows you to move the puppet's pieces in front of or behind other ones without physically changing the layer position.
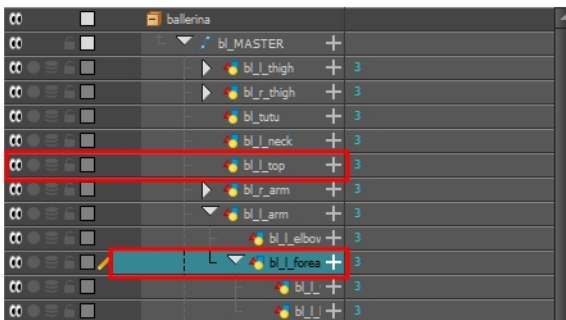
Harmony provides you with a shortcut to move the piece with a micro nudge on the Z-axis. A keyframe is created where different Z values can be entered. This allows the piece to move forward and backwards in space without requiring you to change the drawing's original position or break the layer hierarchy. This also means that the layer ordering is maintained throughout the scene. You can combine animation assets so Harmony can interpolate them.

How to nudge elements on the Z-axis

1. In the Tools toolbar, select the Transform ⠿ tool or press Shift + T.

2. In the Tools toolbar, click the Animate ⚯ button.

3. In the Camera view, select the part to be repositioned and hold down the Alt key.

4. Using the Up or Down arrow keys, nudge the part until it moves to the desired position.
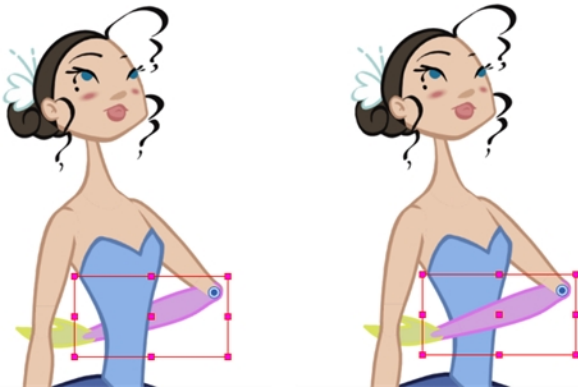
Resetting a Transformation

If you made too many transformations and it's not going where you want it to go, or simply because you want to reset a pose you're reusing from another animation, you can reset your character's position. Once the layers are positioned in the Camera view, you can easily return them to their original position. There are three different ways to reset a transformation.

Using the Reset command, you can reset the value of the selected element to the initial value of the active tool. For example, if the Rotate ⟳ tool is active, the transformation angle will be reset to 0 and if the Transform ⬚ tool is active, all the transformation values will be reset.

The Reset All option resets all transformations on the current frame in a selected layer. Your keyframe will remain, but all the values will return to the default position. All transformations are reset regardless of the tool you're using.

The Reset All Except Z option resets all transformations on the current frame except the Z position. This is useful when doing cut-out animation. Cut-out puppets often have a particular Z ordering for the different views of a character. You might want to reset the transformation, but not necessarily the Z position.

In the Timeline view, you can also use the Clear All Values command to reset all transformation values on the selected layers. Right-click on the selected layers and select **Layers > Clear All Values**.

> **NOTE:** When using the Transform tool to select elements in the Camera view, always make sure the Peg Selection Mode option in the Tool Properties view is disabled or it will limit the selection to peg only.

How to reset the transformation on the current frame

1. In the Tools toolbar, select the Transform ⬚ tool or any Advanced Animation ⟳ tool.

2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.

3. From the top menu, select **Animation > Reset** or press Shift + R.

   The selected layer(s) return to their original position.

How to reset all transformations on the current frame

1. In the Tools toolbar, select the Transform ⬚ tool or any Advanced Animation ↻ tool.

2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.

3. From the top menu, select **Animation > Reset All** or press Shift + R.

   The selected layer(s) return to their original position.

How to reset all transformations except the Z position on the current frame

1. In the Tools toolbar, select the Transform ⬚ tool or any Advanced Animation ↻ tool.

2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.

3. From the top menu, select **Animation > Reset All Except Z**.

   The selected layer(s) return to their original position, except for the Z values.

Creating Cycles

You can create cycles from a portion of your animation or completely reverse the flow of your animation.

How to create an animation cycle

1. In the Xsheet or Timeline view, select the cell range and keyframes to loop.
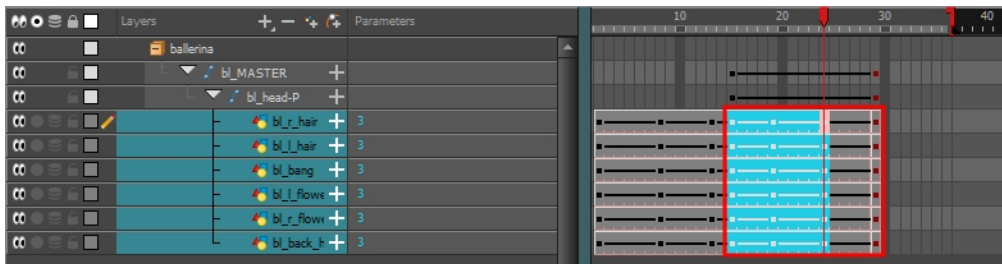
2. From the top menu, select **Edit > Copy Cells From the Timeline**.

3. In the Xsheet or Timeline view, select the cell where you want your cycles to start.
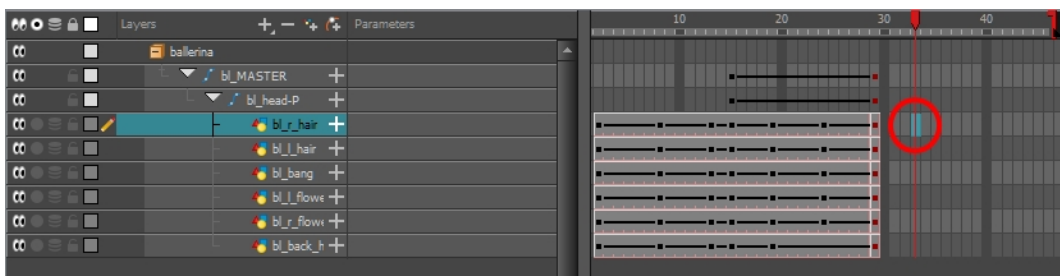
4. From the top menu, select one of the following:

   ‣ **Edit > Paste Cycle** or press Ctrl + / (Windows/Linux) or ⌘ + / (Mac OS X).

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The Paste Special dialog box opens.
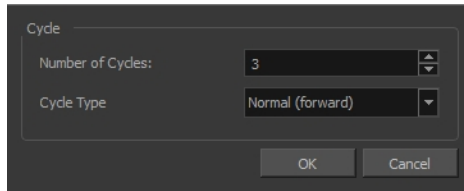
▸ **Edit > Paste Special** or press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).

The Paste Special dialog box opens.
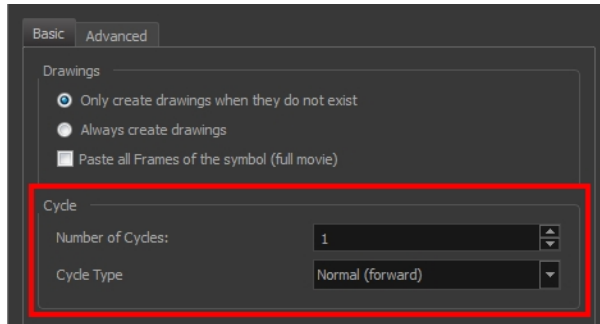
5. In the Number of Cycles field, enter the number of cycles to paste.

6. In the Cycle Type menu, select a type of cycle to paste.
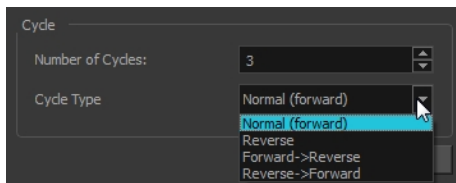
▸ **Normal (forward)**: Pastes the selection as is, starting with the first cell and ending with the last.

▸ **Reverse**: Pastes the selection reversed, beginning with the last cell and ending with the first.

▸ **Forward -> Reverse**: Pastes the selection as a yo-yo, starting with the first cell, going to the last cell and ending with the first cell.

▸ **Reverse -> Forward**: Pastes the selection as a reversed yo-yo, starting with the last cell, going to the first one and ending with the last cell.

7. Click **OK**.
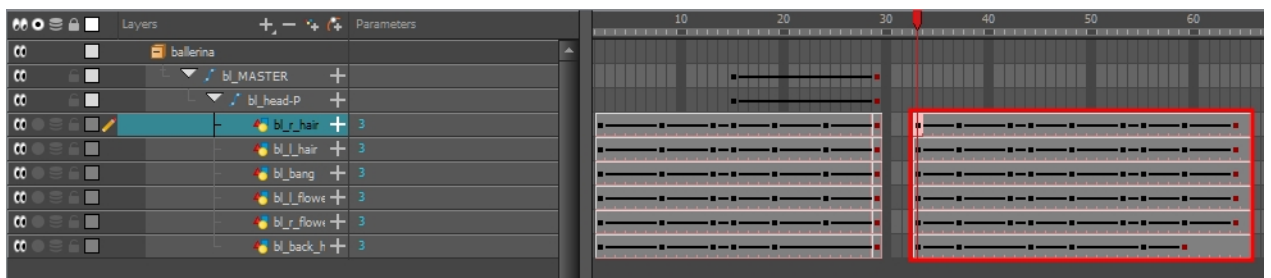
How to create a reverse animation cycle

1. In the Xsheet or Timeline view, select the cell range and keyframes to paste inverted.
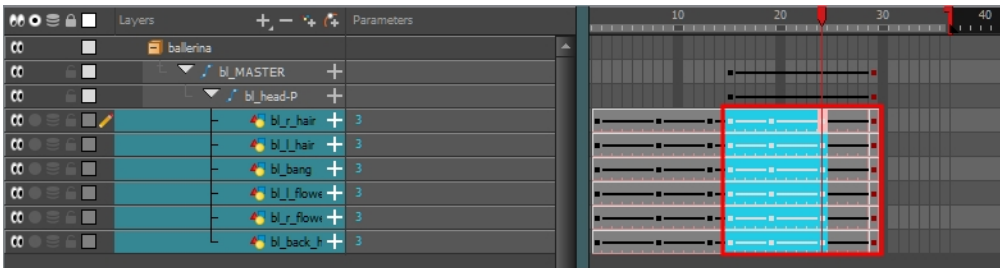
2. From the top menu, select **Edit > Copy**.

