How to work with temporal and spatial keyframe interpolation

Keyframe interpolation changes the behavior of an effect option value as the clip plays toward or away from a keyframe.

The two most common types of interpolation are linear and Bezier.

- *Linear interpolation*: Creates an evenly paced change from one keyframe to another. For example, if you set an effect option value to 0% at the beginning of a 12-second clip and 100% at the end, the value will be 25% at the 3-second point and 50% at the 6-second point. Changes created with linear interpolation start and stop abruptly.
- *Bezier interpolation*: More closely mirrors your experience or exaggerates it. The rate of change accelerates or decelerates based on the shape of a Bezier curve, such as gently or quickly picking up speed at the first keyframe and then slowly or rapidly decelerating into the second.

Switching from linear interpolation to a Bezier interpolation preset takes only two mouse clicks. Becoming adept at adjusting Bezier curve characteristics takes a little practice.

Using automatic adjustments

When you apply keyframes to virtually all effects, you are changing how those effects behave over time. That's called *temporal interpolation*. The default temporal interpolation in Adobe Premiere Pro CS6 is linear: constant velocity between keyframes. You can change that to Bezier temporal interpolation and adjust its curve characteristics in the Effect Controls panel Value and Velocity graphs. You can also access Bezier interpolation presets in a clip's keyframe graph line in the Timeline panel.

Two effects—Motion and Lightning—have a different type of interpolation. For these two effects, you can use position parameters to set their physical locations in and around the video frame. You control how those positions change by using *spatial interpolation*. You adjust spatial interpolation in the Program Monitor screen. The default spatial interpolation is a Bezier curve. The final task in this guide covers that topic.

We recommend you complete the "How to apply and adjust video effects" guide and the "How to use the Motion effect" guide before completing the tasks in this guide. Those guides cover effect properties and keyframes, which are used extensively in this guide. In addition we recommend that you complete the following text-creation guides: "How to build text and objects in the Titler," and "How to add text effects." Those guides explain how to create the text object you work with in this guide.

You do not need any video clips or other assets to complete this guide.

To apply and adjust Bezier curve presets:

1. Start Adobe Premiere Pro and start a new project.
2. Select File > New > Title.

   The New Title dialog box appears.
3. Name the title **Arrow** and click OK.

   The Titler appears.

4. In the Titler, make an arrow by doing the following:
   a. Use the Rectangle tool to create the shaft. Make it almost fill the height of the Safe Title margin (**Figure 1**).
   b. Give it a dark, solid color fill by using the Properties panel (**Figure 2**).
   c. Add a white outer stroke with a size of about 3.
   d. Use the Wedge tool to make the point (you will need to rotate it to place it on top of the shaft)
5. Close the Titler.
6. In the Project panel, drag the Arrow clip to the sequence.
7. In the Effects panel, expand the Video Effects bin, expand the Stylize bin, and drag Alpha Glow to the arrow clip.
8. In the Effect Controls panel, expand the Alpha Glow options and click the Glow option Toggle Animation button to switch on keyframes.
9. Set following keyframes (**Figure 3**):
   - Clip in point: Glow = 0
   - Clip midpoint: Glow = 100
   - Clip end point: Glow = 0

   Note: When you add keyframes to an effect, that displays the effect's Value and Velocity graphs directly below the keyframes. The Value graph displays the selected option's value at any point in time. The Velocity graph shows the rate of change between keyframes. Spatial effect options (Position in the Motion and Transform effects for example) do not have Value graphs.
10. Play the clip.

    The glow expands with constant velocity to its maximum value and then immediately starts shrinking at a constant velocity (**Figure 4**).

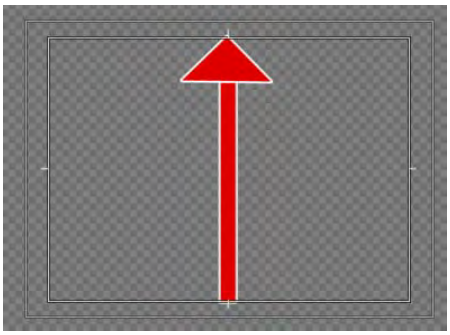

Figure 1 Titler main panel showing the arrow

Figure 2 Properties panel

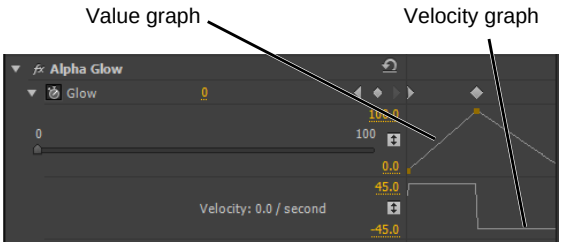

Figure 3 Alpha Glow effect and Value and Velocity graphs in the Effect Controls panel

