# 6.0 Rigging

1. **Open and initialize the Model**

   Add an armature to a mesh, or open a model with armature. *Note:* Just because you have a model containing a *mesh* and an *armature* doesn't mean the two are *connected*. That is what *rigging* does.

2. **Optional: view bones in "Stick" mode**

   a. in **Object** mode, select the Armature (RMB)

   b. open a *Properties Window,* click on the *Armature* icon (the little "man" icon) and in the Display section, select **Stick**

3. **Add the Armature as the "Parent" of the Mesh**

   a. in **Object** mode, select the *mesh,* then shift-RMB select the *armature,* so that both the mesh and armature are selected. It is important to select the *mesh* FIRST and *then* the armature .

   b. Open the "Parent select" menu (Object → Parent). Then select "Armature Deform → with Empty Groups". This makes the armature the "parent" of the mesh, so that changes to the armature affect the mesh. It also adds an *armature modifier* to the mesh, and creates *vertex groups* to specify which vertices are attached to which bones. Initially, the vertex groups are empty.

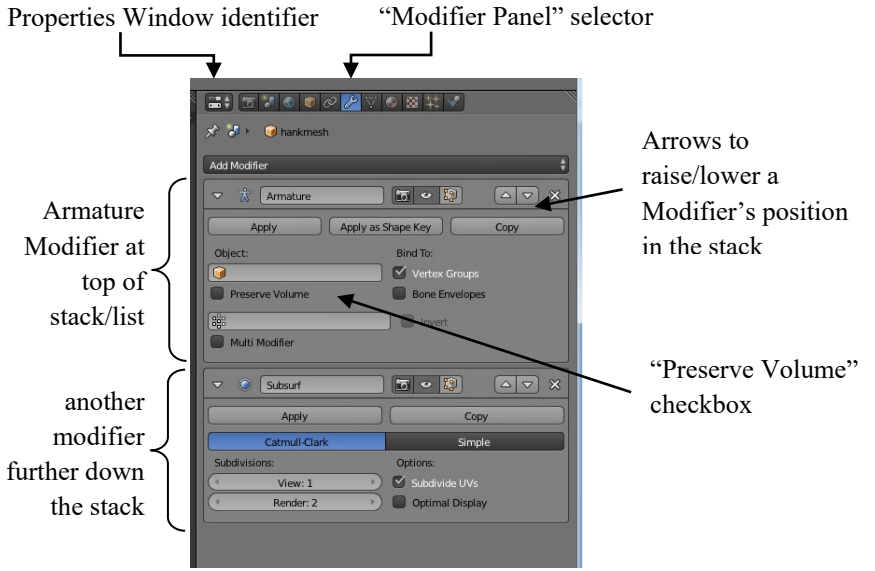
4. Insure that the Armature Modifier is the highest priority modifier for the model. This is necessary in case the model already had another modifier attached (e.g. a *Subsurface* modifier). To do this,

   a. RMB-select the *mesh*

   b. in *Properties Window,* select *Modifiers* panel (the "wrench" icon)

   c. If there is more than one modifier shown in the panel, locate the *armature modifier* and click the "up arrow" to move the modifier to the top of the modifier stack, as shown in the diagram.

   d. It also is usually the case that you want to check the "Preserve Volume" box in the Armature panel. This causes Blender to attempt to minimize distortions when objects move.




5. **Put the *Armature* in *Pose Mode***

   a. in **Object** mode, select *just* the armature

   b. select **Pose Mode** (use Ctrl-TAB or switch from Object mode to Pose mode). In Pose Mode, RMB-selecting a bone should show the bone highlighted in BLUE.

   c. select one bone, and drag it. Notice that the connected *bones* follow it, but the mesh doesn't. This is because in step 3b we created "Empty Vertex Groups" – that is, we didn't assign any vertices to the bones. To fix this we have to adjust the assigned bone weights. This can be done *manually*, or by *weight painting*.

6. **Assigning Vertices to Bones Manually Using Vertex Groups**

   a. in **Object** mode, select the *mesh*

   b. In the *Properties Window*, select the ***Object Data*** panel (the little triangle-connected-vertices icon)

   c. In the *Vertex Groups* panel, notice there is a vertex group for each bone-name; this is where we will put each group of vertices corresponding to that bone.

d. In the 3D View window, de-select everything (**A** key). You will also need to go into Edit mode.

e. Choose one of the vertex groups in the Object Data panel by clicking on it. Then back in the 3D view window, select some set of vertices that you want associated with that bone. Once you have highlighted exactly the vertices you want associated with that vertex group, click the Assign button back in the vertex groups panel. This assigns the vertices you chose to the vertex group associated with the bone of the same name. You can confirm that the vertices were indeed assigned, by de-selecting all of vertices in the 3D window, selecting the vertex group name, and clicking the Select button in the vertex group panel.

f. Repeat step (e) for each desired vertex group. If at any time a vertex group shows highlighted vertices that shouldn't be affected by the bone, you can remove those vertices by using the **A-key** to deselect everything, use the standard selection tools (RMB, box-select, etc.) to select the vertices to be removed, then clicking the **Remove** button on the Vertex Groups panel. Don't forget to also check the back side of the model.

*Caution: **Assign** and **Remove** apply their actions to all currently selected vertices. Be sure you have selected exactly (and only) the vertices you are interested in before clicking **Assign/Remove**. Also, clicking **Assign/Remove** does not deselect any selected vertices; it only assigns or removes them to/from groups. Further, switching to a different vertex group in the Object Data panel does not automatically deselect a previously-selected group's vertices. Observe these things carefully while editing vertex groups, and make frequent use of the **A-key** to unselect everything before continuing with new selections and assignments.*

**7. Pose the Skeleton and Observe the Mesh Following It**

a. Select **Pose Mode** *(described in steps 5a and 5b)*

b. RMB-select a bone and drag to move it. The mesh vertices should now follow the bone movement.

c. **RMB-select** each bone and move it. If portions of the mesh move undesirably when a given bone is moved, it's an indication that some bone has undue influence on vertices in that area. To fix this you will need to go back and edit the Vertex Groups.