3. In the Timeline view, select the cell where you want the cycles to start.
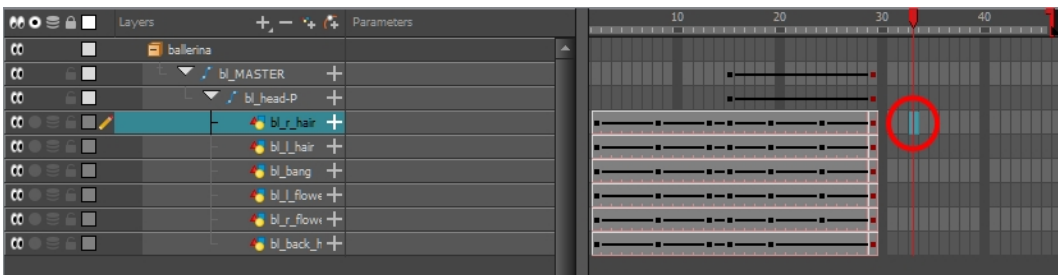
4. From the top menu, select **Edit > Paste Reverse** or press Ctrl + . (Windows/Linux) or ⌘ + . (Mac OS X).
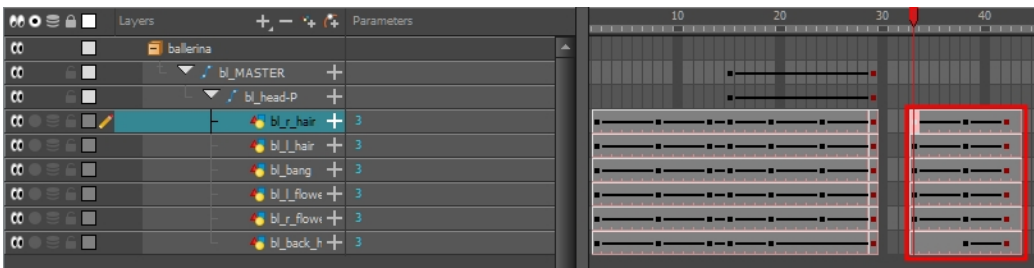
Adding Pegs

Now that you have your puppet on stage, you probably need to resize and reposition it to fit the scene. When you need to scale down or move a character, it's a good idea to hook (attach) the whole puppet to a trajectory.

In Harmony, there is a type of layer you can add to your timeline, allowing you to create a motion path or reposition drawings. This trajectory layer is called a *peg*. Any drawing or layer you hook to a peg will follow the defined motion path, rotation, scaling and skewing information.

Attaching your puppet to a peg allows you to scale and reposition it without having to do the same on all the different parts and pieces. Only one layer will contain the position information, making your animation easier to modify and control.

Next, position your character on the stage by moving it and scaling it to the correct size. You will not scale each layer individually. You can do it on the top symbol or top peg layer.

How to add a repositioning peg

1. In the Timeline view, select the top layer on which you want to parent a peg.

> **NOTE:** You must select a layer to be able to add a peg to your scene. Unless you use the Display All mode from the Display toolbar, an error message will display if you try to add a peg without any selection.

2. In the Timeline view, click the Add Peg button.

   A new peg is added to the timeline as a parent of the selected layer.
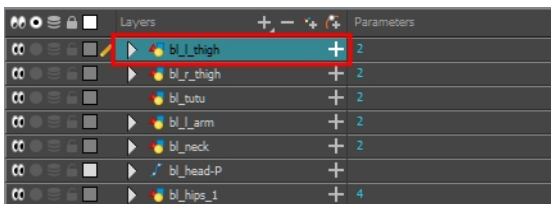
3. Double-click on the name of new peg layer and rename it: `Master_Peg`.
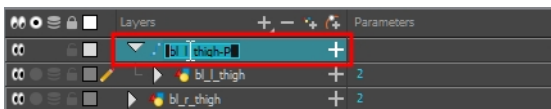
4. In the Timeline view, select all the layers you want to attach to the new peg. Remember that one item is already parented to that peg.
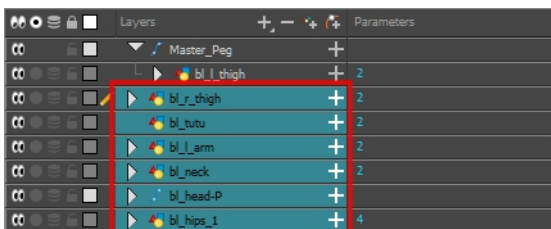
5. Drag the selection and drop it on the peg layer to parent all the character's pieces to the peg. If your layers are added above the already-parented layers, move that parented layer back on top of the layer stack.
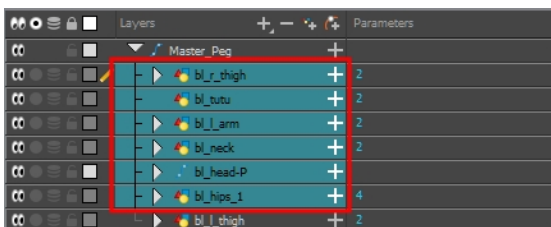
How to reposition a character

1. In the Timeline view, select the top peg layer (master peg).

2. In the Tools toolbar, select the Transform ⬚ tool and disable the Animate 🐾 mode.

3. In the Camera view, position the character.
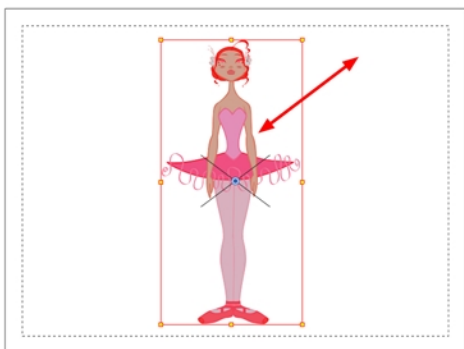
Offsetting a Portion of an Animation

If there is a section of the animation that you want to reposition, such as the head's height or the puppet's position, you can do so using the function curve.

How to reposition a portion of an animation

1. In the Timeline view, click the Expand Function ➕ button of the body part layer to reposition. If you want to reposition the entire body, expand the master peg's parameters.
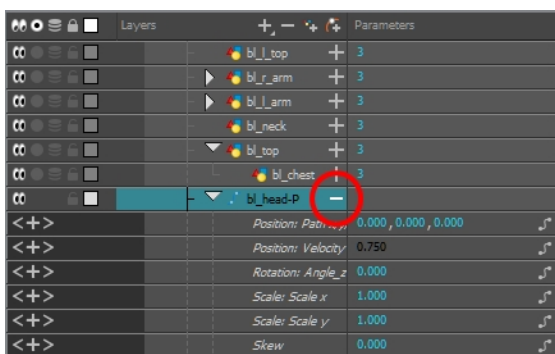
2. Double-click on the layer's parameter controlling the keyframes you want to reposition.
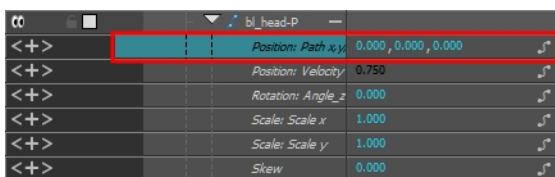
The Function Editor opens.

3. In the Function editor, select the keyframes you want to reposition by tracing a selection box.
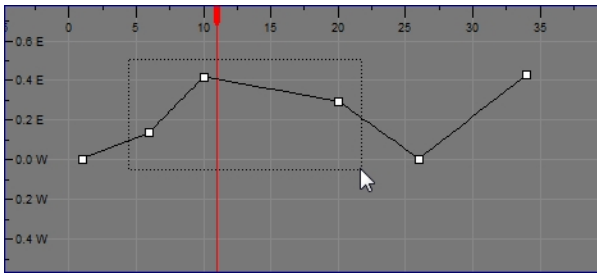
4. Click the Show Current Frame ▶□ button to view the transformation results in the Camera view as you do them.

5. Drag the keyframe selection up or down to reposition the sequence.
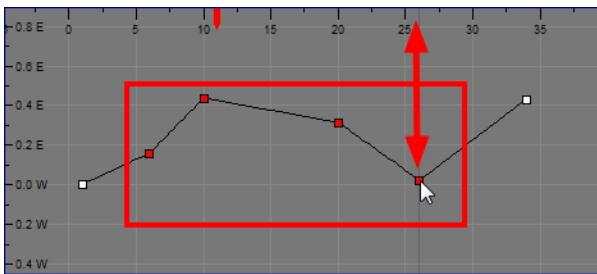
6. Close the Function editor.

Chapter 11: Export Harmony Animations to Unity
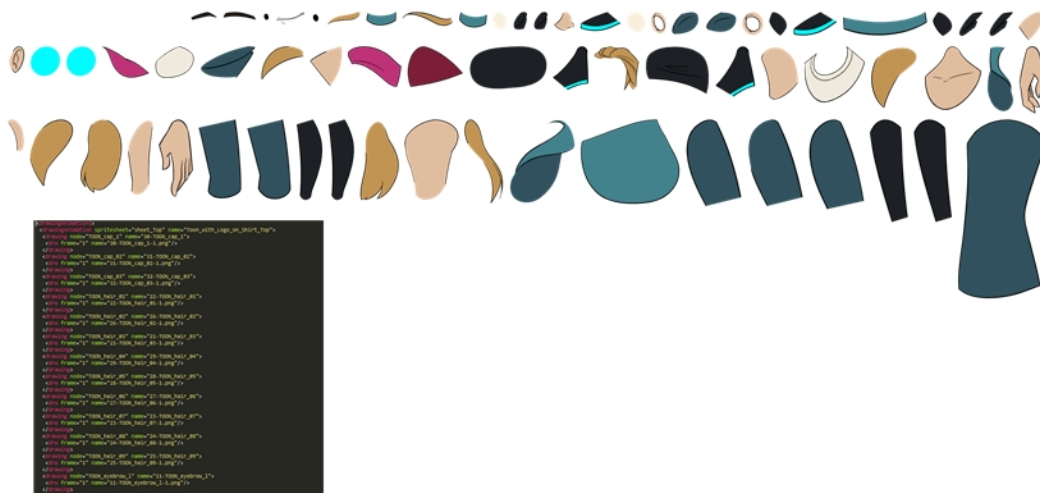
At this point, if you have a custom game engine, you can take the exported data and proceed with your usual process. Or you can modify the export script to fit your convention.

If you're going into Unity, here are some things you need to do:

- *Exporting the Animation* on page 343
- *Opening the Sample Unity Project* on page 1
- *Working in Unity* on page 1

Exporting the Animation

If you were using Harmony 12.1 or earlier, it is strongly suggested that you clear your scripts before exporting animation for the first time. This will ensure there's no conflict with previous versions of the scripts and you have the most up-to-date script.

How to clear your scripts

1. Close Harmony if it is open.

2. Browse to the script folder location:

    - **Windows**:

        - Toon Boom Harmony Advanced: C:\Users\[user_ name]\AppData\Roaming\Toon Boom Animation\Toon Boom Stage EssentialsEssentials\1200-scripts

    - **Mac OS X**:

        On Mac OS X, the Library folder is a hidden folder. To display the display the folder, told down the Alt key.

