

Creating Tweens in OpenToonz:

Automatic Keyframing

The major visual transition points in an animation are called keyframes. In-between 2 keyframes, the frames will show a transition between the starting point and the ending point. Originally, creating the in-between frames had to be done entirely by hand (and still can be). However computer software can now automatically create many of those in-between frames. This process is called tweening and the resultant in-between frames are called tweens (short for in-between). Tweens can save you a lot of time. Sometimes however, tweens can look incredibly obvious and unnatural so use them carefully.



We will practice tweening by making a brief animation that uses at least one keyframe tween (including both a color change and change in either position, size, or rotation), one automatic tween, and one tween that follows a motion path. We will also add our bouncing ball into this animation as a sub-x-sheet. This animation can be abstract and does not need to make any sense.

- A. Create and save a new scene** *(there is no need to create a new project - we will use the same project that our bouncing ball animation is in)*
 1. **File** → **New Scene** *(if you do not have a scene open/loaded, you can skip to the next step and save the empty scene)*
 2. **File** → **Save Scene**
- B. Create a new level**
 1. The level should have 1 frame and 2 steps
 2. **Create a Keyframe Tween that includes a color change and a change in either position, size, or rotation:**

Keyframe Tweens (Motion Tween in Flash)

- can change the color (except for raster levels), size, position, and/or rotation of a drawing
- can be combined with motion paths

To Keyframe size, position, rotation, or shear

1. In the X-sheet window, select the frame you just created and draw the object you would like to tween (tweening works best if you keep different objects in different levels)
2. The next step is to reposition the center/pivot point of the object (this will give you much better control)
 - a. From the toolbar, select the Edit Tool  (first tool at the top or on the left).
 - i. Make sure the correct level is selected 
 - ii. Change from "Position" to "Center" in the tool properties (this selects the center/pivot point of all objects in the current level)



- iii. You should see the center - a pink circle with a + in the middle. Move this pivot point to the optimal position - most likely the middle of your drawn object



- iv. Change the Edit tool's property **back to "Position"** from "Center"

- 3. In the bottom of the viewer, click on the key icon to make a keyframe (you may need to expand the viewer in order to do so)

