

## Real time animation controlled by a sound file

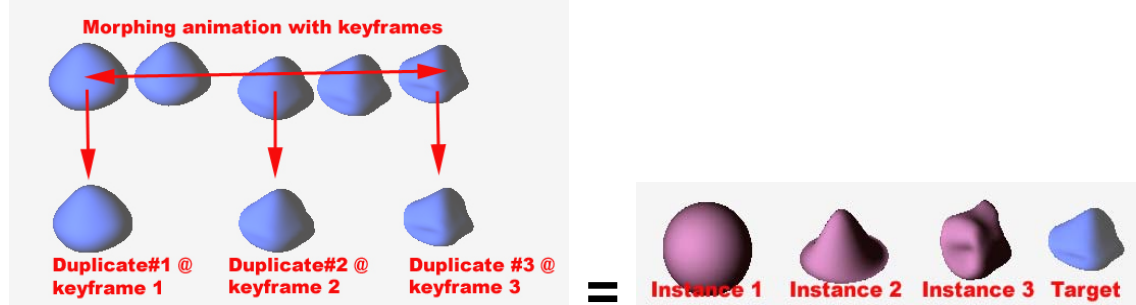
Fall 2007 - JMG

This tutorial shows how to create a facial animation controlled by one or multiple sound files. The facial animation can be controlled by sound bites edited on the fly during an interactive conversation. The main advantages of this method are to eliminate the need for storing large animation files and to create real time animations regardless of the duration of the sound files. The sound file is saved as a wave file internally or externally. The animation is generated in real time by the playback of the sound file. The tutorial covers two animation methods:

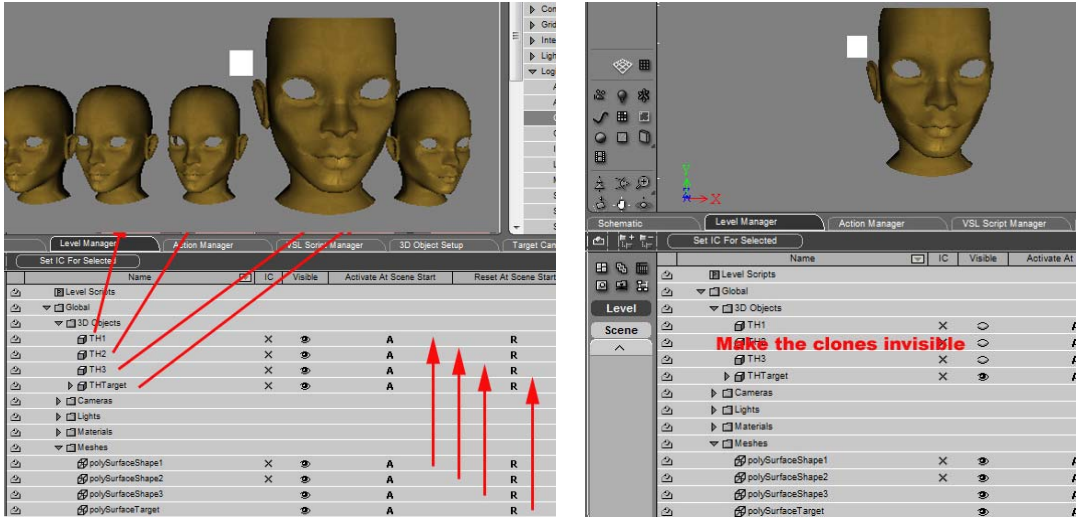
- preparation covers the Maya steps before export to Virtools
- part 1 shows how to pass a variable (float or percentage value) in order to control a mesh morphing
- part 2 shows how use the same set up with a wave file player and a sound spectrum analyzer in order to control a facial animation

### 1- Preparation in Maya

More than three instances are variations created by morphing on deformations of the original face, one instance is the original face or face target. All 3D models are made of polygons and share the same number of polygons.