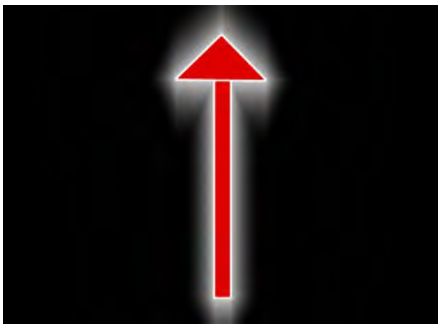

Figure 4 Arrow with Alpha Glow effect

 © 2012 Adobe Systems Incorporated

11. Right-click (Windows) or Control-click (Mac OS) the first keyframe in the time ruler to display the keyframe menu (**Figure 5**).

It has seven keyframe interpolation options:

- *Linear*: The default behavior. Creates a uniform rate of change between keyframes.
- *Bezier*: You can manually adjust the shape of the graph (the rate of change) on either side of a keyframe. Use this method to create very smooth changes or sudden acceleration into or out of a keyframe.
- *Auto Bezier*: Creates a smooth rate of change through a keyframe. If you change a keyframe's value, the Auto Bezier direction handles change to maintain a smooth transition between keyframes. If you adjust a handle, the interpolation changes to Continuous Bezier.
- *Continuous Bezier*: Creates a smooth rate of change through a keyframe. However, unlike Auto Bezier, Continuous Bezier lets you adjust handles manually. As you drag a handle (changing the shape of the curve) on one side of a keyframe, the shape on the other side of the keyframe changes in a complementary fashion to maintain a smooth transition.
- *Hold*: Changes a property value without gradual transition (sudden effect changes). The graph following a keyframe with the Hold interpolation applied appears as a horizontal straight line.
- *Ease In*: Gradually decelerates the value changes entering a keyframe.
- *Ease Out*: Gradually accelerates the value changes leaving a keyframe.

Note: Although interpolation methods can vary the rate at which an option value changes between keyframes, they cannot change the duration between keyframes. Duration is determined by the time (or distance in the time ruler) between keyframes.

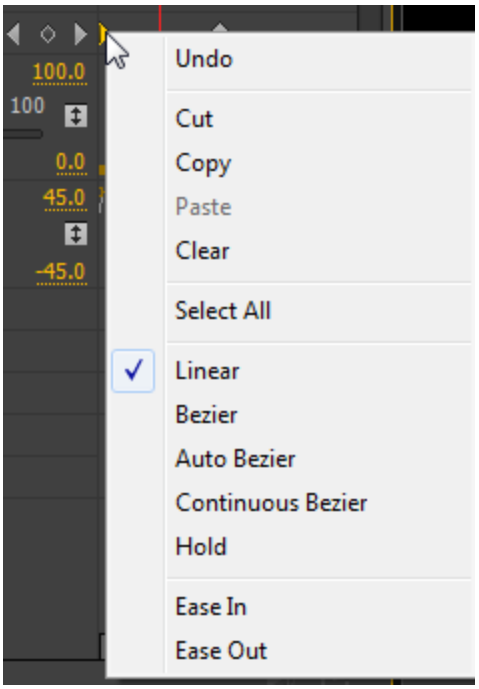

Figure 5 Keyframe menu

12. In the keyframe menu, select Ease Out.

Three things happen (**Figure 6**):

- The keyframe becomes an hourglass.
- The left side of the Value graph line becomes a Bezier curve, and a Bezier handle appears on the first keyframe square in the graph. The Value graph shows how the Glow value changes over time.
- The Velocity graph line becomes a Bezier curve, and two Bezier handles appear, one on the first keyframe and the other on the second keyframe. The Velocity graph shows the velocity change over time: its acceleration.

Note: We explain how to work with Bezier curves and handles in the Value and Velocity graphs in the next two tasks in this guide.

13. Play the clip.

The glow now appears more gradually.

14. Right-click (Windows) or Control-click (Mac OS) the third keyframe (at the end of the clip) and select Ease In.

The same three things happen again, only this time a curve appears on the right side of the Value graph (**Figure 7**).