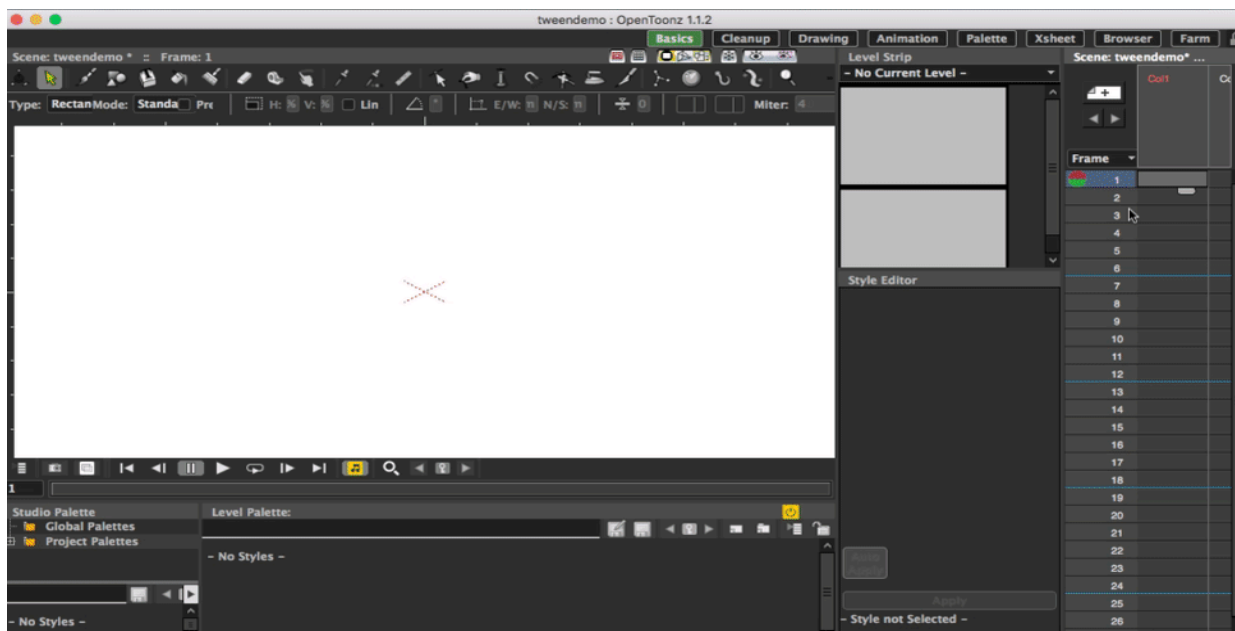


- a. There should be a key icon  in the X-sheet as a result

- 4. Now in the X-sheet window, click on the small tab on the bottom of your frame and drag downward to the end frame of your tween (a minimum of 20 but you may want more)



- 5. In the viewer, LMB-click and drag your object to a new location with the Edit tool.
 - a. This should automatically create another keyframe in the X-sheet
- 6. If you want to transform your object further (through scale, rotation, and/or skew), you can use the edit tool to do so
- 7. Preview your tween by selecting the first frame and pressing play (at the bottom of the viewer). You should see a smooth transition from the setting(s) of the first keyframe to the end keyframe.



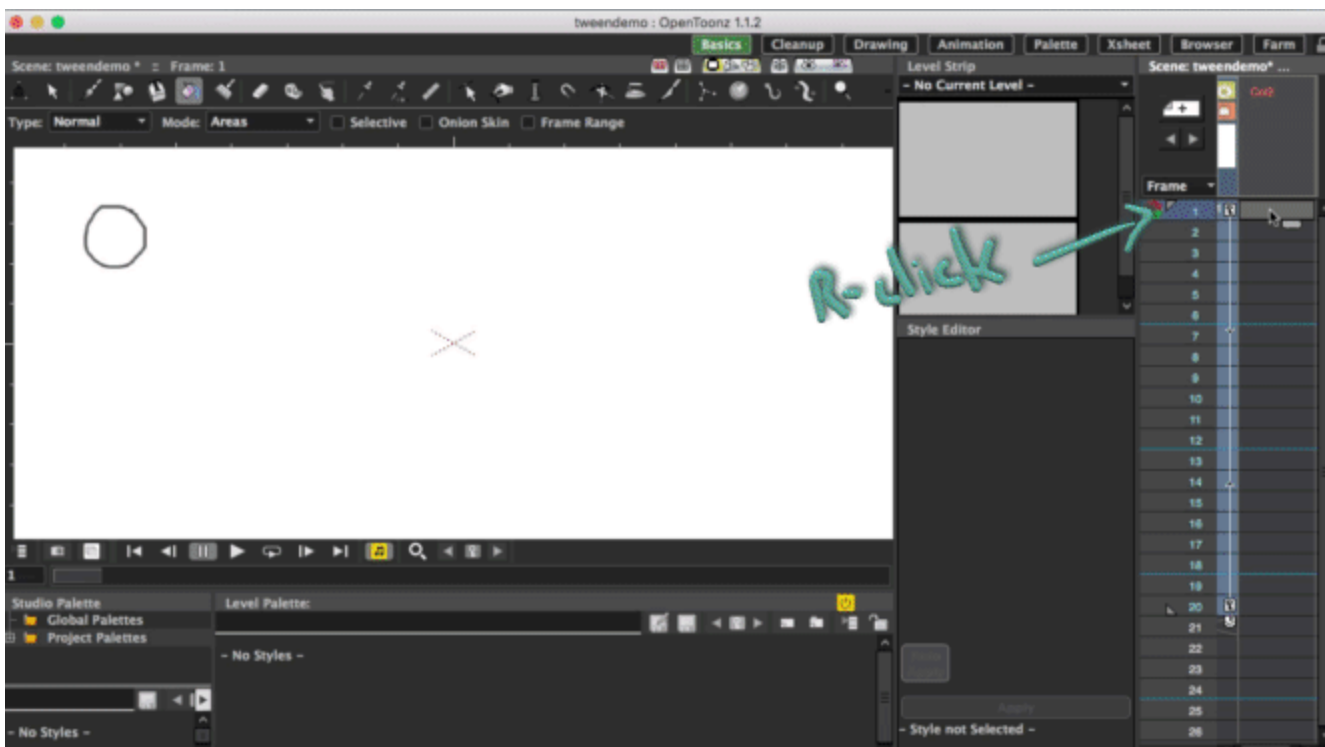
To Keyframe a color:

Keyframing color changes works for Vector or Toonz Raster levels. Color stops (color keyframes/changes in color) can be set on a single drawing that stretches across multiple frames - such as in a keyframe tween. They can also be used with cel animation or automatic tweening.