        - Toon Boom Harmony Advanced: /Users/[user_name]/Library/Preferences/Toon Boom Animation/Toon Boom Stage Essentials/1200-scripts

3. Delete the **1200-scripts** folder.

4. Restart Harmony and test the export.

Setting Anchors and Props

Before exporting your scene, you must set the anchors and props.

An anchor is an attachment point you can use to bind one or several props to a specific location that is predefined by the anchor.

A prop is a game item that will be attached to an anchor. It could be a stick held within the character's hand, a helmet attached to the character's head...the possibilities are endless. Props are easy to turn on or off, and easily swappable from within Harmony or Unity.

For more information, see *Setting Anchors and Props* on page 231.

Before Exporting a Scene

• Before making the export, be sure to set your Display as <Display> and not <Display All>

• Be certain to save your scene. Harmony makes the export based on the tvg files, any unsaved updates you have added will not be exported.

• Set your Harmony scene to be a square resolution (ex. 1024 x 1024). Select Scene > Scene Settings.

How display the Game toolbar

1. From the top menu, select **Windows > Toolbars > Game**.

   The Game toolbar appears above the Camera view, to the left.
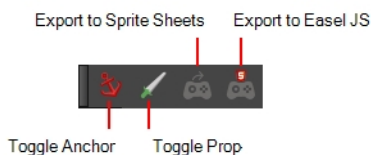
2. Run the script by clicking the Export to Sprite Sheets button in the Game toolbar.

   The Export to Sprite Sheets window opens.
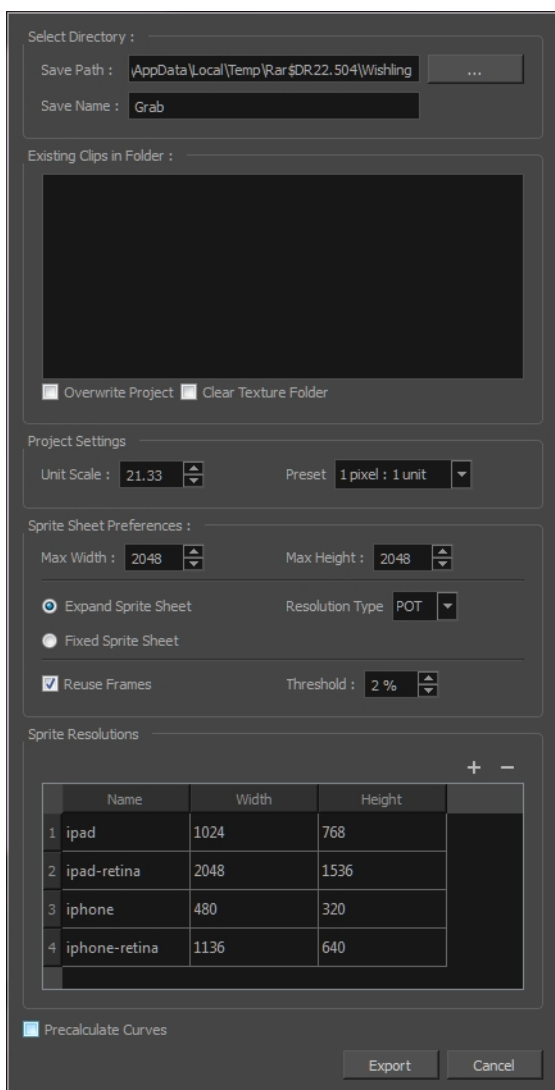
3. Set the Save Path to the correct folder in your Unity project if you want it to update automatically. If not, you can save anywhere, then transfer the animation into your Unity project, or any other game engine you want to use.

4. Set your sprite sheet preferences:

Parameter	Description
Max Width, Max Height	This is a value, in pixels, for the maximum width and height the exported sprite sheet should be. By default, both values are set to 2048 pixels.
Expand Sprite Sheet	Uses the minimum size necessary up until it reaches the maximum resolution.
Fixed Resolution	Creates a texture of the specified size (Max Width and Max Height) even if it does not fill it up completely.
Resolution Type	**POT**: Exports to sprite sheets with sizes that are a power of 2. For example: 1024 x 1024. This is optimized for many graphics cards, but consumes more memory. **NPOT**: Some game engines are optimized specifically to render to non powers of two, so that it will avoid those numbers. Example: 1000 x 1000.

Reuse Frames	
Threshold	
Sprite Resolutions	Size of the render of the individual sprite, when it exports each drawing out.
	The exporter will export to multiple resolutions based on the settings.
	Saves different animations of the same character into the same Save Name. For example, if there's an idle, run, and jump animation, these should all share the same Save Name. You can think of it as the overall collection of animations. Inside are the different saved scene versions whose drawings you can reuse for all the animations in that character set. Each scene version will be displayed as an item in the list.
	When you export an animation, only the drawings used in that scene are exported. All the drawings are exported individually first and then atlased together into a sprite sheet.
	If you save multiple animations to the same Save Name (i.e. SpaceDuck: run, idle), then it will re-atlas the sprite sheet to include all the drawings from all the animations in that folder, creating a new animation file, but reusing the same skeleton.
Precalculate Curves	Makes linear values for interpolation. This increases the amount of memory used but frees up the calculation so it is not done on the fly.

5. Click **Export**.

> **NOTE:**
> Programmers may be interested to note that the XML data exported by Harmony can be converted afterwards to a more optimized binary data structure. The binary converter is not yet available for Harmony, but it can be compiled manually in the game engine package. The C++ code that handles the data structure can be reused and parsed in your own code if you want to integrate with other game engines.

Additional Note

- The Transparency parameter attached to the element node is exported along with the animation. You can set the transparency through the Layer Properties window (Advanced tab).

Harmony Game Previewer
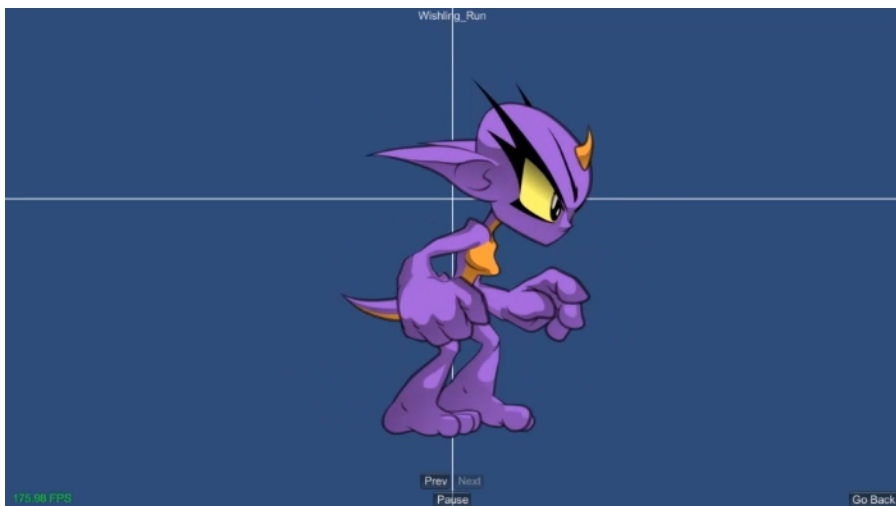
If you are not a developer and would like to see if your animations and rigs will work once imported in Unity, you can use the Harmony Previewer application. You can visualize your characters in the Unity game engine with no programming required.

How to use the previewer on Windows

1. Download the Harmony Game Previewer for Windows:

   ‣ https://docs.toonboom.com/go/download/GamePreviewer-12-2-windows

2. Extract the following to your hard drive:

   ‣ GamePreviewer-[version].exe
   ‣ GamePreviewer-[version]_Data folder

3. Copy your export from Harmony to this folder:

   ‣ GamePreviewer-[version]_Data\StreamingAssets\HarmonyResources\

4. Start the Game Previewer application.

5. Select the export you want to preview.

How to use the previewer on Mac OS X

1. Download the Harmony Game Previewer for Mac OS X:

   ‣ https://docs.toonboom.com/go/download/GamePreviewer-12-2-mac

2. Extract the GamePreviewer-[version].app.

3. Right-click on the GamePreviewer-[version].app and select **Show Package Contents**.

4. Copy your export from Harmony to this folder: Contents/Data/StreamingAssets/HarmonyResources/

5. Start the Game Previewer application.

6. Choose the export you want to preview

Opening the Sample Unity Project

Toon Boom includes a sample Unity project that contains all the scripts necessary to import the data exported from Harmony. Inside this project is an Assets folder which contains the following folders:

- Plugins

- Scenes (demo scenes and a previewer)

- Scripts (all Harmony scripts)

- StreamingAssets (this is where all the Harmony scene files should be exported to)

By configuring the Harmony script, you can automatically export animations into the StreamingAssets folder. This way, Unity will dynamically load the most up-to-date assets as soon as they appear in the folder. You can also manually place exported Harmony data into this location.

Working in Unity

The Harmony Gaming Animation Guide is a basic guide on how to import Harmony projects and configure them, design and animate characters, and includes some tips. It is not meant as a guide on how to program games.

The Unity Interface

Here are the main components of the Unity interface and their equivalents in Harmony:

Unity	Harmony	Description
Scene view	Perspective view	This is where you set the scene, selecting and positioning environments, the player, the camera, enemies, and all other GameObjects.
Game view	Camera view	The rendered view from the camera(s) in your game. It is representative of the final, published game.
Inspector	Layer Properties	Displays detailed information about the selected GameObject, including all attached Components and their properties.
Hierarchy	Layers in Timeline view	Displays the hierarchy of elements in the scene, and lets you set up parent-child relationships for different game objects.
Project Browser	---	Lets you access and manage a project's assets.

The main camera displays the scene and is located in the Hierarchy. To show a Harmony object, you must add a special component. With the main camera selected, in the Inspector, select **Add Component > Scripts > Harmony Camera**.