15. Right-click (Windows) or Control-click (Mac OS) the center keyframe and select Auto Bezier.

The keyframe changes to a circle, and two Bezier handles appear on the Value graph (**Figure 8**).

16. Move the CTI to the center keyframe by clicking the Go To Previous Keyframe or Go To Next Keyframe button.

17. Change the center keyframe Glow value to about 80 (drag the Glow slider or type a new value).

The peak of the Value graph drops but retains the smooth Auto Bezier curve.

18. Play the arrow clip to see the effect of those changes.

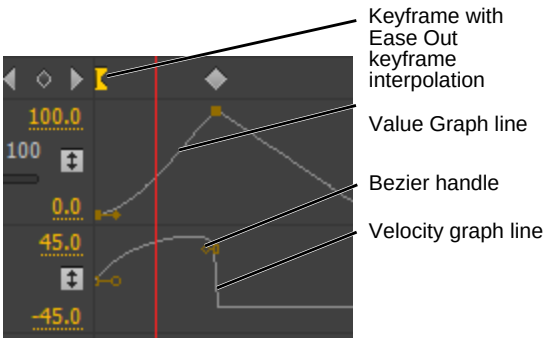

Figure 6 Effect Controls time ruler with Ease In applied

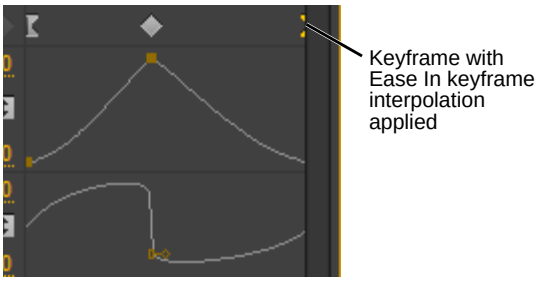

Figure 7 Value graph with Ease In and Ease Out applied

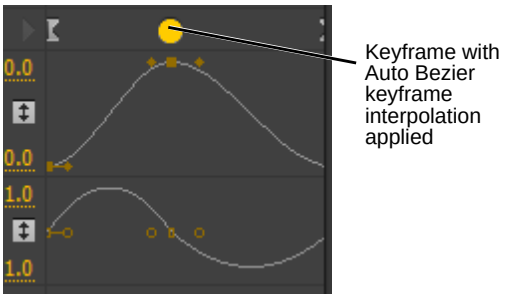

Figure 8 Value graph line and three keyframes with (left to right) Ease Out, Auto Bezier, and Ease In applied

 © 2012 Adobe Systems Incorporated

Adjusting Bezier curves and handles

Adding a keyframe to an effect displays the Value graph and the Velocity graph. Changing the keyframe interpolation to a form of Bezier curve changes the straight graph lines to curves and adds Bezier handles to the keyframes in those two graphs. You use those Bezier curves and handles to fine-tune how the effect behaves over time—its temporal keyframe interpolation.

To adjust Bezier curves and handles:

1. Continue where you left off in the previous task.
2. In the Value graph, drag the center (square) keyframe down (**Figure 9**).

   The Glow option value decreases and the Glow option slider moves to the left. This is another way to change an option value at a keyframe.

   Note: You cannot drag a Value graph keyframe left or right, so there is no chance you will change a keyframe location in the clip when dragging a keyframe in the Velocity graph.
3. Drag the left handle on the center keyframe in the Value graph to lengthen it and move it up or down.

   Two things happen (**Figure 10**):

   - The main keyframe, above the Value graph, changes to an hourglass (dragging a handle of an Auto Bezier keyframe changes that keyframe to a Continuous Bezier keyframe).
   - The slope and shape of the Value graph change (a steep slope indicates a faster change over time).

   Note: Moving the handle up accelerates the changes and moving the handle down decelerates the changes. To adjust the range of the curve's influence, drag the Bezier handle to the left or right.
4. Play the arrow clip to see the effect of those changes.
5. Right-click (Windows) or Control-click (Mac OS) the center keyframe and select Bezier.

   There is no immediate, visible change.