1. In a Vector or Toonz Raster level, LMB-click the first frame where you want the first color stop (where the transition should begin from color 1 to color 2)
2. In the Level Palette - select that first color
3. Click on the Keyframe button (the key icon) at the top of the Level Palette to create a color keyframe (you may need to enlarge/open the Level Palette to see the key icon). The key icon should turn blue.



4. LMB-click on the frame where you want the next color stop (where the transition to color 2 should end)
5. Back in the Level Palette, click on the Keyframe button (the key icon) at the top of the Level Palette to create a color keyframe. Again, it should turn blue.
6. Double-LMB-click on the original color and then select your second color from the picker (you are changing the first color to a new color - not making an entirely new style).
7. Preview your color tween by selecting the first frame and pressing play. You should see a smooth transition from the first color to the second color. You can add as many color stops as you would like.



C. Now create a new vector level (with at least 20 frames) and create an automatic tween:

Automatic Tweening (Shape Tween in Flash)

- creates a smooth transition from a drawing in one frame to a drawing in a different frame (this can be combined with color keyframe tweens)
- cannot be combined with a motion path
- only works with vector levels

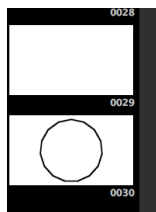
Automatic tweening is based on line order and line direction. If you are trying to do a more complex automatic tween, sometimes it is helpful to copy your image and then paste it into the end frame for your tween. You can use a variety of tools to make adjustments but the line order & direction will be maintained.

If you prefer to redraw your end stage, draw each line in the same order and in the same direction. In this case having a system is helpful - ie. always draw from the top to the bottom and from the left to the right.

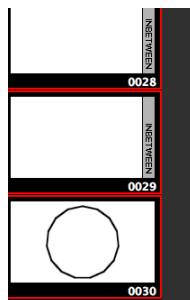
1. Draw your beginning object in the first frame of the new level



2. Draw your ending object in the last frame of the level

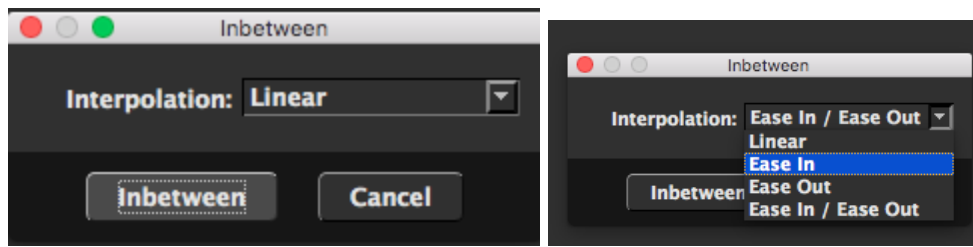


3. In the Level Strip, select all the frames from the beginning of your tween to the end of your tween
 - a. LMB-click the first frame, then shift-LMB-click the last frame of the tween
4. You should see on the right side of all the middle frames, the word “Inbetween”
 - a. If you cannot see “Inbetween”, temporarily enlarge the “Level Strip” by double-clicking on the header