Scene view (Unity) = Perspective view (Harmony)   Game view (Unity) = Camera view (Harmony)

Inspector (Unity) =
Layer Properties (Harmony)

21.18 FPS

Hierarchy (Unity) = Layers in
Timeline view (Harmony)

Project Browser (Unity)
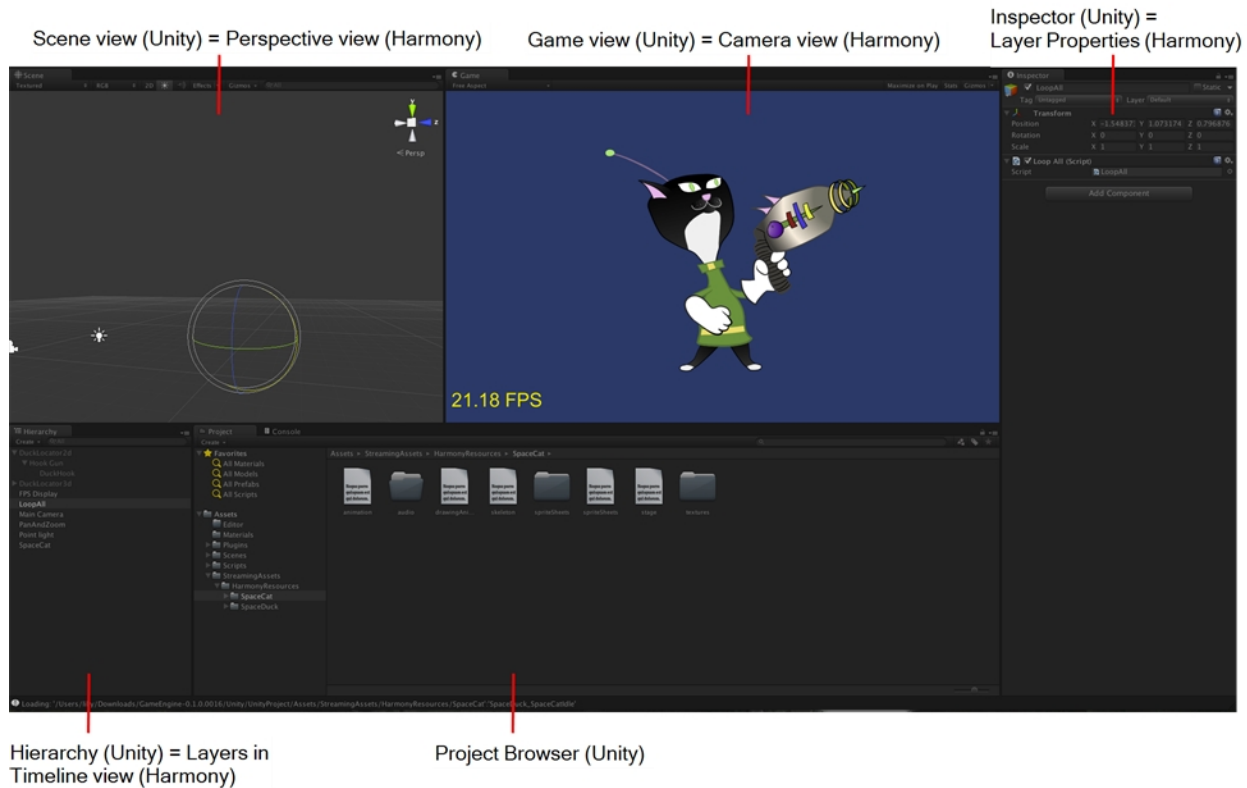
Importing Harmony Files Directly into Unity

How to import Harmony files directly into Unity

1. Create a Unity 2D project.

2. The SDK Harmony project needs to be imported to your project in order for the assets to be brought in. Do one of the following:

   ‣ Go to the Unity Asset Store (assetstore.unity3d.com/en/#!/content/31211) and save the Harmony Game SDK file on your computer. Then import it in your project from the following: **Top Menu > Asset > Import Package > Custom Package**.

   ‣ Search for the Harmony Game SDK in the Unity Asset Store, then download and import the package. You can access the Asset Store from the following: **Top Menu > Window > Asset Store.**

NOTE: For each new Unity project, you must repeat step 2 as it contains the necessary files and folders to make the Harmony import process work.

3. Add the exported game object to the scene by going to **Top Menu > GameObject > Harmony >**

   ‣ **Harmony Object**: Lets you browse for the exported Harmony project folder. If you've already saved this to your StreamingAssets folder, you can browse to it through there. Then it adds the Harmony scene to your Unity file, and sets up the rendering, audio, and animation scripts you need to get going.

‣ **Harmony Texture Object**: Lets you browse for the exported Harmony project folder similarly to Harmony Object, but creates a Unity plane to render your animation on it.

Importing your Hamony files from an empty GameObject

GameObjects are the fundamental objects in Unity that represent characters, props and scenery. Basically everything you create in Unity will be a GameObject. There are two main types of GameObject you can use to import Harmony data:

- **Create Empty**: This creates a regular GameObject in which you can load the exported Harmony data. All the individual body parts on the sprite sheet come in as separate elements, but are treated as one whole object with a dynamically created bounding box. If you put a transparency on this object, you would see the overlapping transparencies of all the individual objects. This creates a higher-quality render and should be the default if you're not animating the transparency of an object. With this option, direct rendering will read the depth information in the scene but not write it. Note that with this option, the rendering cannot be customized.

- **Create Other > Plane**: Renders the entire character to a plane. This renders your character to texture data. If you animate the transparency of the plane, then the transparency of the rendered output is animated; you won't see the transparencies of the overlapping elements. However, you will have one static bounding box the size of the plane that you render to.

    Use this option when you want to animate the transparency of a character in a scene. Also, you can write your own custom shaders. Simply set the Render Target to eRenderTarget. You can see an example of this in the sample project *DemoRenderTarget*.

To understand fully the process, here's are two examples using an empty GameObject and a plane GameObject with the SpaceCat demo file. Everything you do will be based on the GameObject you create to load your Harmony data.

How to use an empty GameObject

1. Select **GameObject > Create Empty**.
2. Rename the empty GameObject so it's clear in the Hierarchy. Since we're using the SpaceCat demo file, rename the GameObject to **SpaceCat** by doing one of the following:

    ‣ Double-click on the name and rename it in the Hierarchy.
    ‣ Select the GameObject and rename it in the Inspector.

3. At this point, it's an empty object. Accessing Harmony data is done through scripts.

    ‣ Select the SpaceCat GameObject.
    ‣ In the Inspector, go to **Add Component > Scripts > Harmony Renderer**.

A new section appears in the Inspector called Harmony Renderer (Script).
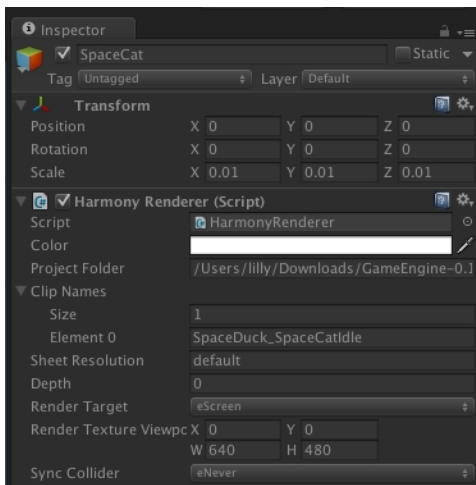
This will let you load an animation file. You must put the path of the asset relative to the HarmonyResources folder. Before this, you must export from Harmony directly to this folder, or manually copy and paste the data here.

4. You exported a scene called *SpaceCat*. In the Project Folder, place **HarmonyResources/SpaceCat** under the Transform information at the top, under Scale. Set the values to 0.01 for X, Y, and Z because the default Harmony project is for an HD screen.

5. You won't see anything until you define a few parameters:

   ‣ Set the Clip Name Size to 1. A second field will appear, Element 0.

   ‣ Enter the clip name for the animation you want to load.

6. Double-check on the right Clip Name to put in Element 0; you can check the output you exported from Harmony.

7. Double-check the `stage.xml` file, which was exported to the folder you specified when exporting from Harmony. Our default export path is to StreamingAssets, so it will automatically load in the game engine.

8. Look in the Project tab, under **Assets > StreamingAssets > HarmonyResources > [ExportName]**.

   You'll find the data that was exported. In this case, we're looking for SpaceCat. Select the file marked `stage` to load the data you want to double-check.
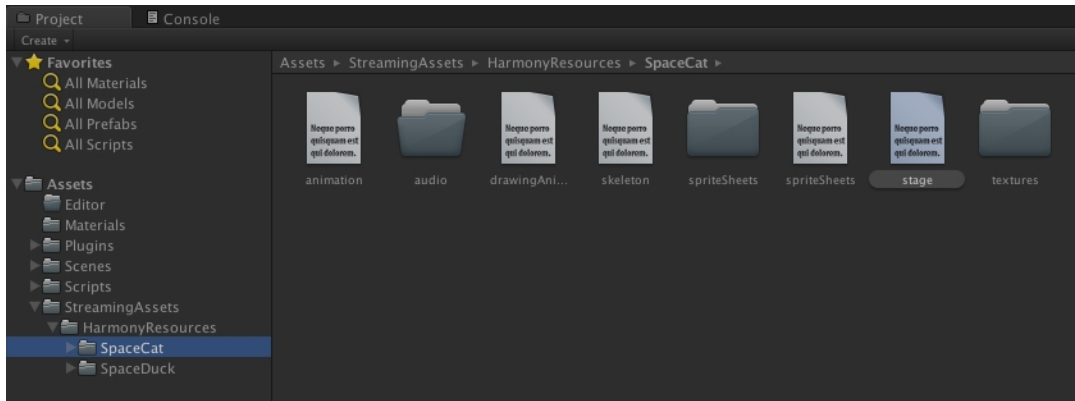
The text data appears in the Inspector.
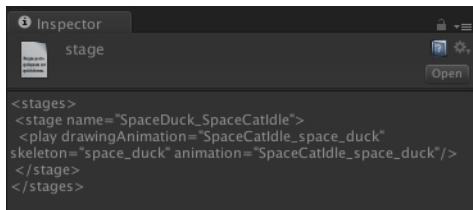
The name to use for loading the object is the stage name. In this case, **SpaceDuck_SpaceCatIdle**.

9. If your GameObject has animation in it, and you want it to load the animation data from the Harmony export, add one more component by doing the following:

   ‣ Select the GameObject.

   ‣ In the Inspector, select **Add Component** and select **Scripts > Harmony Animation**.

10. To loop the animation, you must set a GameObject to define it:

   ‣ Select **GameObject > Create Empty** and rename it: **LoopAll**.

   ‣ Click the **LoopAll** GameObject to display its properties in the Inspector.

   ‣ Click **Add Component > Scripts > Loop All**.

   When you play the animation, it will loop as it plays back. The Loop All command simply iterates on all GameObjects on runtime and asks them to loop, which is useful when testing the animation. When programming the actual game, you should write additional scripts to control the different elements separately.

How to use a plane GameObject

1. Select **GameObject > Create Other > Plane**.

2. Select **Add Component > Scripts > Harmony Renderer.**

3. Set Size to **1** and Element to **0** on the clip name as per previous instructions.

4. Set Render Target to **eRender Texture**.

5. Render Texture Viewport:

   ‣ **X**: To reposition the animation correctly; it should be -½ the width of your Harmony project.

   ‣ **Y**: To reposition the animation correctly; it should be -½ the height of your Harmony project.

   ‣ **W**: Width of your Harmony project

‣ **H**: Height of your Harmony project.

6. Use the custom Shader created by Toon Boom to have a transparent background with premultiplied alpha channel. This is what produces nice, antialiased drawings in your output.

7. With the Plane selected in the Inspector, go to **Mesh Renderer > Materials**. Under Element 0, select **UnlitTransparentPremultiplied**.