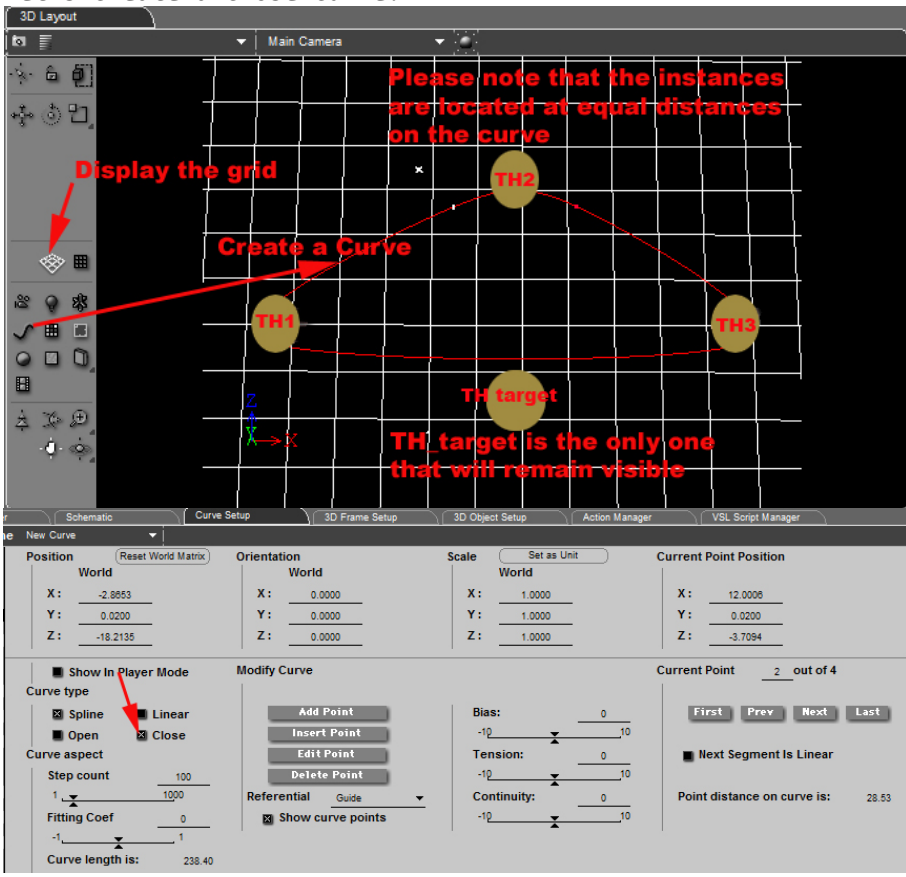


**IMPORTANT NOTE:** We use Duplicate in this tutorial. In Maya 8.5 Duplicate works best with Lattice Deformers. If you use joints or skeleton deformer I suggest switching to lattices. Let's create several duplicates of a 3D object from a Maya animation using keyframes, for example a facial animation. In order to create several duplicates of the face, select a keyframe, for example key frame#1 > select ONLY the mesh of the face > go to Modify > Duplicate, select Copy and World options. Repeat the same step for key frame #60, #120, #180... . Delete the original face, save the duplicates and export each duplicate one by one to Virtools as 3D Entities. The instances of the same 3D object or 3D model of a face and the target are exported to Virtools as separate 3D Entities .



**Part 1 - Morphing animation controlled by a 3D object moving on a curve**  
 In Virtools, import the instances and the target. They have the same location than in the Maya file. Go to Level Manager > 3D Objects > Rename the instances TH1, TH2, TH3... and TH\_target  
 Rename the Meshes > PolySurface 1, PolySurface 2, PolySurface 3... and PolySurfaceTarget.  
 Select all 3D Objects and Instances > press the "Set IC for Selected" IC stands for Initial Conditions.

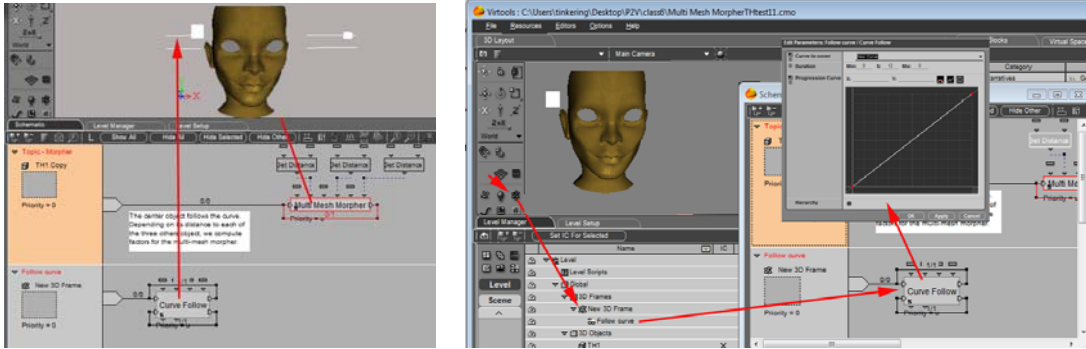
Let's create a close curve.



