

The Macchia's How to Guide

How to Live happy with LightWave And Zbrush 2

Carlo Macchiavello



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Please send comments or suggestions about this document to carlo@macchiavello.com.

Introduction

From the first time I've seen a Zbrush demo movie of Pixolator, i felt in love with that software because it is able to take me back to the old classic times of clay modelling for puppet creation.

Today i have a big debt with the Pixologic Team that develops it and with NewTek for that amazing piece of software called LightWave3D: they take me in the twenty fourth century of SFX....

I wrote this paper to help all those people that want to work with LightWave3D and Zbrush. I collected all the informations from my experience and all the suggestions I received from lots of people, mainly from the Zbrush Central community.

In this paper i describe two different workflows:

- 1) Modeling in LightWave3D, detailing and sculpting in Zbrush, animation and rendering in LightWave3D.
- 2) Modeling in Zbrush, animation and rendering in LightWave3D.

First of all I have some suggestions and some useful links to the plugins you will need to go further.

- http://lynx.aspect-design.de/plugins/normal_displace_info.htm
Normal Displacement [Win/Mac] : this a replacement for the original LightWave3D's plug-in, it's faster and more flexible than the original.
- <http://lynx.aspect-design.de/plugins/tiff16bps.htm>
16bit Tiff Loader [Win] : a tiff loader that can load 16bit Tiff
- <http://www.madeinasa.com/plugins/zwave.asp>
Zwave [Win / Mac] : it loads Uv map from a Zbrush Obj applies them to an other Lw obj
- http://home.att.ne.jp/omega/taboo/3dlabo/p_junk.html
TB_normal map [Win] this normal map shader is the only one to compute the bone and displacement deformations before applying normal maps. If you plan to animate your obj, you must use that, no other actual shader, free or commercial can do that.
- <http://amber.rc.arizona.edu/lw/normalmaps.html> **Marvin Landis' Normal Map Shader [Win / Mac]** complete toolset to build and apply normal maps (useful normal map shader for mac user).

As you will see in the workflow, not all plug-in are indispensable, but they can help in some area where LightWave3D does not have actually the right tools.

Download all plug-ins, fill your tea and coffee's cup, start your preferred music and open the modeler of LightWave3D, we start from the base.

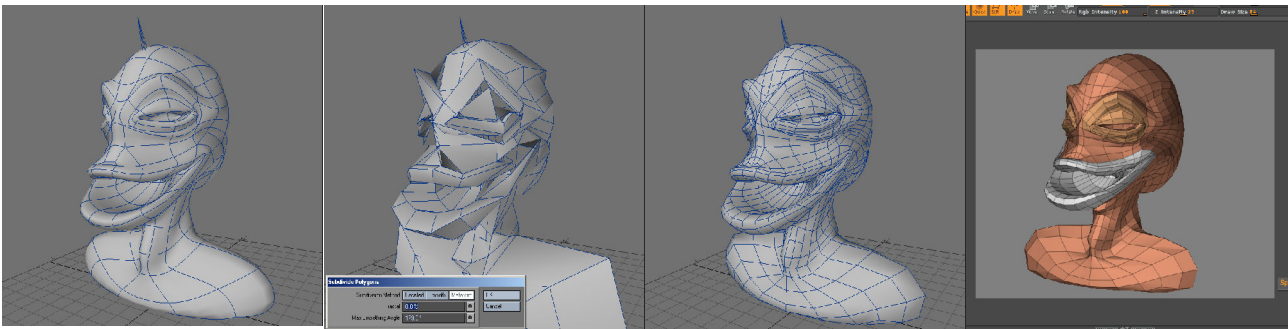
LightWave3D model preparation

Before moving to Zbrush for sculpting we must prepare our object in LightWave3D. I use for this example a very simple obj, I think that all examples should be made with a simple thing to be clear and fast to show concept and avoid mistake.

In LightWave3D you must build the object with some care, if you follow these rules, you will have much less problems:

- polygons must not penetrate other polygons or you will have many problems during the Zbrush session
- avoid strange diffusion of polygons, like areas with a lot of polys and areas with too few. A good and well balanced distribution of polygons is very useful to avoid high number of subdivisions during zbrush and render sessions.
- LightWave3D "Part" features are exported like groups of polygons in Zbrush then, if you want to have different groups on your object in Zbrush, select the polygons to group, go to the modeler tools called "Create Part" and define the name of group.
- If you have different separate parts on your obj or character, save them in different obj files for Zbrush, It will be much easier to control in the displacement and shading and you will sculpt them more easily.
- Don't forget that is useful to save separate obj files for lw and zbrush use, one for the export process, one to retain UV, and one for the animation work. This will save you from a lot of problems if you miss something or if you want to change something in your sculpting work.
- Build your object in a correct scale, not too big not too small, this is very important

to avoid problems when you will apply displacement and normap maps.



Here is my original Object, built in subpatch to keep low the original polygons' number, but...

If i disable subpatch, i see that I have many polygons that compenetrates and the polygons distribution is irregular. I apply Metaform command to solve that problem.

Here i have the polygonal result of Metaform, good shape, good polygons distrution, enough to work on Zbrush without problems and light enough to use in LightWave3D for animation work.

Here you can see the Zbrush result when i load the object, please see how different "part" set in modeler are now group for Zbrush, you can tell the different groups by the different colors on Zbrush's interface.

Well now you know what you must check before starting Zbrush.

Open your object in modeler, if it's a complex model, like a group of many separated parts, it is better to split them in different layers, and work one part at a time, that will help you to be faster and more efficient with Zbrush. Also under LightWave3D you can setup different settings for every part.

For example: if you character have many rigid part like horn, long tooth, dress and more, you can sculpt them separately then parent them after the Zbrush session, you will find a lot of advantage, think to the traditional modelling process, you build all the separate parts, then glue all them at end of process, remember that is useful if you need different level of details be cause you can manage with difference instance of displacement, LightWave 8.5 don't manage well different displacement map on different UV in a same object.

If you prefer to sculpt all together and you have a powerful computer that allow you to do that, you need to work with groups in Zbrush, under LightWave3D select first polygons' group and use functions called "Create Part", setup a name, then click on Ok.