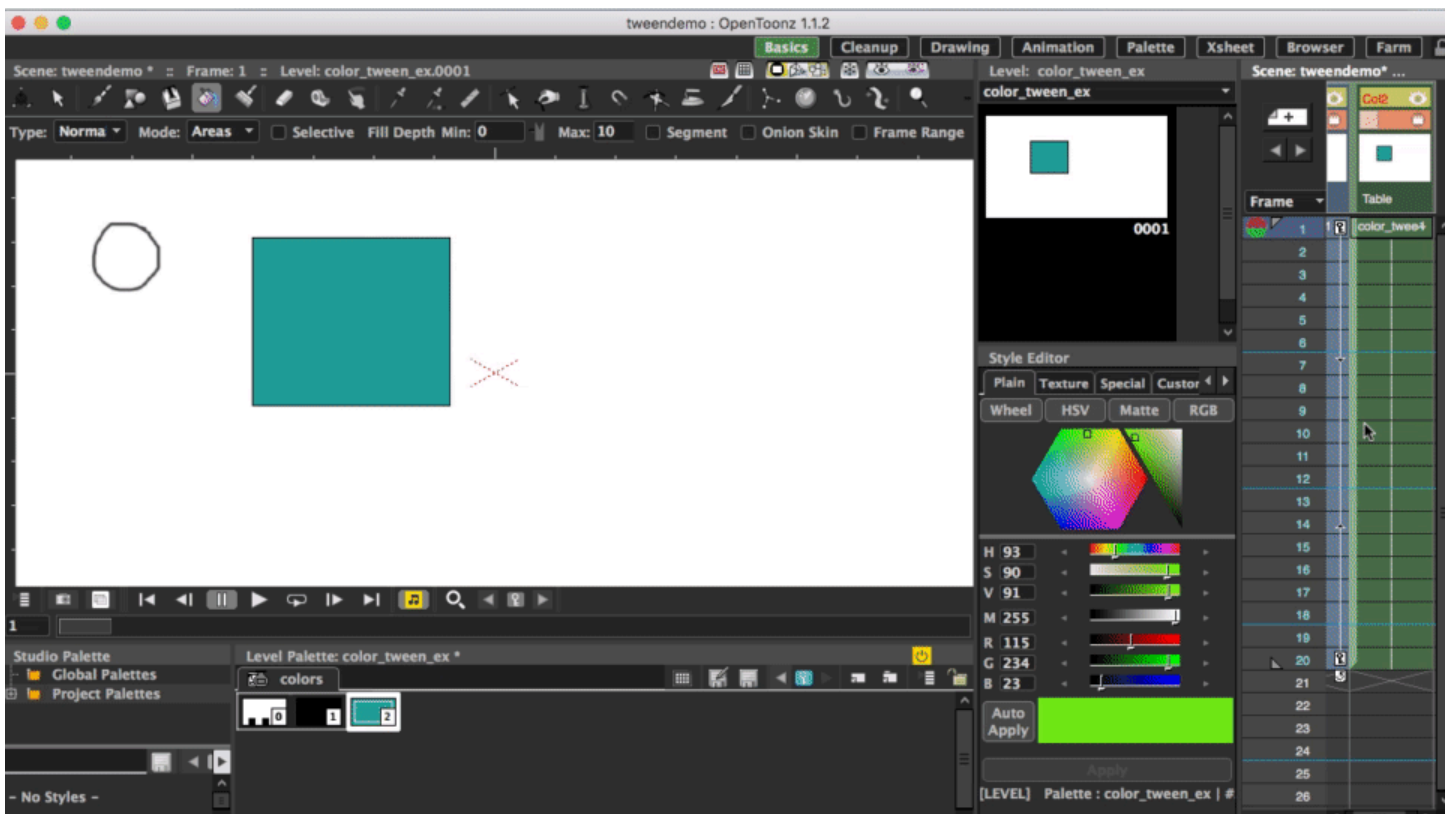
5. Click on the “In-between” on any frame (make sure to click on the right side of the button)

6. Choose the interpolation style and then select “Inbetween”



1. “linear” creates a smooth, steady transition at the same rate of change
2. “ease in” creates a gradual transition at the start but a faster transition by the end
3. “ease out” starts with a faster transition that becomes more gradual by the end of the tween
4. “ease in and ease out” creates a transition that is gradual at the start and end, but faster in the middle

7. When you play the animation, you should see a smooth transition from one drawing to the next



D. Now create a third level with one frame to begin working with motion paths:

Motion Paths

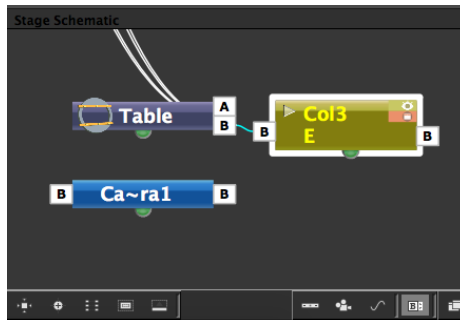
- allow you to use a drawn guide/path to control the motion of an object
- can be combined with Keyframe Tweens but not Automatic Tweening