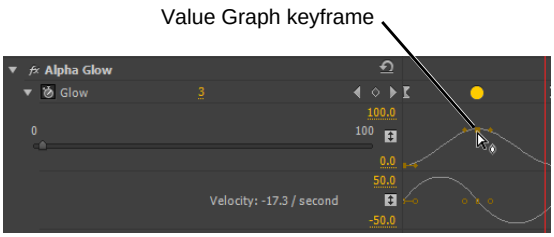

Figure 9 Alpha Glow effect in the Effect Controls panel

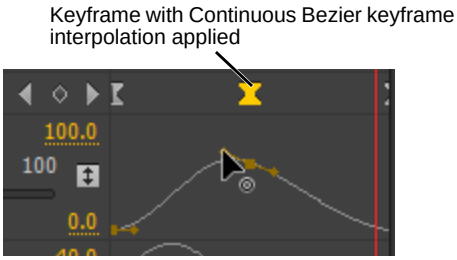

Figure 10 Value graph in the Effect Controls panel

6. In the Value graph, drag the left keyframe handle of the center keyframe down slightly.

   The right handle does not change (**Figure 11**).

   Bezier handles (as opposed to Continuous Bezier or Auto Bezier handles) operate independently, which can lead to abrupt acceleration on one side of the keyframe. In the example (**Figure 11**), the glow builds very slowly at first, quickly expands near the keyframe, and then gradually diminishes after the keyframe.

7. In the Velocity graph (below the Value graph), drag the left Bezier handle of the center keyframe down.

   Three things happen (**Figure 12**):

   - The Value graph curve quickly climbs to its peak value (100) and then holds that position until the center keyframe.
   - The Velocity graph curve between the first and second keyframes becomes more pronounced.
   - The Velocity graph peak values (both positive and negative) increase. Those values, in this case, represent the change per second in Glow size units.

   Note: The Toggle Automatic Range Rescaling feature keeps peaks and valleys of the Value and Velocity graph curves within their viewing areas. You can deselect that feature by clicking the Toggle Automatic Range Rescaling button (**Figure 12**). But if you later heighten the graph farther, the peaks will run outside the viewing area. If that happens, you can drag down on the bottom of the viewing area to expand it.

8. Play the arrow clip to see the effect of those changes.

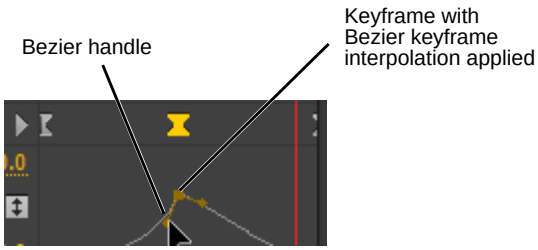

Figure 11 Changes applied to the Value graph

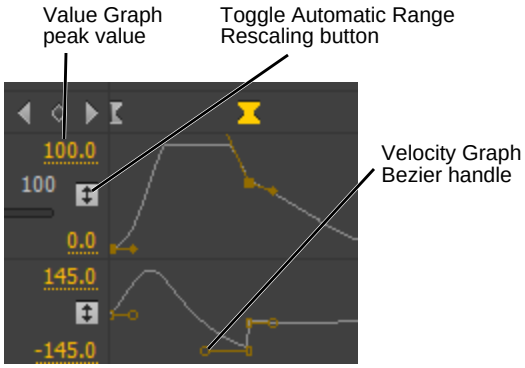

Figure 12 Value (top) and Velocity graphs in the Effect Controls panel

 © 2012 Adobe Systems Incorporated

Applying and adjusting temporal keyframe interpolation in the Timeline panel

You work with temporal keyframe interpolation in a clip in the Timeline panel much the same way you work with interpolation in the Effect Controls panel. The one missing element is velocity. You can change velocity only in the Effect Controls panel Velocity graph. Here is a brief overview:

To adjust temporal keyframe interpolation in the Timeline panel:

1. Drag another instance of the arrow clip to the sequence.
2. Make sure the video track is expanded and that Show Keyframes is selected in the Show Keyframes menu.
3. Apply Alpha Glow to the clip.
4. In the Effect Controls panel, expand the Alpha Glow options and click the Glow option Toggle Animation button to switch on keyframes.
5. In the Timeline panel, position the CTI at the beginning of the clip.
6. In the Timeline for Track 1 (not in the Effects panel), click the Add-Remove Keyframe button to add a keyframe. Position the CTI about 1 second into the clip and add another keyframe. Position the CTI about 2 seconds into the clip and add a third keyframe.