Repeat until you have defined all the groups that you want.

Well now you should go in the layer that you want to export and, under **File/Export/Export**

OBJ, save it like Head_subdivided.obj, and when then the requester ask you if you want to save point group, you answer YES.
Close Modeler.

Uv preparation : LightWave3D or Zbrush?

LightWave3D has many tools that may help you to create and manipulate Uv map: you can build an uv map in LightWave3D and Zbrush can use it (default settings), or you can create them directly in Zbrush and import them whit the sculpted object in LightWave3D. Actually there is a very useful plugin that allows you to read uv built in Zrbush and enables you to apply them to another obj (if their geometry is compatible, naturally).

That means that you can export an obj file for a modelling and texturing session and your co-worker can add weightmaps, endomorphs and other vertex maps to the model in the same time. Finally, you will load the new obj that your co-worker rigged and prepared for animation, and with Zwave you will apply the uv maps built in Zbrush on the original file.

Usually if i don't need to work with another application on the textures (I do all 3d painting and sculpting on Zbrush) I prefer to do all Uv work in Zbrush, this saves me from lots of headaches and i'm sure that the final result is ok, specially now with Zapplink that allow me to use external paint application with Zbrush.

IMPORTANT NOTE : if you do UVMapping in LightWave3D keep in mind that you must avoid overlapping of polygons in UV, or you will have lots of problems in Zbrush, so make a check and avoid it.

ZBrush provides a UV check tool that will show in red areas where problems are that we need to eliminate before we continue.

Press **Tool:Texture:Uv Check**

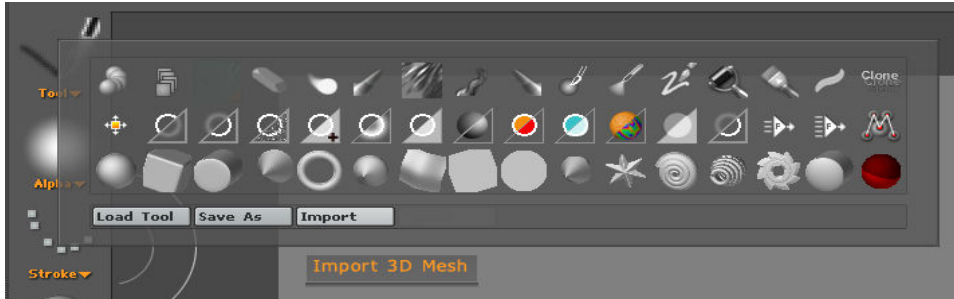
to perform the UV check.

Overlapping UVs show up in red. (Remember to rotate and check your model from every point of view).

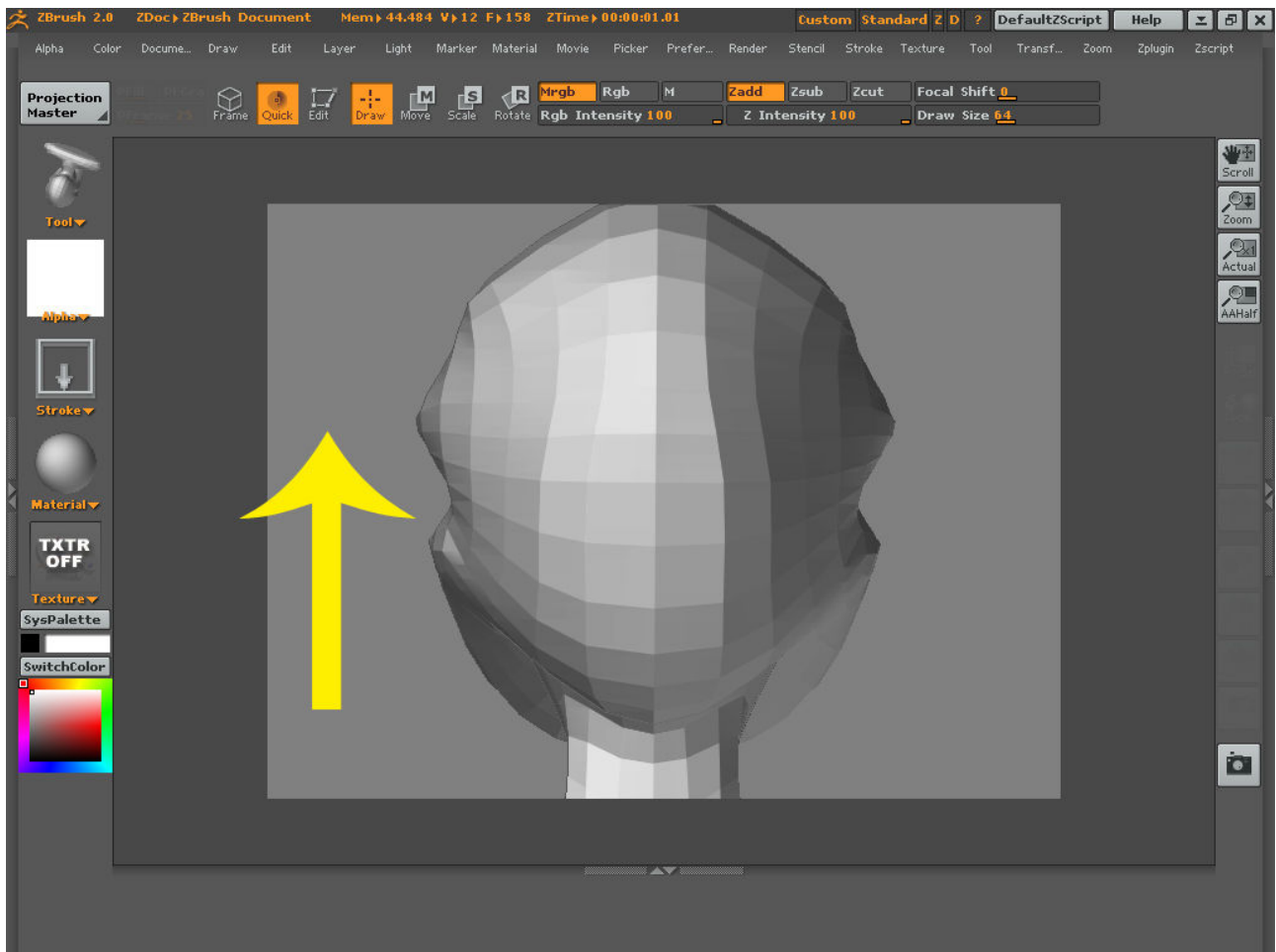
Zbrush loading and preparation

Open Zbrush.