8. If you're starting with the Toon Boom demo project, this renderer should already be loaded in your list.
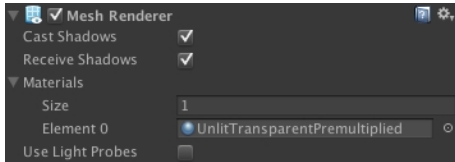
You can also write your own custom shaders and use them here.

9. You must also add the animation component. Select the Plane. In the inspector, click **Add Component > Scripts > Harmony Animation**.

Attaching Props to Anchors in Unity

Once your Harmony GameObject is imported, you should be able to see your character both in the Scene and the Hierarchy views. From here you can attach one or several props to an anchor.

How to attach the prop to an anchor

1. Open up your character in the Hierarchy view to have access to both the props and the anchors.

2. Click on the prop you wish to attach, and drag it onto the appropriate anchor.
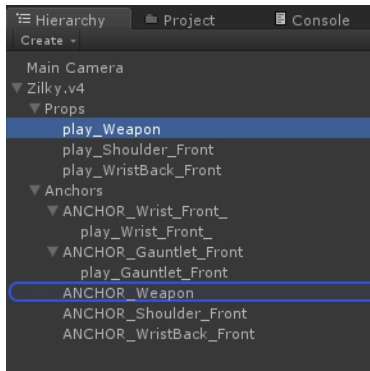
3. Repeat these steps for each prop and anchor in your project.

4. In the Inspector view, under Frame, you can select which frame you wish to show. If you only had one drawing in your prop, then you will not have multiple options.

5. If part of your character is cut off by the plane of the character, now that the props are showing, you will need to regenerate the mesh. To do so, select your GameObject. After this is done, go to **Inspector View > Render > Generate Mesh**.

Placing a Target in an Imported Animation

It's possible that after importing the Harmony animation into the Unity scene, you may want to assign a target to some piece of the animation. For example, in the Space Duck scene, the character has a gun. Perhaps you want to attach some other action, such as shooting spheres and cubes out of the end of the gun.

You can see some examples of this in the provided Unity project. The first example in the demo scene is called *DemoLocator* which shows a simple cylinder attaching to the end of the gun.

The second example called *DemoCallback* shows the gun shooting spheres and cubes.

When you set up your character in Harmony, you can access any drawing layer in Unity later and use its pivot point to attach things. For this reason, you should set the pivot points on your drawing layers with the Rotate tool.

You can also create an empty drawing layer. Use Create Empty Drawing to create a blank drawing, ensuring that this drawing layer will be exported. Then you can use the Rotate tool to set the pivot point on this drawing layer. In the Space Duck example, an empty drawing layer called `hook_gun` was created on which you can attach the locator.

When you access the imported Harmony character in Unity, you can access the data with a script.

How to set a target to a part of a character

1. Select **Game Object > Create Empty** to add a new GameObject to extract the target's position, rotation, and scale.

2. Drag and drop the new object so that it's a child of the character.

   It becomes indented.

1. Rename the GameObject to: `Hook Gun`.
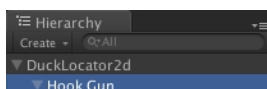
2. In the Inspector of the target object, select **Add Component > Scripts > Harmony Locator**.

3. Enter the name of the drawing layer to which you want to attach.
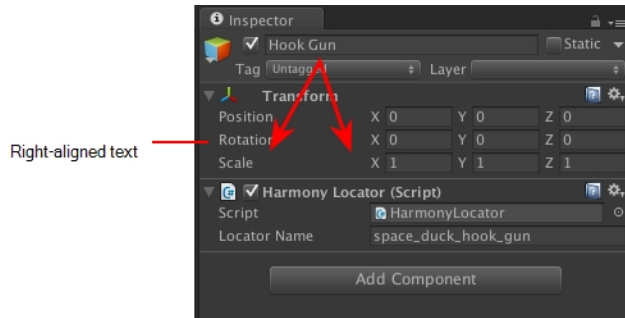
4. To find the exact name for the Locator Name, look at the `skeleton.xml` file in the Streaming Assets folder. You can find it in **Streaming Assets > Harmony Resources > Name of Harmony File > skeleton**.

All the drawing and peg layers are listed. In this example, look for `space_duck_hook_gun`. Having drawing layers with distinctive names makes them easy to recognize when you need to retrieve them.

You can copy the name of the layer into the Locator Name to see the Transform information updating dynamically as you run the simulation.

5. Now you can attach anything as a child of this Locator Object. For testing purposes, you could attach a cylinder for example. In a real example, you'd want something to shoot out of the end of the gun, so you can see the Callback example to verify how that works.

Bounding Boxes and Collisions

Extracting the bounding box information is useful when you want to make something collide with your character. When you put a 2D character into a 3D scene, you may want to use Physics to make the 2D character collide with the 3D plane. To use the following scripts, you will need Unity 4.3 or higher.

In the Demo scene, open the DemoPhysics example to see collisions and bounding boxes. In this example, there's a 3D plane and some 2D characters. The 2D characters have a collision defined with their bounding box, and they're also reacting to the physics of the scene to fall with gravity.

Colliders were improved to provide several different types of colliders for use in Unity. You can select polygon colliders and box colliders for a more accurate bounding box.

How to enable a collision based on the bounding box of the character

1. Select your imported character.

3. In the inspector, select **Add Component > Physics 2D > Box Collider 2D**.

4. To enable the Physics on the character, go to **Add Component > Physics 2D > Rigid Body 2D**.

NOTE: You can also use 3D physics on the imported files.
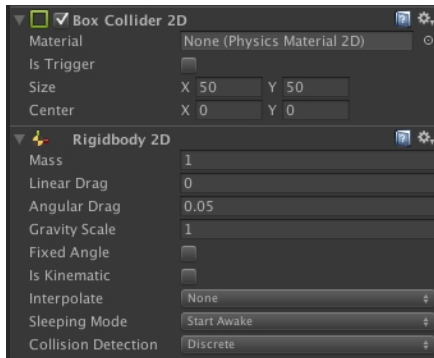
You can now adjust the variables and see the results.

Working with Audio

When you create scene files in Harmony with audio, the audio is exported into the project folder. However it's important to understand how the game is built to determine the best way to handle audio.

When a game is built from Unity, it creates its own database for holding the assets. Within the export, the Streaming Assets folder is preserved intact. This is what enables the Toon Boom plugin to access those assets on the fly, and render them in the camera to create the final animation you see on the screen.

However when it comes to audio, the game first looks for the audio in the Unity database. So this is the most efficient place to store the audio for the real game.
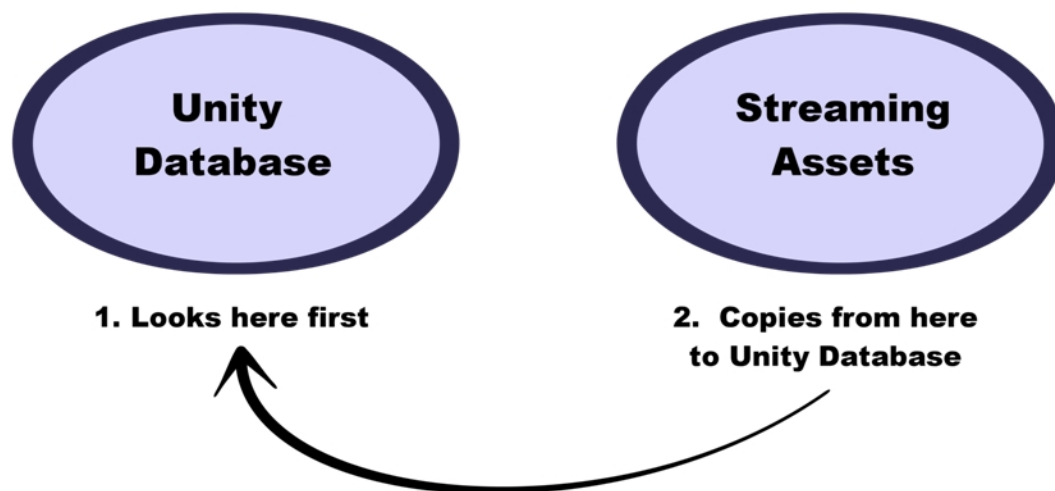
If audio can't be found in the Unity database, then the game looks in the Streaming Assets folder to find the audio. When it does, it copies the audio on-the-fly back into the Unity database. Since this action is quite costly, don't

leave the audio in the Streaming Assets folder for the final game. It's fine to leave it there while you're testing, but not for the final game.

The audio should be copied back into the Unity database, either manually or by automating this process with a script.

Export to Sprite Sheets

The Export to Sprite Sheets window export to multiple resolutions, generating multiple .xml files and one or multiple sprites sheets depending how many sprite resolutions you defined.

This saves different animations of the same character into the same name. For example, if there's an idle, run, and jump animation, these should all share the same Save Name. You can think of it as the overall collection of animations. Inside are the different saved scene versions whose drawings you can reuse for all the animations in that character set. Each scene version will be displayed as an item in the list.

When you export an animation, only the drawings used in that scene are exported. All the drawings are exported individually first and then atlased together into a sprite sheet.

If you saved multiple animations to the same Save Name (i.e. SpaceDuck: run, idle), then it will reatlas the sprite sheet to include all the drawings from all the animations in that folder, creating a new animation file, but reusing the same skeleton.

How to access the Export to Sprite Sheets window

1. From the top menu, select **Windows > Toolbars > Game**.

   The Game toolbar appears above the Camera view, to the left.

   Export to Sprite Sheets   Export to Easel JS

   Toggle Anchor   Toggle Prop

2. Click the Export to Sprite Sheets button.

Parameter	Description
Select Directory	
Save Path	The folder path where you want to save your export.
Save Name	The folder name in which you will save your export. This will also be the name of your asset in Unity. Your scene file name will be used as the clip name.
Existing Clips in Folder	
Overwrite Project	The folder name in which you will save your export. This will also be the name of your asset in Unity. Your scene file name will be used as the clip name.
Clear Texture Folder	Removes any information from the texture folder within the Harmony file. This has no incidence towards the Unity export but contributes to a lighter Harmony file.
Project Settings	
Unit Scale	Lets you change the scale when exporting to Unity to accommodate the size of the export without it affecting the Harmony scene. This helps you resize assets properly for Unity without having to resize them in Harmony. The basic scale is one Animation Field for one Unity unit.
Sprite Sheet Preferences	
Max Width	This is a value, in pixels, for the maximum width and height the exported sprite sheet should be. By default, both values are set to 2048 pixels.
Max Height	Makes linear values for interpolation. This increases the amount of memory used but frees up the calculation so it is not done on the fly.
Expand Sprite Sheet	Uses the minimum size necessary up until it reaches the maximum resolution.
Fixed Sprite Sheet	Creates a texture of the specified size (Max Width and Max Height) even if it does not fill it up completely by all the drawings in your scene.
Resolution Type	**POT**: Exports to sprite sheets with sizes that are a power of 2. For example: 1024 x 1024. This is optimized for many graphics cards, but consumes more memory. **NPOT**: Some game engines are optimized specifically to render to non powers of two, so that it will avoid those numbers. Example: 1000 x 1000.