   Note: It may help to display clip names only in the Timeline panel.
7. Drag to position the keyframes as shown in the example (**Figure 13**).
8. Apply Bezier interpolation as follows:
   - Right-click (Windows) or Control-click (Mac OS) the first keyframe and select Ease Out.
   - Right-click (Windows) or Control-click (Mac OS) the center keyframe and select Continuous Bezier.
   - Right-click (Windows) or Control-click (Mac OS) the third keyframe and select Ease In.

   Bezier curves are added to the keyframes (**Figure 14**).
9. Drag the Bezier handles of any keyframe to change the shape of the curve.

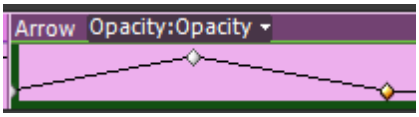

Figure 13 Clip keyframes in the Timeline panel

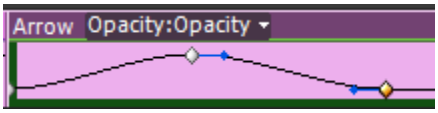

Figure 14 Clip keyframes with Bezier interpolation

Adjusting spatial and temporal keyframe interpolation in the Motion effect

Two effects in Adobe Premiere Pro—Motion and Lightning—use an additional type of keyframe interpolation: spatial.

You use the Motion effect Position option to move a clip within and around the viewing screen. Add keyframes and you create a motion path. You use the Lightning Start Point and End Point options with keyframes to move the Lightning effect in the screen.

In both cases, you can use Bezier curve spatial interpolation on the two effects' position keyframes to change the behavior of their motion. The focus for this task is the Motion effect's Position option. You will likely use its Bezier curve spatial and temporal interpolation options time and again.

To adjust keyframe interpolation in the Motion effect:

1. Drag another instance of the arrow clip to the sequence.
2. Click that clip to display it in the Effect Controls panel.
3. Display the Motion effect options and click the
4. Reduce the Motion Scale value so the arrow shrinks to about half-screen height.

   This gives you room to move the arrow.
5. Give the arrow clip four position keyframes as follows:
   - In point: Upper left quadrant of the screen
   - About one-fourth of the way into the clip: Lower center of the screen
   - About one-half of the way into the clip: Upper-right quadrant
   - About three-fourths of the way into the clip: Center

   Your Effect Controls time ruler (**Figure 15**) and Program Monitor motion path (**Figure 16**) should look like the examples. If you don't see the path in the Program Monitor, click Motion in the Effects panel.

   Note: The motion path (the spatial interpolation) in the Program Monitor is a Bezier curve by default. The little four-point stars on the path are keyframes and the tiny dots near those keyframes (but off the path) are Bezier handles (**Figure 16**).

   Each keyframe has Auto Bezier spatial interpolation applied to it by default, which means the clip motion behaves the same on both sides of the keyframe. You can change Auto Bezier to Continuous Bezier or Bezier. Both have different characteristics (as explained in the first task).

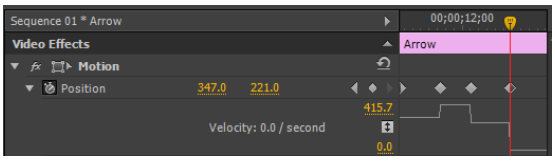

Figure 15 Motion effect in the Effect Controls panel

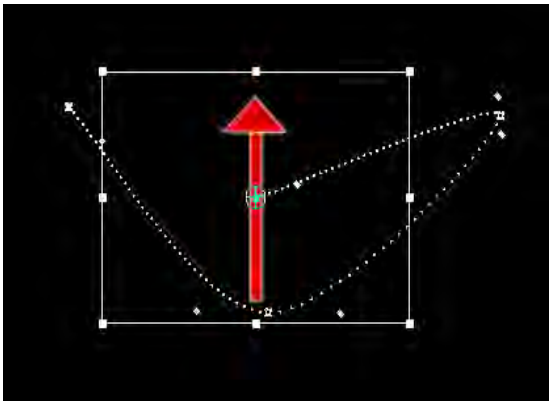

Figure 16 Motion effect path and keyframes in the Program Monitor

 © 2012 Adobe Systems Incorporated

6. Play that clip.

   If your keyframes are spaced more or less equally in the Effect Controls time ruler, the clip velocity is constant. It has linear temporal interpolation. You change that to Bezier temporal interpolation later in this task.

7. Position the CTI in the middle of the clip. In the Program Monitor, drag one of the Bezier handles on the second keyframe (**Figure 17**).

   You changed the shape of the curve, which adjusts how the arrow moves through the screen. That's its spatial interpolation.