Go under Tool and select **Import**



When you have loaded the new tool, you must create a Tool on the canvas by clicking and dragging on canvas, draw from **down to up** the object until it reaches your desired size, then click on Edit button, or hit “T” key.



Before going further, go under the
Tool tab, select **Morph**, and click on
Store Morph

this step is very very important for a correct
export process of your work at end.





Go under **Tools / Texture**

Click on **GUV Tiles** button to build UV map.

Save tool with **Tool / save as** with a name like : Head_subdivided_001.ztl

I suggest to save often, with progressive names, it is good habit to avoid loss of files, if you decide to change your work, you have many versions of the model at different degrees of sculpting and editing.

Now you are ready to start your work with Zbrush like you are used to, sculpt until you find your desired result.



My usual habit is to sculpt the object to give it the basic shape and skin deformations, like you can see in this picture.

This is an object with 4 subdivision levels and 80.000 polygons, i save it.

My goal is to have the main shape defined with a Displacement map, then I will add **Bump Viewer material**, and continue to add the fine details in a bump map.

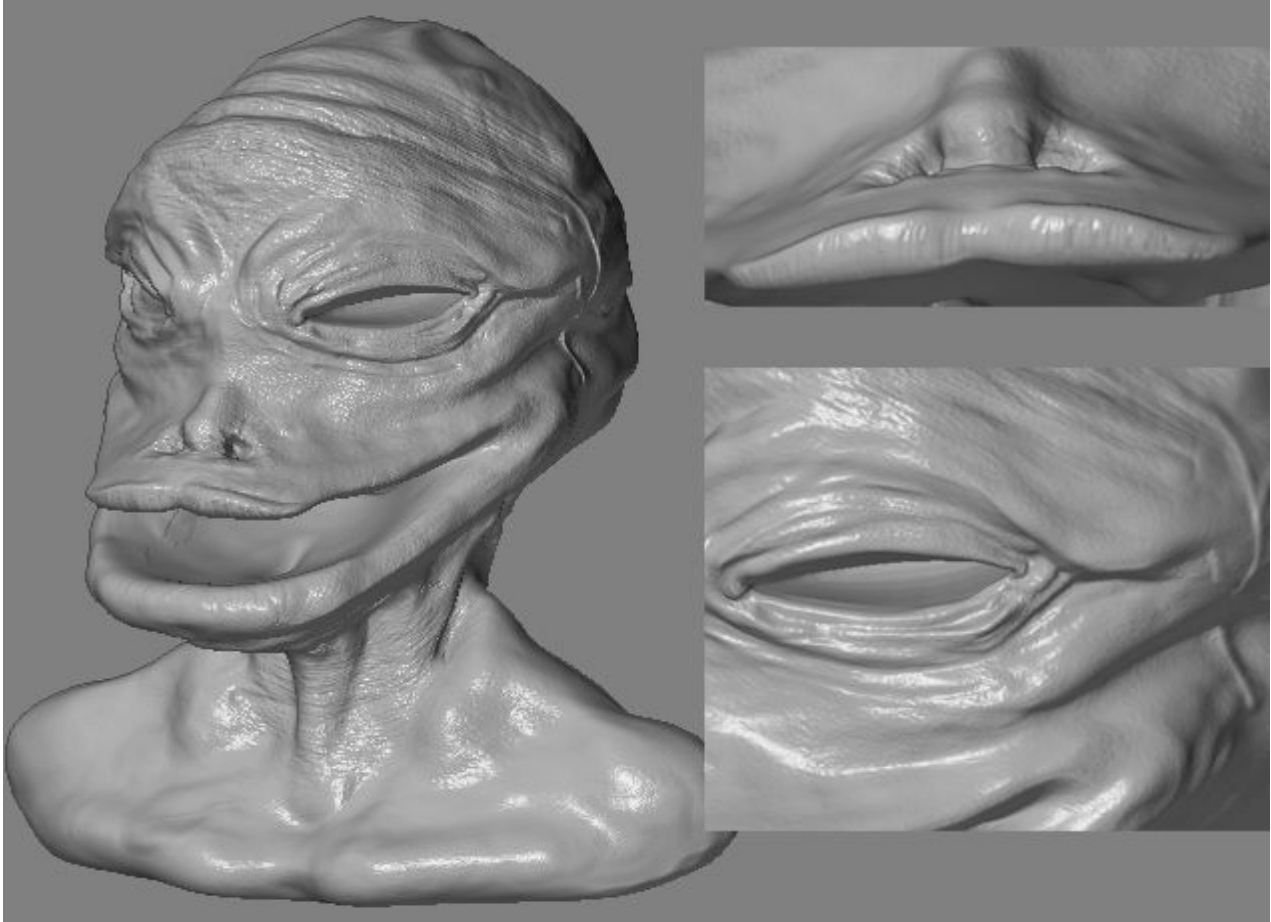
In this way, if I want to add geometry, I can apply the bump map in a Displacement channel easely, but if I work with bump maps I can work with light mesh and high fine detail.

I setup gray at 50% and build a large texture to paint bump map, 3000 x 3000 pixels.

Now I select black color and I start to add fine detail to my obj, in projection master.

I continue to add details until I'm satisfied with the results.

During the work, save some intermediate levels, it could be useful.



Here you can see the detailed version with the bump viewer material.

The detail is good and it is what we need to have a good render in LightWave3D.

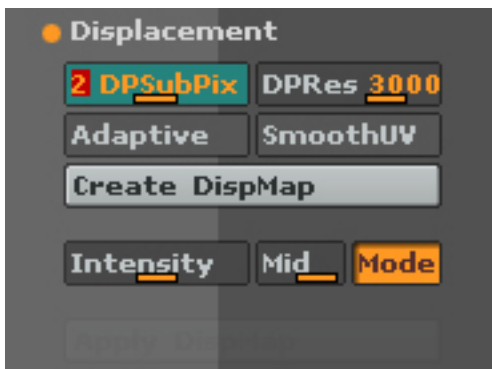
Now we are ready to export displacement map, normal map and bump map.