Reuse Frames	This option works in tandem with the Threshold option. The export will compare the drawings in your project to reuse a maximum of similar drawings and reduce the amount of information found in the sprite sheet, making it lighter. The export will omit the creation of new drawings if the difference is less than the threshold percentage.
Threshold	Calculates the differences between multiple drawings. A 2% threshold will prevent the creation of a new drawing if the drawing is too similar to an existing drawing. For instance, with a 2% threshold, and my drawing is 100 pixels big, only 2 of those pixels need to be different from my other drawing in order to create a new one. The higher the threshold, the fewer similar drawings you will have.
Sprite Resolutions	Size of the render of the individual sprite, when it exports each drawing out.
Precalculate Curves	Makes linear values for interpolation. This increases the amount of memory used but frees up the calculation so it is not done on the fly.

Export to Easel JS

The Export to Easel JS window lets you a flattened image sequence of your animation. Even if you have a fully rigged puppet or a single drawing layer with your animation sequence, the outcome will still be a flattened output of each frame, grouped together in your sprite sheet. This allows for more flexibility and freedom of work as you have access to any tools or effect modules you want to use. However, this can result in heavier files depending on the length, complexity and export size of your animation.
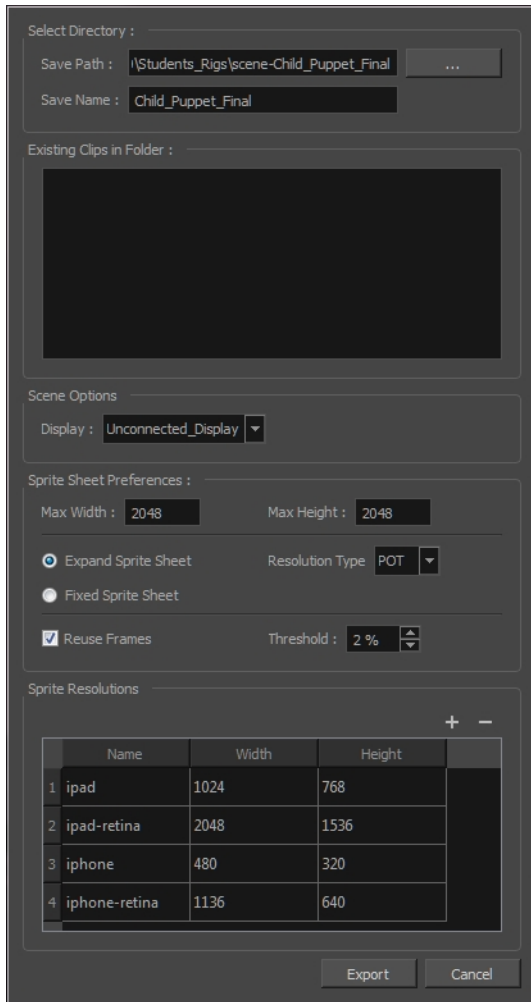
How to access the Export to Easel JS window

1. From the top menu, select **Windows > Toolbars > Game**.

   The Game toolbar appears above the Camera view, to the left.
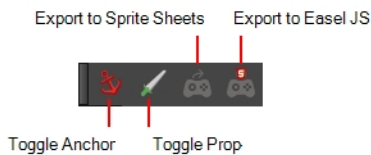
2. Click the Export to Easel JS button.

Parameter	Description
Select Directory	
Save Path	The folder path where you want to save your export.
Save Name	The folder name in which you will save your export. This will also be the name of your asset in Unity. Your scene file name will be used as the clip name.

Existing Clips in Folder	Displays the clips in the folder.
Scene Options	
Display	Here, you must select the Display of your character. This is the one that will be used to render out all of the information attached to that Display node. If the Unconnected_Display option is selected, all of the visual information in your scene will be rendered out.
Sprite Sheet Preferences	
Max Width	This is a value, in pixels, for the maximum width and height the exported sprite sheet should be. By default, both values are set to 2048 pixels.
Max Height	
Expand Sprite Sheet	Uses the minimum size necessary up until it reaches the maximum resolution.
Fixed Sprite Sheet	Creates a texture of the specified size (Max Width and Max Height) even if it does not fill it up completely by all the drawings in your scene.
Resolution Type	**POT**: Exports to sprite sheets with sizes that are a power of 2. For example: 1024 x 1024. This is optimized for many graphics cards, but consumes more memory. **NPOT**: Some game engines are optimized specifically to render to non powers of two, so that it will avoid those numbers. Example: 1000 x 1000.
Reuse Frames	This option works in tandem with the Threshold option. The export will compare the drawings in your project to reuse a maximum of similar drawings and reduce the amount of information found in the sprite sheet, making it lighter. The export will omit the creation of new drawings if the difference is less than the threshold percentage.
Threshold	Calculates the differences between multiple drawings. A 2% threshold will prevent the creation of a new drawing if the drawing is too similar to an existing drawing. For instance, with a 2% threshold, and my drawing is 100 pixels big, only 2 of those pixels need to be different from my other drawing in order to create a new one. The higher the threshold, the fewer similar drawings you will have.
Sprite Resolutions	Size of the render of the individual sprite, when it exports each drawing out.

Chapter 12: Troubleshooting

Unity Questions

Q. My Harmony asset does not appear in the Unity Editor.

A. There are several possible reasons for this. Check the following:

- ‣ Has the HarmonyRenderer plugin been copied to the Assets/Plugins directory? The plugin is named **HarmonyRenderer.bundle** on Mac OS X and **HarmonyRenderer.dll** on Windows.
- ‣ Is the clip name valid ? Make sure the clip name exists in the stage.xml file.
- ‣ Are the binary files up to date? If you updated the Toon Boom Game Engine SDK to a newer version, make sure to regenerate the binary files if you use them so they're compatible with the SDK.

Q. My Harmony asset does not appear in iOS or Android when exported from Unity.

A. There are several possible reasons for this. Check the following:

- ‣ Make sure the Harmony assets are copied in the **StreamingAssets** directory. Since the HarmonyRenderer plugin cannot use Unity's asset database, the Harmony assets were packaged as plain files so they are accessible to the plugin.
- ‣ Is the plugin for iOS the same version as the one used for the editor? The plugin for iOS is in the **Assets/Plugins/iOS** directory.
- ‣ Is the clip name spelled correctly? Windows and Mac OS X aren't usually case sensitive file systems, but iOS and Android are. This implies that an asset that is visible on the editor will not appear on the mobile platform because it cannot be found.
- ‣ Make sure the size of your sprite sheets does not exceed the hardware limit of the device you're working on. Otherwise, the texture might not appear at all.
- ‣ Is the path to the project folder an absolute path? If it is, it might not work on the mobile device as that path will not exist on the platform. Make sure to use relative paths to the **StreamingAssets** directory.

Q. My Harmony asset does not composite properly with other 2D sprites in Unity. The 2D sprites always appear behind the Harmony assets even if I change the order index in the GameObjects.

A. The 2D sprites from Unity and the Harmony assets cannot currently composite together. There are, however, several solutions for working around this problem:

Use 2D textures instead of 2D sprites. The 2D textures, when attached to a geometry in Unity, will composite like the other 3D elements in the scene and you can change the compositing order by incrementing or decrementing the Z value of the transform.

Use multiple cameras to render your scene in parts. Here's how:

Harmony Camera

1. Create a new camera.

2. Make sure you set the Harmony GameObjects to a specific layer (top-right of the game object inspector).

3. In the camera, set the culling mask to this layer (and the other layers you want rendered in the background).

4. Add the HarmonyCamera component to this camera so the Harmony GameObjects render properly.

Sprite Camera

1. Create a new camera.

2. Make sure to set the 2D sprite objects to a specific layer.

3. In the camera, set the culling mask to this layer (and the other layers you want rendered in front of the 2D sprites).

4. Make sure to set the clear flags to **Depth Only** or **Don't Clear**.

5. Set the depth to be higher than the Harmony camera.

6. Afterwards, if you move the camera, make sure to move both cameras simultaneously if you want to keep Game Ojects in sync.

Q. How can you specify the frame rate of the animation? My animation does not play at the same frame rate in Harmony and in the Game Previewer in the Unity Editor.

A. The Game Previewer previews the animation at a default of 24 frames per second. In your game, using the HarmonyAnimation component, you can schedule animations at the speed you want.

Example

```
HarmonyAnimation animation = GetComponent<HarmonyAnimation>();

if (animation != null)

{

animation.PlayAnimation( frameRate, clipName );

}
```

Q. I cannot see my character in the Scene view in Unity. Is there any way to preview the Harmony asset?

A. Since the rendering of Harmony assets is implemented in a plugin, it does not update any Renderer component in the GameObject, and so cannot be shown directly in the Scene view.

However, you should still be able to preview your assets in the Game view (even when not playing). To help find and position assets, we also added bounding box shapes rendered in the editor and the Game view.

Q. How is memory management handled in Unity for Harmony assets?

A. Most of the memory extensive algorithms are executed in the C++ plugin. The data structure is maintained alive as long as a GameObject refers to it. This means you can instantiate as many clones of a character without reloading the data. Upon destruction, the GameObject will issue a clean-up call to the plugin and delete its associated rendering object. The sprite sheet and animation data are kept alive as long as a single GameObject uses them and a cleanup call is issued once they are destroyed.

Q. The Harmony assets memory does not appear in the Unity profiler. Can we profile the assets memory?

A. The Unity profiler does not pick up Harmony assets in its traces. Since the Harmony GameObject refers to a C++ plugin for its asset management and rendering, its memory cannot be recorded in the profiler. Profilers such as the one provided with XCode or Visual Studio should allow you to track your application's memory including the Harmony assets and should also provide a more accurate result.

General Questions

Q. How can you specify the resolution used for the drawings in the sprite sheet?

A. The drawing resolution is not fixed in Harmony. Since you're exporting the scene to multiple sprite sheets in multiple resolutions, every drawing will have a different resolution in the end. You can use the Drawing view to see the resolution of a drawing compared to the rest of the scene. By enabling the light table in the Drawing view, you will see all of the scene's drawings untransformed in the same proportion as they will appear in the sprite sheet. More specifically, the resolution used in the sprite sheet for a drawing is the size it appears untransformed in the Camera view, scaled to the sprite sheet resolution ("Sprite Resolutions" in the Export Sprite Sheet dialog box).

Once you know that, you can easily adjust the size of a single drawing. Use the Select tool to scale down a drawing and use the Transform tool to scale it back up so it does not change visually in the Camera view. This should allow you to alter the size of drawings in the sprite sheet.