Make the instances or clones invisible. Select all 3D Objects and Instances >

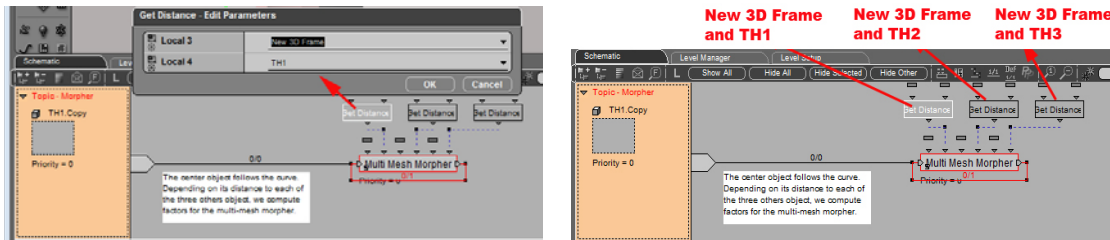
press the “Set IC for Selected” IC stands for Initial Conditions.

Let’s place a moving 3D objet or a 3D frame on the curve called New Curve. Create a 3D frame. Go to Building Blocks > 3D transformations > Curve > LMB + drag Curve Follow on the 3D frame. The script of the 3D frame with the “Follow Curve” BB will take care of moving the 3d frame on the path. Remember to edit the follow curve behavior with the curve’s name and the duration of the motion of the curve.

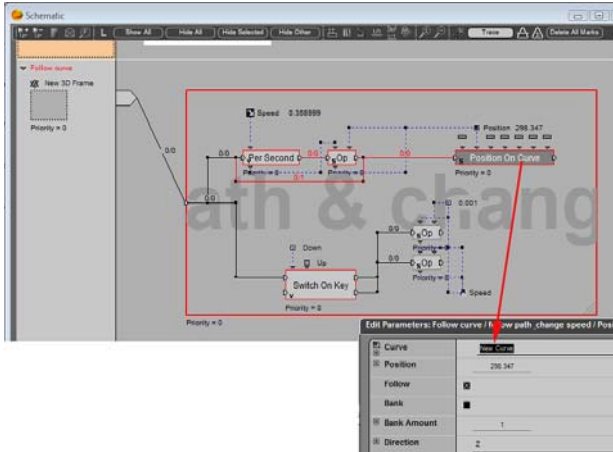


Let’s create a script with Multi Mesh Morpher (Mesh Modifications > Deformation > Multi Mesh Morpher) for TH\_target. RMB on the BB and select Edit Settings, the mesh count is the number of instances used in your project. This script will convert the position of the moving 3D frame on the curve into a percentage of mesh morphing for the face. We are going to calculate the distance between the moving 3D frame and each instance located along the curve.

The Get Distance BB gives us this information. Let’s input the Get Distance data between the 3D frame and TH1 into the amount of morphing of PolySurface #1. Repeat with the Get Distance data between the 3D frame and TH2 into the amount of morphing of PolySurface #2.



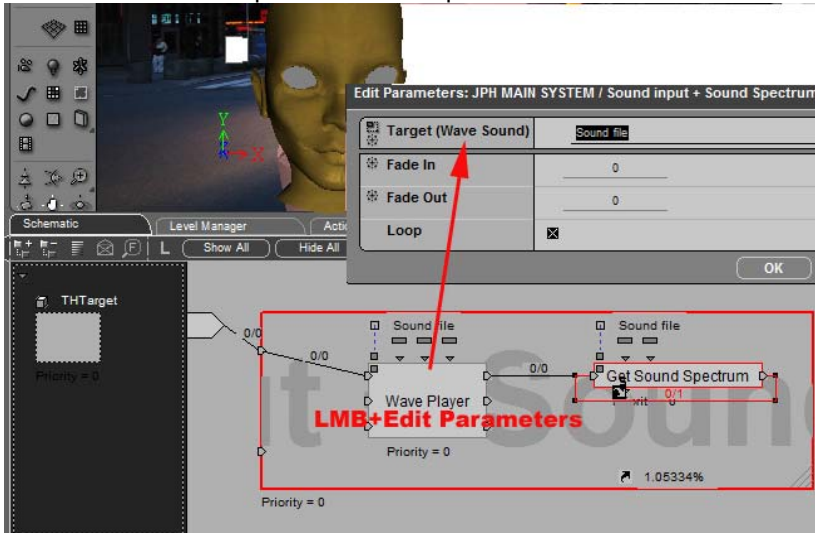
Playback the real time morph animation controlled by a 3D object moving on a curve. In the following example, you can add more control for the animation. the Follow Curve BB is replaced with a speed control BB.