Go under tab **Tool / geometry** and click on button **Lower res** to arrive at level 1



- Go to **Tool / Morph** and click on **switch** button to come back to the original geometry.
- Go to **Tool / Export** and save obj like Head_subdivided_Zbrushed.obj.
- Go to **Tool / Morph** and click on **switch** to Zbrushed version.
- To save Bump Texture go to **Texture menu**, click on **Export** and save like Head_bump.
- To save Displacement Map go to **Tool / Displacement**, enable **smoothUV** if disable,

setup 3000 for **DPRes**, **DPSubPix** on 2, to have more quality, set **Mode** enable (if is Off you build a Bump map and not a Displacement Map), now click on **Create DispMap** button.



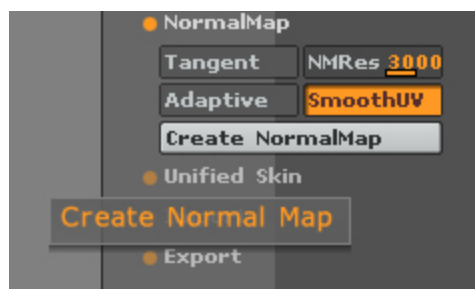
After that, click on Alpha and select the last alpha created, which is our Displacement Map.



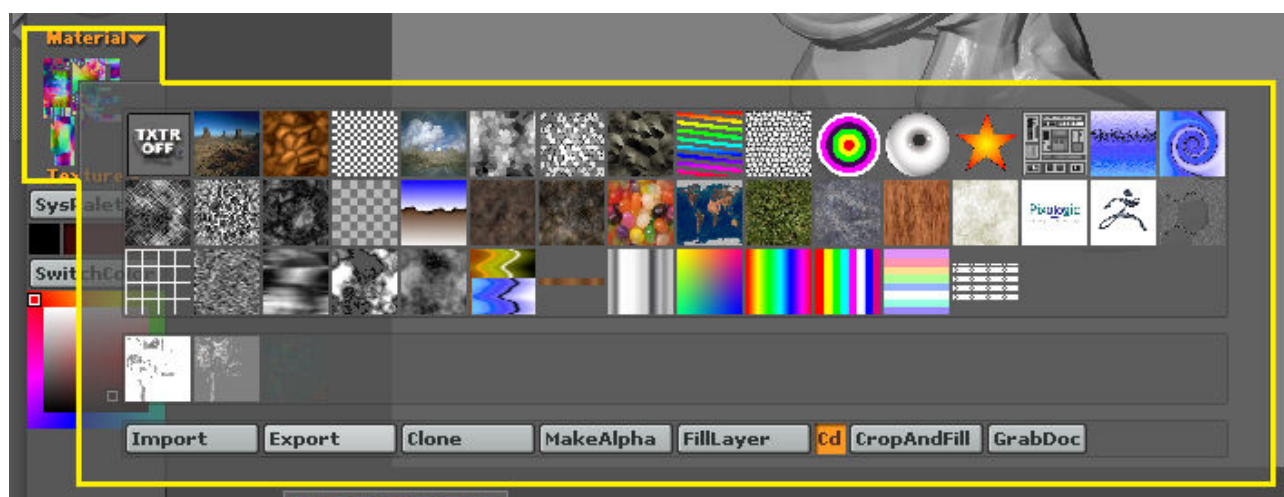
Select it and use **Export** to save it like Head_Displacement.psd

IMPORTANT NOTE : save displacement image like psd or tiff, because Zbrush works with 16bits/channel precision and only psd and tiff formats support that kind of depth.

- To save the Normal map go to **Tool / Normal**, enable **smoothUV** if disable, setup 3000 for **DPRes**, click on **Create NormalMap** button.



After Zbrush has created the NormalMap, you can see it in the texture panel, click on it, and in the windows that appears, click on the **Export** button, then save it like Head_normal.psd



Ok we have all the necessary files to alter the geometry of our object, now we can close Zbrush.

If we need to come back to do some changes, we have the saved tool that can be reloaded, modified and re exported.

First part of the game is done.

Some workaround on the maps

It is important to align Uv maps of Zbrush with Uv working in LightWave3D.

To do so, open Photoshop or another paint software and load all images saved, apply a vertical flip to all images¹, and save them.

Now save Normal and bump maps in Jpeg files.

Then select Displacement maps and save them in Tiff (we use that format because displacement maps have a 16bits resolution, and Lightwave3D does not support 16bits PSD files).

Mac User have two different choises :

1. convert Displacement map from 16 to 8 bit, it reduces a bit the precision of displacement, but in this special workflow it is not visible for many reasons: displacement maps of LightWave3D are a deformation applied to real points in the mesh, not a subpixel displacement in rendering, and I'm sure that you are far to use one polygon for one pixel because the mesh would be too heavy to use or animate, and probably to render. This special workflow divides basic shape (displacement) from fine detail obtained with bump maps, there is no risk to lower fine detail with this downsampling.

2. Another choise is to convert to HDR :

A bit more tricky in Photoshop CS2: select Displacement image, go under **Mode**, setup **RGB** mode and setup to **32 bits depth**, then go to **File / Save as**, select **HDR format**, save like Head_displacement.hdr. This format preserves all depth of displacement and is supported by Lightwave3D without external plugins, but it is so big and heavy to manipulate.

¹ If want to avoid to flip image in Photoshop you can flip directly in Zbrush, every menu like texture and alpha have a flip button, before to export image you can flip image.