   By dragging an Auto Bezier handle, you also changed the selected keyframe to Continuous Bezier (as explained in the first task).

8. In the Effect Controls panel, right-click (Windows) or Control-click (Mac OS) the second Position value keyframe.

   The context menu includes two options: Temporal Interpolation and Spatial Interpolation (**Figure 18**).

9. Select Spatial Interpolation (its current setting is Continuous Bezier), and select Bezier.

   Note: In step 7, in the Program Monitor, you changed an Auto Bezier spatial interpolation keyframe to Continuous Bezier simply by dragging a Bezier handle. But the only place where you can change a spatial interpolation keyframe to Bezier or back to Auto Bezier is in the Effect Controls time ruler keyframe menu.

10. In the Program Monitor, on the second keyframe, drag the same handle you moved in step 7.

    Note: This time the other Bezier handle does not move. As noted in the temporal interpolation discussion in the previous task, Bezier handles behave independently.

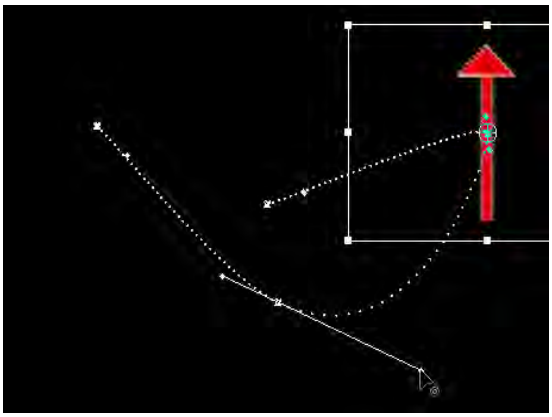

Figure 17 Adjusting the Motion effect

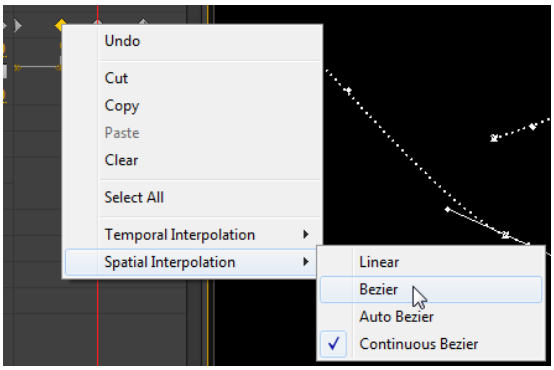

Figure 18 Position option Keyframe menu

11. In the Effect Controls panel, set different types of temporal interpolations for each of the four Position keyframes by right-clicking (Windows) or Control-clicking (Mac OS) each one in turn, selecting Temporal Interpolation, and then making the following selections (**Figure 19**):

- first keyframe: Ease Out
- second keyframe: Continuous Bezier
- third keyframe: Bezier
- fourth keyframe: Ease In

12. Play the arrow clip.

The arrow gradually accelerates at the start and slows down at the finish. The behavior at the second and third keyframes does not change, even though you changed their temporal keyframe interpolation. You need to change their Bezier handles.

13. In the Effect Controls panel, click the second Position keyframe (the one set to Continuous Bezier).

That activates its temporal interpolation Bezier handles in the Velocity graph (**Figure 20**).

14. Drag a handle up and down.

The shapes of both sides of the curve change in a complementary fashion.

15. Drag a handle left and right.

That changes the location of the peak of the curve on the selected side of the keyframe and does not change the shape of the curve on the other side of the keyframe.

16. Select the third keyframe (the one set to Bezier) and drag one of its Bezier handles up and down.

Because it has Bezier keyframe interpolation applied to it, only one handle moves at a time, which can create sudden velocity changes (**Figure 21**).

17. Play the arrow clip to see the effects of your changes on the temporal interpolation.

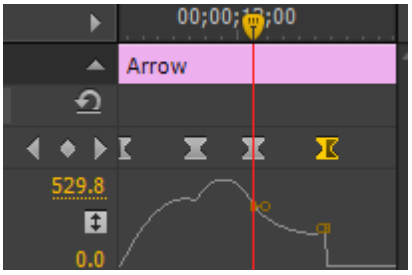

Figure 19 Velocity graph in the Effect Controls panel

Figure 20 Continuous Bezier handle

Figure 21 Bezier handle

 © 2012 Adobe Systems Incorporated