Creating a Motion Path


1. Begin by drawing the moving object in the very center (where the red x is located) of the new single frame

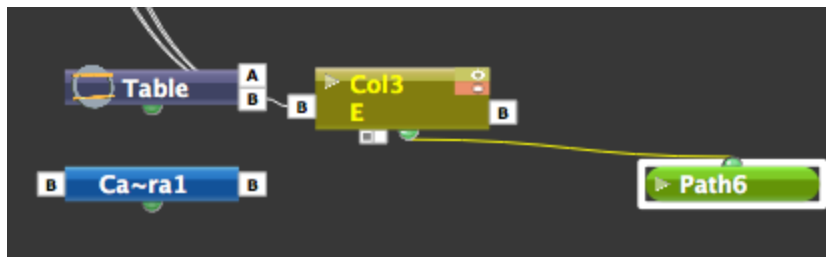



2. In the Schematic (nodes) window, select that new column/level


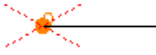


3. Select "New motion path"

- a. Press the squiggle icon  in the bottom menu of the Schematic window or RMB-click → New motion path
- b. LMB-click on the green motion path to select it



- c. In "Viewer", if you use the "Edit Tool"  with "position" selected, you will see you can drag the object a short distance either direction

4. From the "Toolbar", select the "Control Point Editor Tool"  (this should change the color of the path from pink to orange) 

5. LMB-click on the motion path in the "Viewer" (the line should turn purple with square handles)



6. Adjust the path as necessary (make sure to use the edit tool to preview the motion)
 - a. You can use the paintbrush or geometric tool to draw a specific motion path
 1. After drawing the path, select yes to replace the default path (you can redraw the path multiple times if you are not satisfied with the result)
 - b. You can also refine/adjust the motion path by using the control points/handles when the path is selected
 1. You can pull the control points (the white/blue squares, called anchor points in many vector programs) to set the beginning and end of the path
 2. Pull the purple handles to adjust the curve of the path from either end

3. To add other anchors (transition points) along the path, CMD-L-click and adjust their positions as necessary
4. To change the type of anchor from curved to straight (or the reverse), Alt-L-click the anchor point
5. To remove an anchor point, from the top menu select Edit → delete
- c. In the Schematic Window, you can also specify if the object rotates in reaction to the path or if its rotation stays the same.
 1. Select the column node connected to the path node, you should see two tiny squares along the bottom edge (the left box impacts rotation)
 2. LMB-click that tiny left square to change between rotation modes
 1. To keep the rotation locked, there should be a tiny dark square inside that left box




2. To unlock the rotation, there should be a tiny dark rotated square/diamond shape



7. When your motion path is working as you would like, you can click on your frame in the X-sheet and pull the bottom tab of the frame down to fill as many frames as you would like



8. Making sure that you have the “Edit Tool”  with “position” selected:
 - a. In the first frame, drag your object to the beginning of the path (*or wherever you want the motion to start*)
 - b. In the last frame, drag your object to the end of the path (*or wherever you want the motion to end*)

9. You can also temporarily stop following the motion path, draw custom frames, and then continue to follow the motion path at a later time
 - a. After you set your stopping point along the path (8b), start drawing on a new, empty frame