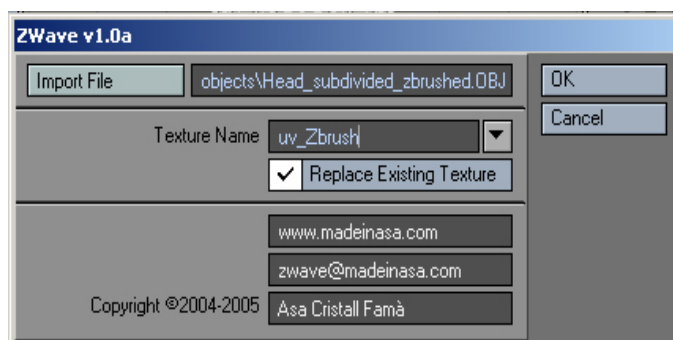
Start with LightWave3D

Start the modeler.

Go to the Utilities tab, and add plug-in **Zwave.p**

Zwave is a very useful plugin that loads uvmaps from obj files saved from Zbrush and applies them to the object actually loaded in the Modeler.

The advantage is that we can setup endomorphes, weightmaps, skelegons and more on our object, then we load uv from obj files from Zbrush, and we must not repeat all the setup on our new obj.



Load the Object and go to the **Utilities Tab**, then in the **additional** menu, select **Zwave**. it opens a window where you can set the path of the object saved from Zbrush. Second info is the name that we want for the Uv, write your preferred name and click **OK**

Hit Tab button, to convert object to subpatch and save object, then send it to Layout.

Now in the Layout we need to add some free plugins :

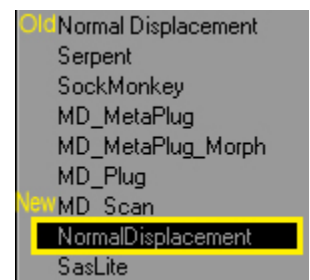
tb_normalmap.p / normaldisplacement 12.p / tiff16bit.p

(for mac user : load normal map shader80 by Marvin Landis)

in my first example I do not use normal maps, I build all with real displacement and real bump, later we see the use of Normal map to add more detail without a large number of polygons.

Select Object, hit P (or click **Property** button), go to **Deform Tab**, and select on **Normaldisplacement**

IMPORTANT NOTE you find two Normal Displacement plugins in the menu, you can see one with a space between the words, and this is the original newtek plugin, but we want to use new plug-in, then we must select Normaldisplacement.

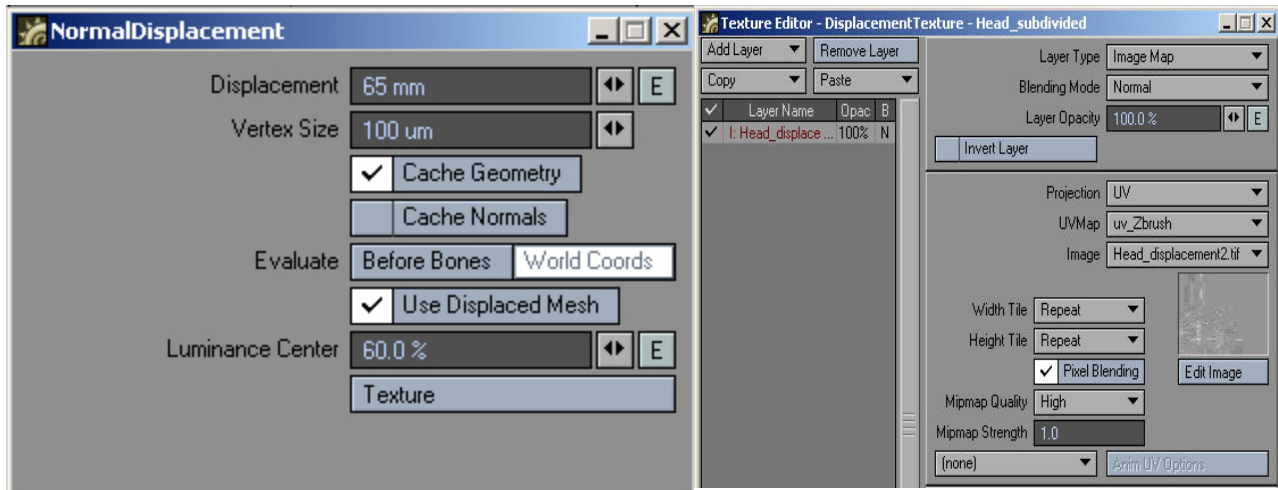


Double click and setup the parameters:

Is not simple to suggest correct parameters, you can start with Luminance center at 50%

and Displacement at 50mm, then start to tweak until you find the parameters that work for you.

Click on the Texture Button, and add Texture for displacement, setup uv on Surface editor, click on T (Texture Editor), and set like in picture.



Go to the first tab of object and setup :

Display subpatch level at 6

Render subpatch level at 8

I tried different combinations and I've seen that level 6 of subdivision is enough to replicate the 80.000 polygons of Zbrush, but for the render I prefer to setup higher values, because I had observed that it helps to replicate a more correct displacement detail.

Probably LightWave3D and Zbrush use two different algorithms of subdivision and displacement, and when we setup displacement we need to setup an higher value than the one we used in Zbrush where it mixes displacement and subpixel displacement, Lightwave3D can only build polygonal displacement.

Setup subdivision order to **After Bone**.

Open Surface Editor and apply the bump map we created to add those fine details and other maps, like color and more.

Load bump map and click on T of the Bumpmap channel, select Head Bump.jpg and Uvmap projection, then select uv built in Zbrush.

Go to the Texture amplitude requester and insert the new value, usually the value is 1, but we need to set a stronger value to see a good result, so insert 10, close texture editor and try to render to see if you need to tweak the values.

Change until you reach the results you want.

The basic setup of the object is done, now we can try to render to see the result



As you can see, the result is quite near to Zbrush work, it is fast enough to render (2 minutes with antialias low, no adaptive sampling, area light) and you have all the fine details that we sculpted in ZBrush.

With this workflow you can replicate deformations of Zbrush without problems or limits.

