**Character Rigging**

# **Terms to Know**

* **Rigging –** taking an object and specifying the ways in which it can be used by animators, by giving and taking away specific controls
* **“Anim” –** This is our term for animation controls. It’s a way for an animator to control the object without having to access the mesh or skeleton directly.
* **Skeleton and Joints –** the components that make up the underlying character skeleton. They are a lot like actual human joints.
* **Hierarchy** – a system of objects, parented and grouped with one another, which can behave as one object even though they are composed as several, different objects. Hierarchies are primarily created via Parenting and Grouping objects together.
* **Parenting** – a hierarchical structure that allows one object, the parent, to control the objects below it, the children.
* **Constraint** – allows the source to drive the actions of a target object.
* **Blend Shape –** creating a copy of the mesh and changing it, like making it blink. This mesh is then linked back to the original mesh and can be controlled by the animator.
* **Skin-weighting –** this allows the joints to have influence over the parts of the mesh that are closest to it. It makes it so that the skin deformers as the skeleton moves.
* **Weight-painting –** this is the process of altering how much influence certain joints have over certain parts of the mesh. This can help to get better deformation as the character is moved around.
* **Pivot** – the point of rotation for an object
* **Channel** – these are the points of information shown in the channel box, which can be thought of as “attributes” of a specific selected object. These often include (but are not restricted to) translation, rotation, scale, and visibility.

# **Hotkeys**

## **General**

* **Select ‘child’ then ‘parent’ + ‘p’ –** parents the first object to the second
* **‘shift’ + ‘p’** – un-parents the objects
* **Select ‘source’ then ‘target’ + ‘parent constraint’ –** constrains the second object to the first
* **‘ctrl’ + ‘g’** – to group objects
* **‘insert’** – enters pivot mode
* **Snap controls *(can be used to snap the pivot*):**
	+ **Hold ‘x’** – snap to grid
	+ **Hold ‘c’** – snap to curve (& edge)
	+ **Hold ‘v’** – snap to vertex

## **While in the joint tool**

* **Backspace** will undo the last joint
* **Enter** will complete the joint chain and exit the tool

# **Tips**

## **Rigging**

* Particularly with Rigging, you will want to follow the directions exactly. The order that things are selected in also matters. You might want to consider checking off the steps as you go.
* The biggest thing about rigging, and character rigging specifically is testing. **Test, test, test, test, test.** You will want to constantly test as you work to make sure that it has the behavior that you want.

## **Freeze Transforms**

* Technically, this option resets all of the channels in the channels to 0, without moving the actual mesh.
* Functionally, this option allows you to set a new “base point” for your object, so that by zeroing out all of the values in the channel box, you end up at a good start or base position.

## **Top Con**

* The Top Con stands for “Top Control”, and **should not** be animated! It allows for a “clean” version of your rig to be imported from scene to scene.
* If your top con is not keyed, this lets you take an animated character from one and then put that character in another scene, without needing to copy specific keys on the top con. If you animated the top con, then the character would be keyed in a specific position, and could not be moved to another position on the new scene!
* The important takeaway is: **Don’t key the top con!** As you begin to have multiple characters in a scene, and more complicated scenes with uneven ground, and multiple sets, this becomes even more important, which you’ll find out in the coming quarters.

## **Hierarchy**

* There are two ways to put objects in a hierarchy:
* Grouping is when you group two or more objects together, underneath a parent “group” node.
	+ When you scale, translate and rotate the group, you also do it to all of the individual members.
	+ Grouping also can be a nice way of changing the pivot point of an object without actually changing the pivot, because the group node has its own pivot point, which can be different than those of its members.
* The other way is by Parenting, which looks kind of like grouping, but has some important differences.
	+ The order in which you select parents is important: the last object you pick, when parenting using **CTRL-P**, becomes the parent. There is no new node created in parenting, unlike grouping.
	+ Also, you can parent objects that are parented to one another. This can create parented trees, which is how you will use rigging to create skeletons out of characters. But more on that in the next assignment!

## **Blend Shapes**

* As you make your blink blend shape, make sure that your mesh is deforming nicely
* You can also test your blend shape as you work, but connecting it to the mesh
* Definitely **test** it as you go.

## **Weight-Painting**

* It’s good to have a work-flow when weight-painting. I would suggest to do something similar to what was mentioned in class.
	+ Start with flooding the tail
	+ Then work on each control separately, giving each one full weights
	+ Then as you move the character, blend outward to get a nice deformation
	+ Lock the weighted joints as you finish them so that their influences do not change
* Oh yeah, did I mention to **test**?
	+ Do so by moving around the anims and making sure that the behavior is what you’d expect.

# **Demo Notes**

## **Rigging**

* What is rigging?
	+ Rigging is giving the character the ability to move and come to life.
* Parenting vs. Parent Constraint, what is the difference?
	+ Parenting is essentially putting one object, the child, under the other object, the parent’s control. This allows the parent to control the child object in translation and scaling. When rotating, they will rotate along the parent. This is useful when you want one object to control another.
	+ Parent constraint gives a lot of the same controls as parenting, but allows for only scaling the parent, and for keying the constraint. This will allow you to do some really nice things later on when you want to objects to interaction (i.e. picking up an object).
* Why do we parent constrain instead of parent?
	+ Constraining gives us more flexibility than parenting does, mostly when it comes to making anims to control the character. These anims can be kept separately from the mesh but still control it. It gives a degree of separation between the two objects and also makes it easier to work with.
* Why do we use animation controls?
	+ We use animation controls (anims) for ease of control. It is easier to click on an object that controls, say, the ears, instead of having to go through the entire joint skeleton to find the ear joint.

## **Blend Shapes**

* What are blend shapes?
	+ Blend shapes allow you to deform the mesh and control it, such as giving a character the ability to blink
* Why do we use them?
	+ It’s a simply way to control some character expressions. You can also key these blend shapes, which is a really nice attribute for later.

## **Weight-Painting**

* What is weight-painting?
	+ Weight-painting is the ability to make a character deform as it is moved around.
* Why is it necessary?
	+ Without weight-painting, the characters would not deform properly. As you move the head of the character, his feet might come with, and this is not the behavior you want. Weight-painting allows you to adjust the influences that certain joints have on different parts of the mesh so that the characters deform in an expected manner.