1. In the X-sheet LMB-click on the cell below your last frame



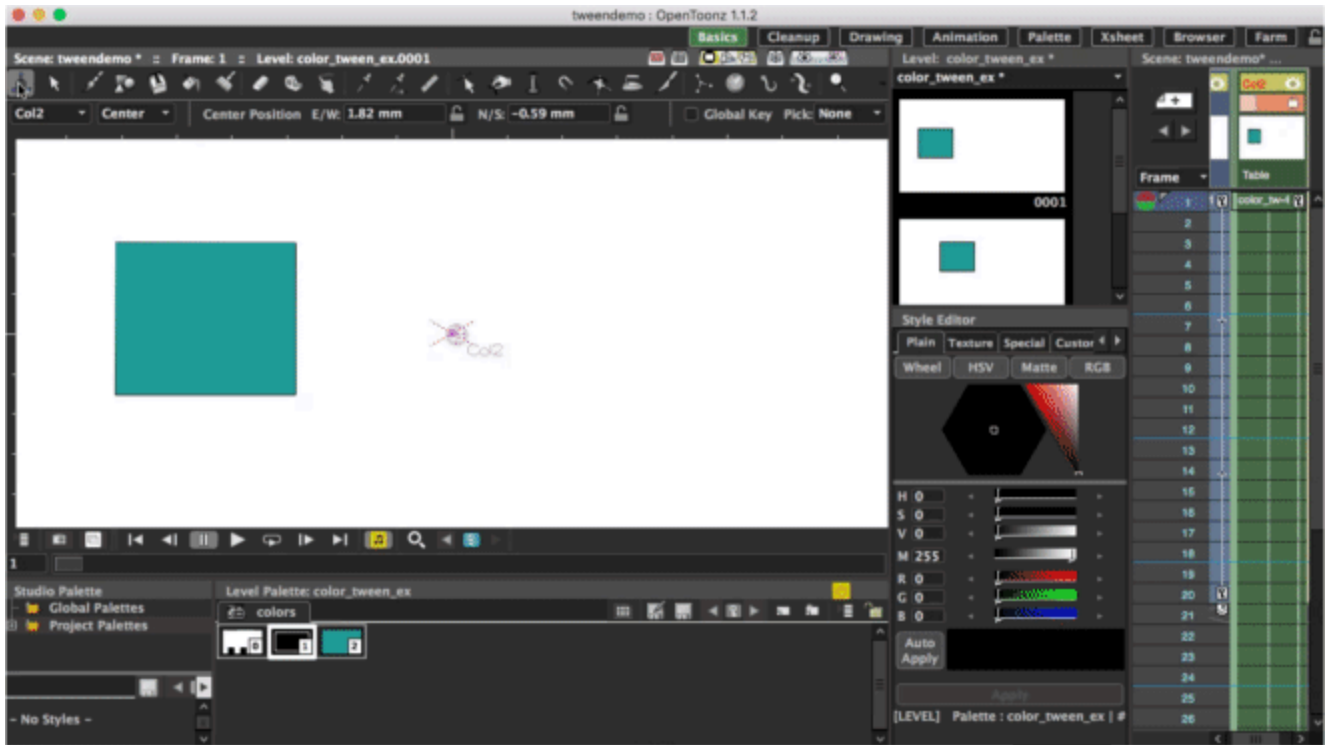
2. In the viewer, draw/create the custom frame

1. You may want to copy (Cmd-C) and paste (Cmd-V) your drawing from the previous frame and then make adjustments as necessary
2. You might also just draw freehand
 - a. Make sure onionskin is enabled

3. Extend the frame to fill a 2nd step

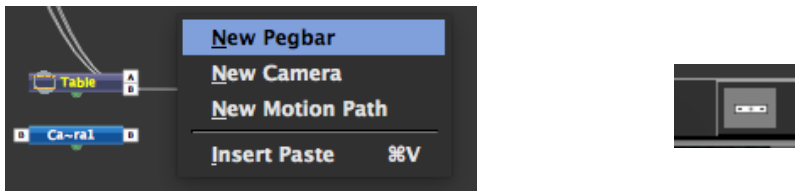
- b. Repeat **a1/ a-2** and **a-3** as many times as necessary

- c. When/if you want the object to follow the path again, extend the ending frame further down by pulling on the bottom tab and then set the end position of your object at the desired position on the path

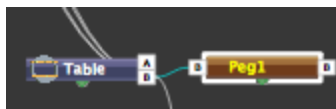


Multiple Objects on the same Motion Path (from different columns)

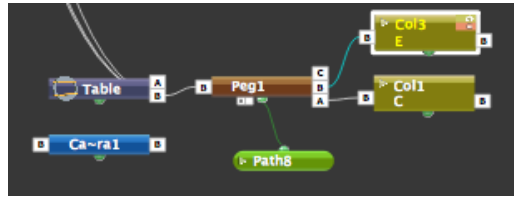
1. With the first column selected, draw your first object on the desired single frame
2. With the second column selected, draw the second object on the desired single frame
3. In the Schematic (nodes) window, select the “Table”
4. RMB-click on the background and select “New Pegbar” or click on the icon in the bottom menu