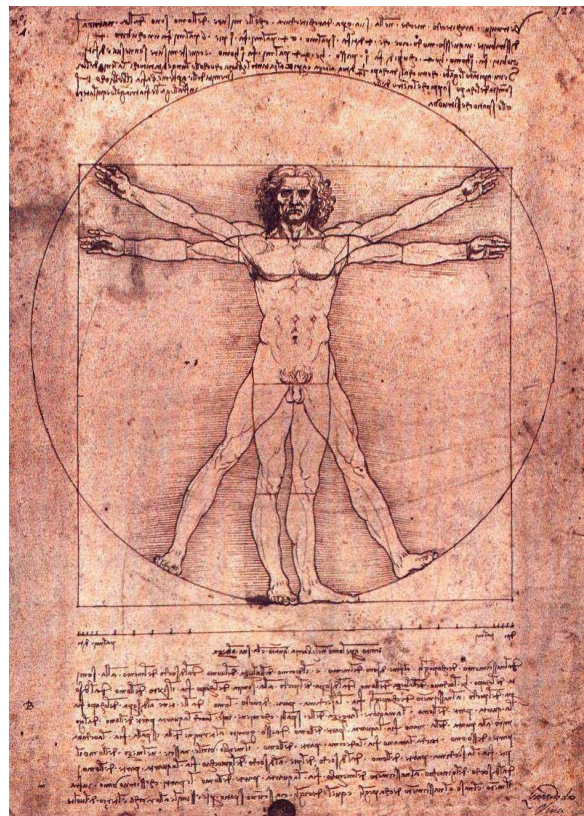
From Zbrush To LightWave3D

This second workflow starts directly from Zbrush and gives some suggestions to export Objects to LightWave3D, with less problems as possible.

If you project to animate objects, you could find some problems on deformation parts, check and build your basic mesh with special attention to the articulations and their joins.

The work started directly from Zbrush must be organized to avoid some problems in animation and deformation, nothing of complex, but a bit of attention to detail help us to avoid a lot of headache in final process.

Good thing is to build your object in a neutral position to avoid problem in deformation when you load it in LightWave3D, usually Vitruvian man position is good, be cause avoid deformation in critical joins.



But second problems is the polyflow on muscle and other important animated part of creatures. When you build a creatures, digital or with traditional method, you build a mass of bones and muscles, to build a correct anatomy, to be believeable and see a correct motion and deformation on creatures, the polyflow would follow the muscle line, to build a correct deformation in animation.

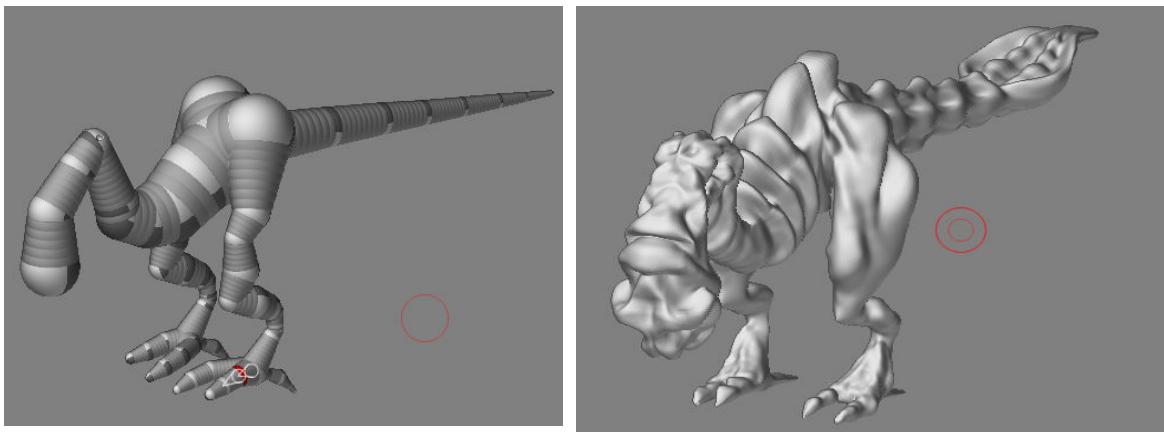
If polyflow is correct, you can build easily the muscle animation, and all deformation are more natural and correct for the viewer. If Polyflow not follow the muscles' lines, you need to do a lot of work to have correct deformation.

If you build your base on Zbrush, you can modify polyflow with many tools, and some retouch you can do with LightWave3D on basic mesh.

A very interesting tool of Zbrush is edgeloop tools, that help you to modify you mesh, to add edge and split your edgeloop to have more dectails.

I start from a zphere scratch, and i build a biped creatures, with zphere model that you can see below.

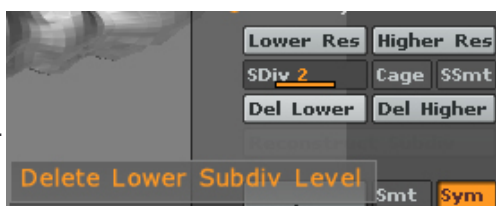
From Original Zphere shape, i build my polymesh to be free to sculpt my final creatures.



I sculpt main shape, be cause i think to build fine dectails like bump map later.

Then i can go to subdivision level 1 to export first obj version

- Go to **Tool / Export** and save obj like **Creatures_cage Level01.obj**.

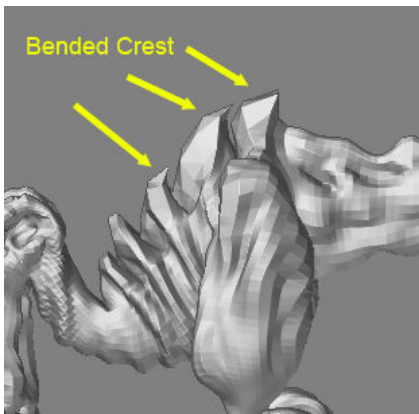


then i go to level 2 and click on button Del Lower, and export second version of Obj.

Go to **Tool / Export** and save obj like **Creatures_cage Level02.obj**.

I did it be cause that help me to speed up animation work.

First version of Obj is basic cage of obj, that i use to have a fast feedback during animation, second version of Obj is a cage that i can deform with displacement.