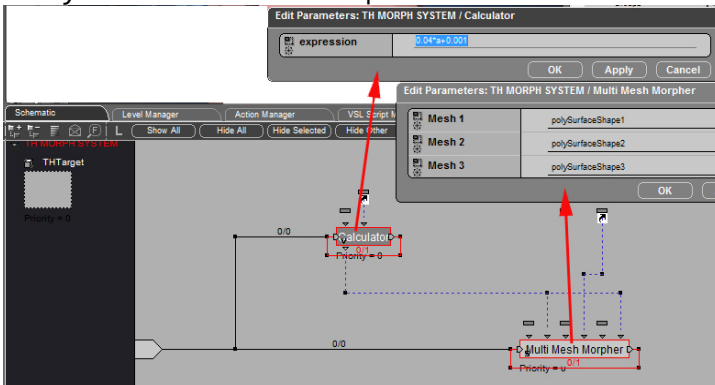
The UP and Down arrow keys control the speed of the animation by accelerating/decelerating the 3D frame on the path. The “Path and change speed” BB can be found at [www.tinkering.net/p2v/speed.zip](http://www.tinkering.net/p2v/speed.zip)

## Part 2- Real time animation controlled by a sound file

We reuse the setup created in part 1 with another set of BB

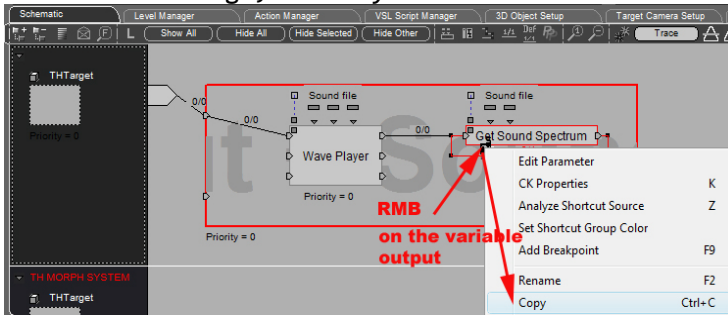


Let’s create the sound analysis set up. Import a sound file in wave or mp3 format your Virtools composition. The “Wave Player” BB takes care of the sound playback (BB > Sound > Basic > Wave Player). The “Get Sound Spectrum” BB analyzes a number of frequencies from the sound file.




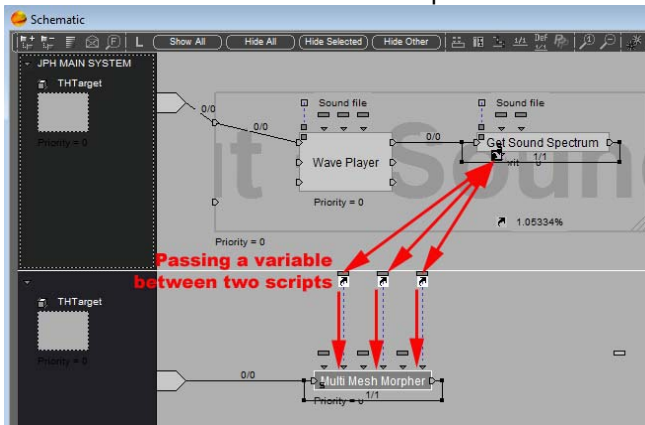
LMB+Edit Parameters, let’s you choose the sound file.

LMB+Edit Settings, let's you choose the number of frequencies.



Let's pass the variable output from the script that contains the Sound Spectrum Analyzer to the script that contains the Multi Mesh Morpher. RMB on the variable output of the "Sound Spectrum Analyzer" BB > Select COPY Go to the Multi Mesh Morpher script, RMB+Select "Paste Shortcut". The short

cut  is a black arrow curved towards the top right. You can connect the shortcut with the variable input for the Multi Mesh Morpher.



Let's playback the sound file and the animation. The result is ok but lacks of control. Let's create an expression in order to amplify the motion of the lips for the facial animation. We add a "Calculator" BB and write inside the expression  $0.004*a+0.001$ . The animation is now much more expressive in relationship with the sound file.

