THE HOOK MODIFIER

Introduction
Blender, unlike some other modeling/animation softwares, does not provide many subobject animation features in its default installation (though the AnimAll add-on, accessible through User Preferences, provides some useful options). The Hook modifier is one exception, which attaches individual vertices to an Empty object that can then be animated.

Exercise
In this exercise we will use the Hook modifier to create a tentacle that will grow along a curve path, and flail around when it is done. Let’s start with a basic scene with an object on a plane.

A tentacle will move in from the right, twine around the cube, and wave around. For this we’ll need a Bezier curve that defines the path. Create a Bezier curve in top ortho view, and in edit mode arrange it to come in from the left (the arrowheads define its direction) and wind around the cube. Select the vertices of the curve and use G, R, and S to move, rotate, and smooth them.
Now we want to define the cross section (the bevel) and animate the width (the taper) of the curve. First go back to object mode and add a circle to the scene. This needs to be a curve circle – Bezier or Nurbs – and not a mesh circle. Scale it until it looks about right for the average cross section of the tentacle and normalize the scale. Name it Section. Now select the curve and go to its Object Data tab in Properties; this will look like a curve between two vertices. Under Bevel Object in the Geometry panel select Section. The tentacle will show thickness.

Add some color to the curve and render.
Move the vertices of the curve to stop it digging into the cube and ground plane, bearing in mind it will get thinner along its length.

Now go to top ortho view and add another Bezier curve to the scene. Go immediately into edit mode and hit V, then set the Handle Type to Vector. The curve will become straight.
Select the left hand vertex and hit E-Y-2-Enter. The curve will turn into an L shape as that vertex is extruded two Blender units along the Y axis. Use A to deselect all, then select the center vertex, the lower left. Add a Hook modifier by using Control-H and selecting Hook to New Object. An Empty object will appear close to the selected vertex. Go back to object mode.

Call the new empty object Control. Call the new Bezier curve, the L shape, Taper. Now select your original Bezier curve, go back to the Object Data tab, and select Taper in the Taper Object box. The line’s thickness will disappear except for a short cone at the start of the curve.

But now select the Control (empty) object and move it back and forth along the X axis. The tentacle will appear to grow along the curve. If it seems too fat reduce the scale of the Section circle. To add more points to the tentacle curve go into edit mode, select two neighboring vertices, and hit W to subdivide.

Now you can animate the tentacle growing along the path by making keyframe location points for the Control empty object. But there is more you can do. For a start, you may need to animate the vertices of the tentacle as it grows to make sure it stay on the ground as it increases in thickness. That means adding more Hook modifiers and animating the resulting empty objects. But since you can do that, you can also animate the tentacle moving around as it grows … There is a lot you can do with the Hook modifier.
There is a YouTube tutorial on using the Hook Modifier with shape keys at https://youtu.be/jp_hjje9SPI.

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