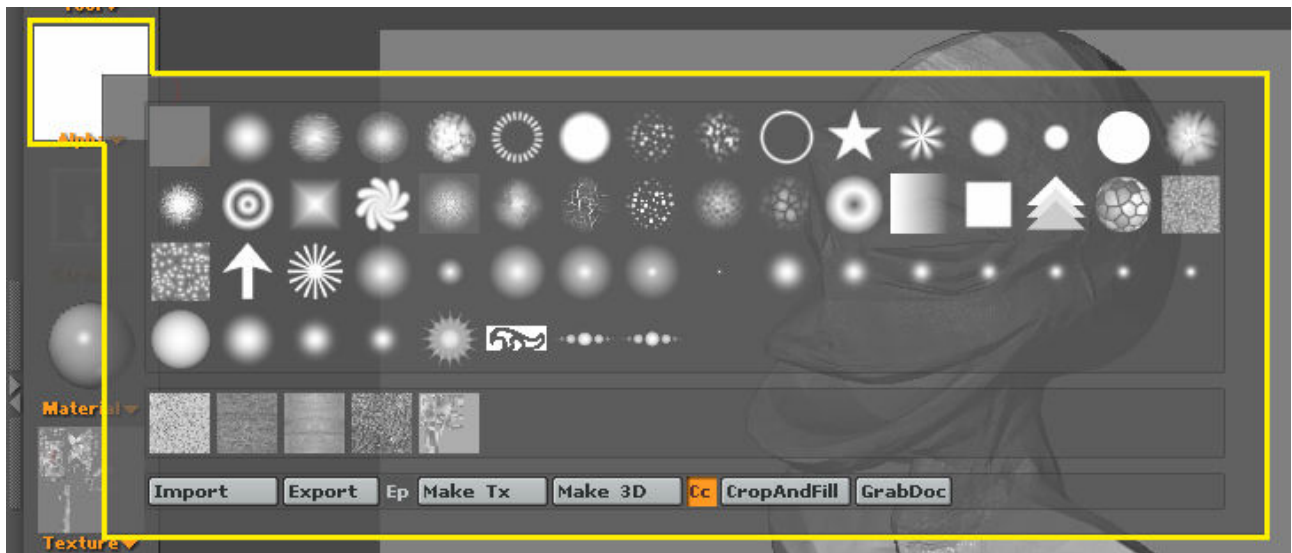
There are another reason to export an higher version of cage, during sculpting of creatures, i sculpt some crest and bend it, to replicate it i need a basic crested version of creatures, be cause LightWave3D displacement (and most of render displacement) cannot displace a mesh in a bend space², then i need a basic shape to replicate correctly the original Zbrush shape.

Now we are ready to export displacement map, normal map and bump map.

Go under tab **Tool / geometry** and check that we are at level 1

- To save Bump Texture go to **Texture menu**, click on **Export** and save like Head_bump.
- To save Displacement Map go to **Tool / Displacement**, enable **smoothUV** if disable, setup 3000 for **DPRes**, **DPSubPix** on 2, to have more quality, set **Mode** enable (if is Off you build a Bump map and not a Displacement Map), now click on **Create DispMap** button.

After that, click on Alpha and select the last alpha created, which is our Displacement Map.

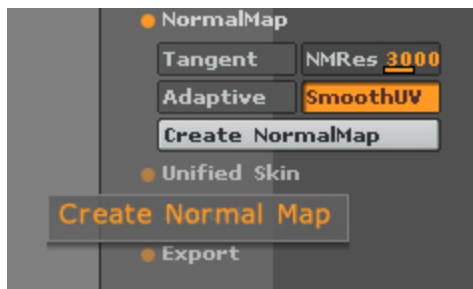


Select it and use **Export** to save it like **Creatures_Displacement.psd**

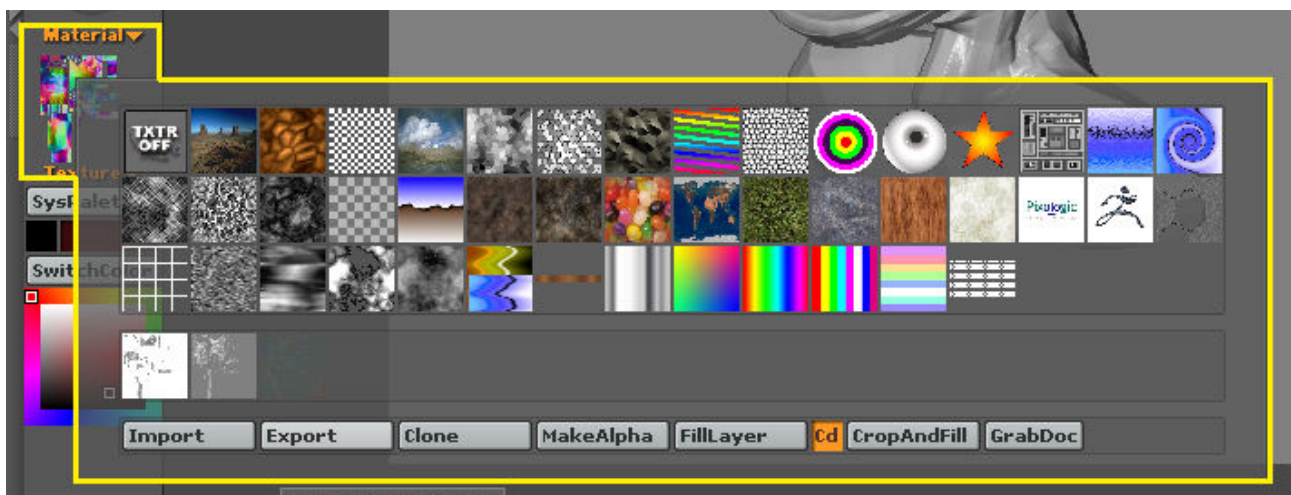
IMPORTANT NOTE : save displacement image like psd or tiff, because Zbrush works with 16bits/channel precision and only psd and tiff formats support that kind of depth.

² I read somewhere that Renderman can displace in a deformed space, with a combination of spline guide, normal map and displacement map, but if i remember correctly is a R&D of a new features

- To save the Normal map go to **Tool / Normal**, enable **smoothUV** if disabled, setup 3000 for **DPRes**, click on **Create NormalMap** button.



After Zbrush has created the NormalMap, you can see it in the texture panel, click on it, and in the windows that appears, click on the **Export** button, then save it like **Creatures_normal.psd**



Ok we have all the necessary files to alter the geometry of our object, now we can close Zbrush.