Q. The assets take time to load on mobile devices. Is there any way to speed up the process?

A. Harmony exports an interchange XML format that is intended to be compatible with multiple game engines. However, reading data from the XML files is slow and this is mostly intended to test the assets in your project. At some point, they should be converted to a binary compact data structure that can be read into memory a lot faster than the XML.

You can use the Xml2Bin tool provided with the game engine SDK to convert your XML files to binary. This tool is in the `Utils/Xml2Bin` folder and a precompiled version for Mac OS X is available in the `Utils/macosx` folder.

Q. There are problems with the character I exported in the game engine. Pieces are not exported or are not showing in the proper order. What can I do ?

A. To integrate with the game engine SDK, all animations in Harmony must follow certain guidelines. Here are some of the key points for building a character that is compatible with the rendering in the game engine SDK:

- ‣ Build your rig in the Timeline view. The game engine SDK data structure is similar to what is displayed in the Timeline view and an advanced node system might not always export properly.
- ‣ Because every top level node in your scene will render separately in the game engine SDK, they may not intersect. A top level node is also isolated in its separate sprite sheet to allow the artist better memory segmentation of the character. If you created a character with top level nodes and this was not the intended result, create a top level group or peg to group them all together.
- ‣ Use micro-Z ordering if necessary. With no Z ordering, a child layer will appear behind its parent (as it does in Harmony). To change the ordering, add some Z offset to the child layer.
- ‣ The export script does not handle plain bitmap images. Toon Boom vector drawings and Toon Boom bitmap drawings are supported though.
- ‣ The export script does not handle symbols.

Glossary

3D stereoscopic	The ability to create stereo images which, when animated and viewed through 3D active shutter glasses or using glasses with one red and one blue lens, will appear as a three-dimensional movie.
alpha channel	An image channel that carries transparency information. An image already has three channels: red, green and blue (RGB). The alpha channel is the fourth channel (A). The matte, or the transparency information, is stored in this fourth channel. An image without an alpha channel is always opaque.
animatic	A movie with sound that is developed from the storyboard. The storyboard panel is exposed for the duration of the scene and at times, the characters are placed on a trajectory to indicate motion. The camera moves are also animated. The animatic is used to determine the rhythm of a project and provides a good overview of the project before beginning production.
animation	A simulation of movement created by displaying a series of pictures or frames.
anime	An animation style known for its sinister and dark feel; popular in Japan.
arc	Action rarely occurs in a straight-forward manner; rather it typically unfolds in what storytellers refer to as an arc. The purpose of a story arc is to move a character or situation from one state or scenario to the next.
aspect ratio	The relationship between the width and height dimensions for any scene, frame or film format. Television ratio is 4:3 and widescreen ratio is 16:9.
auto-feed	An automated method of feeding drawings into a scanner in which multiple drawings are stacked into a sheet feeder. When the scanner is activated, the drawings are scanned consecutively, without further user intervention.
automatic lip-sync detection	Automatically mapping drawings in an element to the mouth chart generated for a sound. This can save time when lip-syncing a voice track.
axis	An imaginary line around which an object rotates. For 2D graphics, there are two axes: X (horizontal and Y (vertical). For 3D graphics, there are three axes: X (horizontal, Y (vertical) and Z (depth). In animations that constantly rotate, the axis element specifies what axis the object rotates around. A negative number causes an animation to rotate counter clockwise whereas a positive number causes an animation to rotate clockwise.
background	The part of a scene that is farthest to the rear. The background is the artwork, or decor, against which the animation takes place.
Bézier	A method of defining curved lines invented by French mathematician Pierre Bézier. A Bézier curve is a mathematical or parametric curve. Bézier curves use at least three points to define a curve.
bitmap	An image composed of pixels with a single resolution (size). If it is enlarged too much, it will lose definition and individual pixels will begin to appear. This is known as *pixelation*. Bitmap image files are defined as a standard rectangular mesh of individual pixels. Each individual pixel contains a value that represents a specific colour.

breakdown	In cut-out animation, breakdown is the action of breaking a character into pieces to create a puppet with articulations. To break down a character, the artist cuts parts, such as the hands and arms, from the character's model and pastes them in separate layers. Next, the joints are fixed and the pivots set.
	In traditional animation, a breakdown is an animation pose generally found between two key poses. The key poses are the main poses in an animation and the breakdowns are secondary poses, ones that help describe the motion and the rotation curve (usually referred to as an *arc*).
camera shake	Camera shake occurs in a scene when the camera moves slightly and quickly in several directions. This gives the impression of an impact, vibration or, for example, bumps on the road.
caption	A text field containing dialogue, effects, sound or slugging information in a storyboard.
cel	In traditional animation, a cel (also known as *celluloid*) is a transparent sheet on which the animation is inked and painted before being sent to the camera. The picture's outline is drawn on the front of the cel and then coloured along the back.
character design	Each character in an animated film is drawn from multiple angles in poster-style format, called a *model sheet*, which serves as a reference for the animators.
chromatic aberration	In optics, chromatic aberration (CA), achromatism or chromatic distortion, is a type of distortion in which there is a failure of a lens to focus all colours to the same convergence point.
clean up	After rough drawings have been tested and approved, all the noise in the image (excess lines, notes, etc.) is removed to create final drawings which can be inked, painted and shot. The clean up process refers to either tracing a clean line over a rough drawing to achieve the final version or removing dirt and extra lines left by the scanning process.
CMYK	Acronym for Cyan, Magenta, Yellow, Black. These colours are the standard model used in a process called offset *printing*.
colour card	A colour card is a card containing one solid colour that is the same size as the camera. The colour card fills the background with a solid colour when there is no background image included.
colour model	The official colour design that must be used to paint the animation. A model is the definitive character, prop or location design that each artist must follow for the production.
colour wheel	A display of the colour spectrum in the form of a circle.
compositing	Compositing is the action of incorporating all of a scene's elements to create the final result prior to rendering. For example, the compositing artist will import all the animation sequences, background, overlays and underlays in the scene and position them correctly. The artist will then set the camera frame and animate it, if needed. Finally, the animator will create all the computer-generated effects for the project.
cross dissolve	An effect used to fade two scenes, one into the other.
cut	A direct transition between two scenes. When a cut is used, there are no transition effects inserted to pass from one scene to the next. The first scene ends and the second one starts immediately.
cut-out animation	The process known as *cut-out animation* is the action of animating characters made out of several pieces by moving them around frame by frame. Cut-out animation can either be

	computer generated or done traditionally using paper.
cycle	A group of images that together make up an action, such as walking. A cycle is an action repeated as a loop over a period of time. It can be a series of animated drawings or keyframes.
dialogue	The text spoken by a character in a movie or animation.
dope sheet	Used by animators, directors and other members of a crew to track the sequence and timing of images, dialogue, sound effects, sound tracks and camera moves. Also known as an *exposure sheet*.
doping	To assign a particular drawing to a range of frames.
double bounce walk	In the key frames and passing positions in a double bounce walk, the body is lower than a reference line drawn in the upright position. During the in-betweens, the body is above this line giving the appearance of a bounce.
DPI	Dots per inch is the standard measure of resolution for computerized printers. It is sometimes applied to screens, in which case it should more accurately be referred to as *pixels per inch*. Either way, the dot is the smallest discrete element making up the image.
ease	In animation, the ease, also known as *velocity*, is the acceleration and deceleration of a motion. It can be a motion created by a function curve, or a series of animated drawings. Other common terms for ease-in and ease-out are slow-in and slow-out.
ease-in	Gradual acceleration in the action. Also known as *slow-in*.
ease-out	Gradual deceleration in the action. Also known as *slow-out*.
establishing shot	A scene in which the viewer can see the whole area in which a sequence is happening. For example, if a child is playing on the ground in front of his house, the establishing shot would be a scene where the viewer can see the house, the ground, a part of the street and the buildings around the central point of action. This helps the viewer understand the story location and scene orientation.
exposure	In animation, an exposure is the number of cels on which a drawing appears in the scene. For a drawing to appear longer, the exposure must be extended over a greater number of cels.
exposure sheet	A sheet with several vertical columns and horizontal frames used to indicate a scene's timing. Each column represents a scene layer. The drawing numbers in each column are indicated and repeated over the particular amount of frames they need to appear. The exposure sheet is used by animators, directors and other members of a crew to track the sequence and timing of images, dialogue, sound effects, sound tracks and camera moves. Also known as a *dope sheet*.
fade in/fade out	Fade in or fade out is a transition effect used to open or close a sequence. A fade in occurs when the first scene appears progressively, from complete transparency to its complete opacity. A fade out occurs when the last scene progressively disappears, going from complete opacity to complete transparency.
fast-in	Dramatic acceleration at the start of the action.
fast-out	Dramatic acceleration at the end of the action.
field	A measurement unit used to calculate motion, registration and camera positioning. A standard animation scene will vary between 6 to 12 fields.

field chart	A guide containing all the field units that animation and layout artists use to determine a scene size or camera motion.
film-1.33	A resolution that is ideal for the widescreen film format that conforms to the standard 4:3 pixel aspect ratio.
film-1.66	A resolution that is ideal for the widescreen film format that conforms to the 16:9 pixel aspect ratio. (The pixels are wider than they are high).
flipping	In traditional animation, flipping is the action of going through the drawings of an animation sequence very quickly in order to see the animation in motion. Flipping can also be the action of creating a mirror transformation of an object.
follow-through	The secondary motion caused by the main action. For example, a character wearing a cloak is running. The main action is the body running. This will cause the cloak to follow the motion, although it will not move at the same time, but react a few frames later and follow the main motion curve.
forward kinematics	Forward kinematics is a feature used to animate principally 3D characters and cut-out puppets with hierarchy. It is used to animate a puppet from one of parent parts, such as a shoulder, and make the rest of the arm move with it as a single piece.
frame	An animation frame is a single photographic image in a movie. In traditional animation, the North American standard generally contains 24 frames per second, while in Europe the standard is 25 frames per second.
frame rate	The frame rate is the speed at which the frames are played. They are generally calculated by frame per second. For example, a scene could be played back at 12, 24, 25, 30 or 60 frames per second or any other number. This is the measurement of the frequency (rate) at which an imaging device produces unique consecutive images, called *frames*. The term applies equally to computer graphics, video cameras, film cameras, and motion capture systems. Frame rate is most often expressed in frames per second (fps) and in progressive-scan monitors as hertz (Hz).
function	A computer-generated motion, trajectory or path on which elements, other trajectories and effects parameters can be attached. The function can be controlled by adding keyframes and control points on the function curve.
gamut	The range of colours that a particular device can represent.
HDTV	Acronym for High Definition Television which delivers a higher quality image than standard television because it has a greater number of lines of resolution. To take advantage of the superior quality and make full use of your resolution setting, the output device must be compatible with HDTV technology.
hold	A frame in the animation in which the character maintains its position without moving. A hold can be created between any two keyframes.
HSV	Hue, Saturation, Value. A method of defining colours in terms of hue (tint), saturation (shade) and value (tone or luminance).
in-between	The drawings that exist between the key poses. These are drawn to create fluid transitions between poses.
ink and paint	The ink and paint process is the action of painting the empty zones and colouring the lines