1. You will notice an orange-brown node called Peg1 that will let you link columns together (The number may vary dependent on whether you have made other pegboards)



2. The pegboard should be connected to the “Table”
5. LMB-click and drag from the red socket on Peg1 to the blue socket on each column you would like linked
6. Select the pegboard then R-click on the background of Schematic
 1. Choose “New Motion Path”
 2. The motion path should be connected to the pegboard

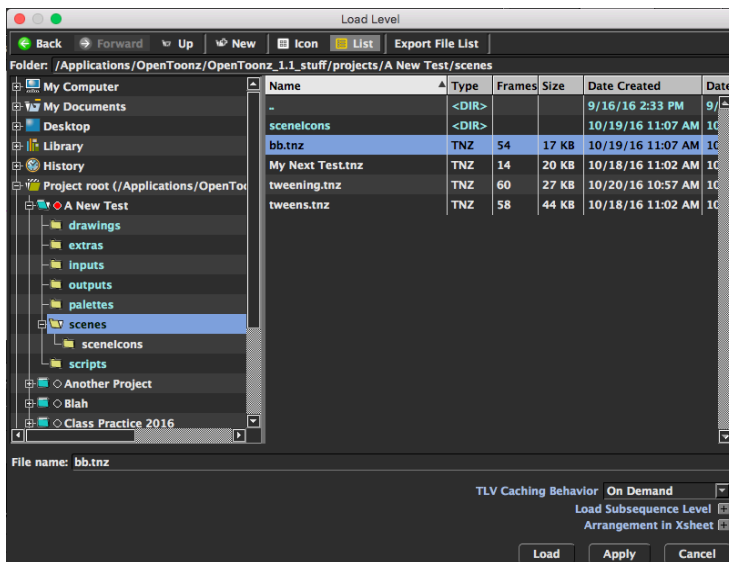


7. Back in the “Viewer”, adjust the motion path as desired
8. When your motion path is working as you would like, you can click on your frames for each level in the X-sheet and pull the bottom tab of each frame down to fill the number of frames you would like
9. Making sure that you have the “Edit Tool” with “position” selected, move the position of each object on the last frame for each level to the desired positions

E. Add your bouncing ball animation in as a sub-x-sheet

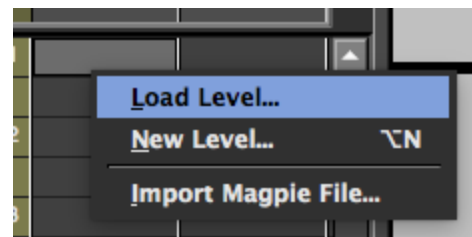
Sub-Xsheets (Similar to Flash’s Movie Symbol)

- While this is not actually a tween, this process is very handy allows and allows you to take an entire scene and load it as its own level
- This can be a great way to let you reuse resources and to help keep the X-sheet more organized/manageable



To add a sub-x-sheet:

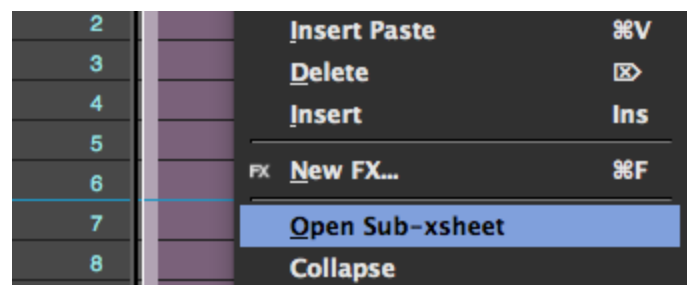
1. RMB-click on an empty column
2. Select “Load Level”



3. In the “Scene” folder, select the scene you would like to load as a sub-x-sheet

To view/access the entire sub-x-sheet in the x-sheet:

1. RMB-click on the “Table” section at the top of the sub-x-sheet column
2. Select “Open Sub-x-sheet”



To return to the scene level x-sheet:

1. RMB-click on the “Table” section at the top of any column
2. Select “Close Sub-xsheet”