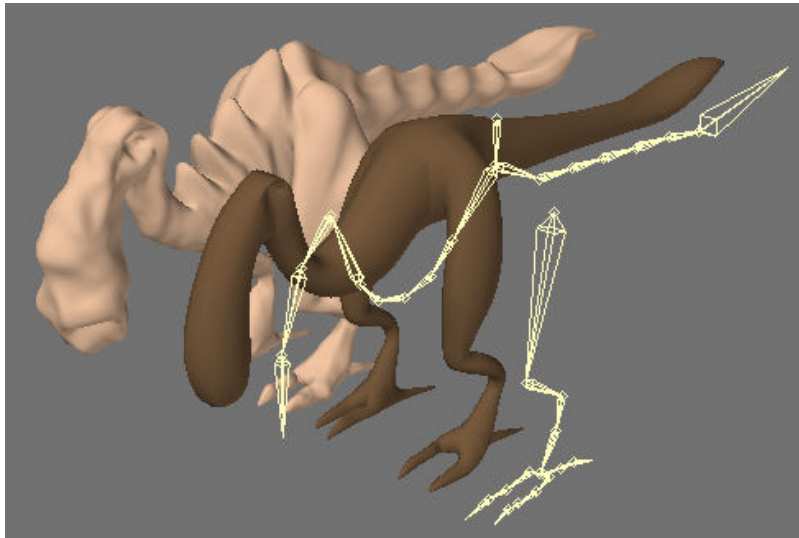
If we need to come back to do some changes, we have the saved tool that can be reloaded, modified and re exported.

Start with LightWave3D

Start the modeler.

Load Creatures_cage01 and Creatures_cage02.

Hit Tab button, to convert object to subpatch, copy Creatures_cage01 in a second Layer of Creatures_cage02, and use



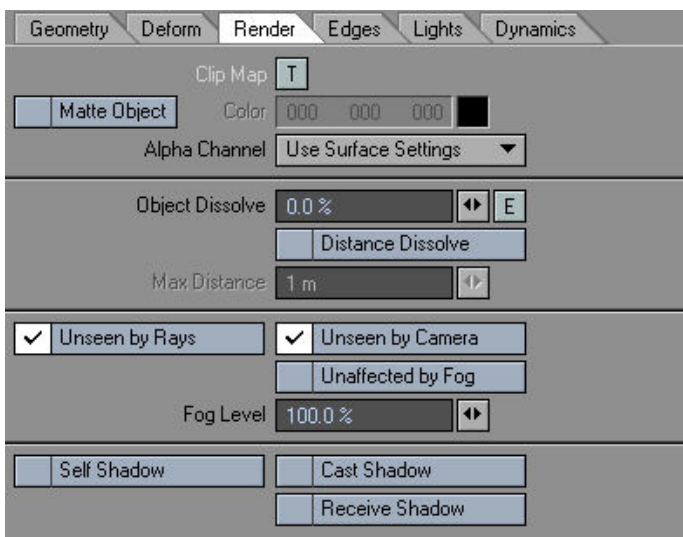
Skelegons to add bone for animation in layer 3 (useful to animate both at same times), then save obj like **CreaturesMultiLevel.lwo**

Now i can send to Layout the mesh.

In the Layout we need to add some free plugins :

normaldisplacement 12.p / tiff16bit.p

Go in the Scene editor and parent Layer 02 to Layer 01, and Layer 03 to Layer 01.



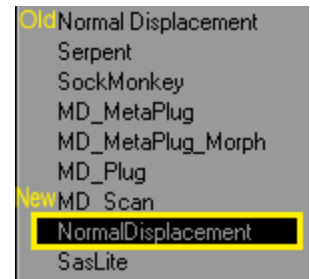
Select Layer02 and hit p to have Property panel, go under tab render and setup level to be invisible in render (this is a stand in level used for animation).

Disable all **shadow** options, and enable **Unseen by rays** and **Unseen by Camera**

This help you to speed up your animation work.

Select Object layer 01 (which is mesh that must be deformed from displacement), hit P (or click **Property** button), go to **Deform Tab**, and select on **Normaldisplacement**

IMPORTANT NOTE you find two Normal Displacement plugins in the menu, you can see one with a space between the words, and this is the original newtek plugin, but we want to use new plug-in, then we must select Normaldisplacement.



Double click and setup the parameters:

Is not simple to suggest correct parameters, you can start with Luminance center at 50% and Displacement at 500mm, then start to tweak until you find the parameters that work for your obj size.

Trick : when you load obj in modeler check its size and define a correct scale for it, this help you when manage obj in layout, and speedup a lot of setup. If you know the size of your creatures, of your humanoid, is simplier to setup displacement value, the camera settings and more, be cause LightWave3D work with real scale, that mean rendering, falloff of light, dynamic simulation and more are size related and working in correct size help a lot to work fine and faster.

Go to the first tab of object and setup :

Display subpatch level at 2

Render subpatch level at 5

I tried different combinations and I've seen that level 5 of subdivision is enough to replicate the polygons of Zbrush for this obj, but for the render I prefer to setup higher values, because I had observed that it helps to replicate a more correct displacement detail.

Probably LightWave3D and Zbrush use two different algorithms of subdivision and displacement, and when we setup displacement we need to setup an higher value than the one we used in Zbrush where it mixes displacement and subpixel displacement, Lightwave3D can only build polygonal displacement.

Setup subdivision order to **After Bone**.

For this creatures i prefer to build fine dectails with a LightWave3D procedural texture, if you prefer to sculpt also fine dectail you can use bump viewer techniques like in first example of this guide.

The basic setup of the object is done, now we can try to render to see the result in LightWave3D.



Thanks for reading this guide!

If you have any suggestions or corrections I can be found at carlo@macchiavello.com or at ZBrush Central like madrenderman. Happy sculpting!

Special thanks to all:

Pixelator, Aurick, Steve Warner, Pilou, Pixologic team! NewTek Team and the countless other artists on ZBC who are always inspiring and teach me every day a new tip!

All models by Carlo Macchiavello.