	on the final animation drawings, while following a colour model.
interpolation	The computer-generated motion created between two keyframes. You have the choice to create interpolation, or not, between your keyframes.
inverse kinematics (IK)	A feature used mainly to animate 3D characters and cut-out puppets with hierarchy. Inverse kinematics will animate a puppet from one of the extremities, such as a hand, and make the rest of the body follow naturally.
jump cut	A jerky cut between two scenes. Typically, a jump cut is not visually pleasing. It is generally caused by one scene ending, and a second one starting, with a similar image. The lack of difference causes the eye to see a little jump between the two scenes.
key pose	Important positions in the action defining the starting and ending points of any smooth transition. Keys, or key poses, are the main drawings in an animation sequence describing the motion. For example, if an arm is waving, the keys will be of the arm at one extremity of the wave motion and the other extremity. By flipping those drawings, the animator can see the skeleton of the motion without having all the drawings.
keyboard shortcuts	One or more keyboard keys which, when used, cause an operation to be performed.
keyframe	Important positions in the action defining the starting and ending points of any action. A keyframe is a computer-generated position at a specific moment (frame) on a given trajectory.
layer	In animation, a layer is an individual column, level or character. A scene's layers are superimposed to form the final image.
layout	The communication step between the storyboard and the animation. It is the action of putting the storyboard on model. That is, drawing the character by following the design in the model pack, so the animator can start working. The layout artist draws the background, creates the camera and field guide matching the scene and camera motion. Lastly, the animator draws on model the main action poses.
layout and posing	The action of putting on model (at the right scale) the storyboard for the animator to start working.
layout artist	The artist who draws the background, and creates the camera and field guide to match the scene and camera motion. They will draw on model the main action poses.
layout planning	Drawing of the main features of the scene used as reference when planning the animation and executing the initial stages of it.
layout process	The communication step between the storyboard and the animation.
library	A storage area containing templates and assets that can be reused in any project or scene.
light table	A device that allows you to see other layers in transparency while you are working on a particular layer.
line of action	The direction that the action will follow. Also known as *path of action*.
lip-sync	The process of synchronizing a character's mouth to sounds in the dialogue soundtrack. The mouth is adjusted frame-by-frame to match the sound of the dialogue and provide the illusion that the character is speaking. Lip-sync can be used for any sound sequence, not only speech, you could for instance have a bird chirping or a wolf howling at the moon.
low resolution	A format that is ideal for videos destined for the web, where size and fast download of a

	video file take precedence over quality. A low-resolution image is one that lacks fine detail.
manual lip-sync detection	The manual swapping of mouth position drawings to match a voice track. For this process, both sound scrubbing (listening to a sound wave broken up frame-by-frame) and drawing substitutions are used.
master palette	A group of colours attributed to a character or prop. The palette is used throughout the entire production to maintain consistency in the look and to ensure that the same colours are used throughout the production. Also known as *palette*.
model/colour model	The definitive character, prop or location design each artist must follow for a production. A colour model is the official colour design that must be used to paint the animation.
morphing	A feature for creating computer-generated drawings between a source drawing and a destination drawing. Animation created with the morphing feature can be reused in different projects.
motion keyframe	A keyframe with computer-generated interpolation.
mouth chart	A chart based on the eight animation phonemes (A, B, C, D, E, F, G, and X, which is used to represent silence) used for lip-sync.
multiplane	The effect of passing through multiple levels of drawings to create a sense of depth in a shot. A multiplane is a scene in which the layers are placed at different distances from the camera so that when the camera moves, a depth illusion occurs. With a multiplane, all the perspective and scale is calculated automatically.
NTSC	The standard analogue television broadcasting system used in North America. NTSC conforms to North American standards on how rectangular pixels are displayed for computer and television screens.
nudge	A small push (left, right, up, down, forward or backward) done with the keyboard arrow keys on a selected element. Nudging is used to move a selection very slightly and precisely.
onion skin	A feature that lets you see the previous and next drawings of a sequence.
overlay	A part of the scene environment, such as a chair or a bush, that is placed in front of the main animation.
PAL	A resolution that works best with the European format for television and computer screens, as the rectangular pixels are displayed at a different orientation.
palette/master palette	A palette or master palette is a group of colours attributed to a character or a prop. The palette is used throughout the entire project to maintain a consistency in the look and avoid the colour changing during the animation. Also referred to as a master palette.
palette style	A palette style is a second version of an existing palette with a slight change in the tint and value. A palette style can be used to create the night version of a palette. It may also be called a clone palette.
pan	To move the camera across the scene in any direction.
panel	In a storyboard, a panel is a frame in a shot. A shot can be composed of one or several panels.
paperless animation/tradigital	The paperless animation process is the action of animating digitally. The main paperless animation process is to draw, frame by frame, the animation directly in the software.
passing position	When drawing a walk sequence for a character, the passing position is the point at which one leg passes the other.

path of action	Direction that the action will follow. Also known as *line of action*.
peg	In traditional animation, a tool used to ensure accurate registration of action as cel layers move. In digital animation, in which you are doing a more advanced puppet rigging, you can use peg layers. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to add path articulations. For the latter, you can also use an inverse kinematics tool.
phoneme	A unit of sound in a language.
pivot	The point around which a peg or drawing rotates.
pixel	The smallest element of an image displayed on a monitor or TV screen. Pixel, short for *picture element*, is a single point in a graphic image. It is a small sample of an image, a dot, a square, or a very small section made out of smooth filtering. If you zoom in close enough on a digital image, you will see the pixels, which look like small squares of different colours and intensity.
pose-to-pose animation	The pose-to-pose animation process is the action of creating all the main action poses, called *key poses*, and then placing the secondary poses between the keys. The secondary poses are called *breakdown*. Finally, the animator fills the gaps with the in-between drawings to achieve a smooth animation.
rendering	The final step when animating by computer. During rendering, the computer takes each pixel that appears on screen and processes all of the components, as well as adding motion blur before it produces a final image. The process of calculating the final images after the compositing process.
resolution	The size of a scene, generally calculated in pixels. For example, the NTSC resolution is 720 x 480. The resolution should match the final output: HDTV, film-1.33, film-1.66, NTSC, PAL, low.
RGB	Red, Green, Blue. A method of defining colour by specifying amounts of these three colour components.
rigging	The process of attaching the various parts of a cut-out puppet.
rotary table	Equivalent to the animation disk/table, a device that allows you to rotate the workspace for greater comfort while drawing.
rotoscoping	An animation technique in which animators trace over live-action film movement, frame by frame, for use in animated films. The act of sketching over live-action footage to create an animated sequence.
roughs	Rough is a common name in an animation movie for a drawing that is used as a reference but which does not form part of the final image. A layout is a rough. The skeleton sketch of an animation or design. Roughs mainly consist of sketch lines and shapes, but can also contain design details.
safe area	The zone at the center of a scene's frame that is safe from being cropped by the TV frame. As a TV frame cuts a margin off the original frame size, maintaining a safe area ensures that the scene's main action will remain clearly visible once the film is screened on television.
scene	A shot in a movie or show. A sequence is composed of several scenes. A scene changes to another scene by a simple cut or transition.

script	The original text containing all the movie or show information. In animation, the script contains all of the location descriptions, dialogue, time and more. A project starts with a script.
sequence	A series of scenes or shots forming a distinct part of the story or movie, usually connected by unity of location or time.
shot	A scene in a movie or show. A sequence is composed of several shots. A shot changes to another shot by a simple cut or transition.
slow-in	The gradual acceleration in the action. Also known as *ease-in*.
slow-out	The gradual deceleration in the action. Also known as *ease-out*.
slugging	To indicate the start and stop times of dialogue and relevant actions.
sound scrubbing	A process that lets you hear sound in real time while you move the playhead forward or backward. This is very useful for finely-tuning a lip-sync.
stop-motion keyframe	A keyframe with no computer-generated interpolation.
storyboard	A visual plan of all the scenes and shots in an animation. The storyboard indicates what will happen, when it will happen and how the objects in a scene are laid out.
straight-ahead animation	A technique in which an entire sequence is drawn from the first position to the last, in order. There is very little planning in this methodology. Where the character ends up and how it gets there can be a surprise for both the audience and the animator. While this approach is spontaneous and creative, it can create inaccurate results.
strokes	Invisible vector lines forming the drawing zones. They can be adjusted with Bézier handles.
symbol	A symbol combines animation, artwork or layers into a single object that you can control in one layer. You can also create symbols out of each body part in your cut-out puppets. You can place whatever you want in a symbol. You can use symbols to animate a puppet or create reusable animations such as blinking.
tablet/pen	A device used in conjunction with, or instead of, a mouse to move a mouse pointer (sometimes referred to as the *cursor*) around the computer screen.
template	An asset stored in the library that can be reused in any project. A template can be a drawing, a series of keyframes, a sound file, a panel, a cut-out character, an effect, a trajectory, an animation, or anything else used in the animation.
thumbnail	A very small image used as a reference or indicator.
timecode	The timing information printed on a movie clip to indicate the scene, hour, minute and second that is currently displayed on the screen.
timeline	A horizontal representation of a scene's elements, timing and keyframes.
trace and paint	After the rough animations have gone through cleanup and a final line or pencil test, each drawing is traced and painted for the final animation. In today's digital world, this may be done in a variety ways other than the traditional celluloid or acetate methods.
track breakdown	The break down of an animated film's soundtrack into individual sounds to produce the precise frame-by-frame position of each sound.
traditional	A type of animation process whereby all the animation sequences are drawn by hand on

	paper before scanning or inking them on cels.
trajectory	A computer-generated path or trajectory that elements can follow. The trajectory can be controlled by control points, keyframes and velocity.
transition	An effect placed between two scenes as they pass from one to the other. Common transition effects are cross-dissolve and wipe.
underlay	In animation, an underlay is a specific part of the decor placed behind the main animation.
vector	A vector-based image is composed of points and Bézier curves. The computer reads the points and traces the segments, linking them to reproduce the image shape. There is no fixed size or resolution in a vector image. The graphic can be enlarged and distorted as much as desired and the system will simply recalculate the segments and rebuild the shapes. Vector images are translated and displayed in pixels once the calculation is done.
velocity	In animation, the velocity, also known as *ease*, is the acceleration or deceleration of a motion. This can be achieved by a function curve, or via a series of animated drawings. Other common terms for ease-in and ease-out are *slow-in* and *slow-out*.
walk cycle	A series of drawings "on the spot" that describe the walk for a character. The illusion of movement is created by the use of background pans. To avoid making innumerable drawings, animators routinely make a walk cycle for a character.
zone	An area which can be painted with colour.

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