

SKIN SHADING ESSENTIALS

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I. GOALS OF THIS TUTORIAL AND BASIC INFORMATION

1.1. Goals

The goals of this tutorial are very simple. At the end you should be able to work easily and efficiently with the Iray Uber base shader in order to :

- Create your own skin shader from scratch
- Modify an existing skin shader to get closer to or eventually really reach the skin you want (depending if what you want is possible or not).
- Identify and understand the influence of the key parameters of the Iray Uber base shader for skin management, and know how to tweak these parameters (also called properties) to adjust the skins to your needs.

1.2 What is a shader? What is a PBR shader ?

Before beginning to speak about skins, the first thing is to explain clearly what a shader is. A shader is render engine dependent, meaning that if you create a shader for a given render engine, another render engine will not be able to exploit it. In our case we are going to focus on Iray shader in Daz Studio, called Iray Uber Base, included in Daz Studio Default Resources.

A shader can be seen as the set of laws explaining to the render engine it has been created for what happens to the light coming to (exiting from if the surface is emissive) a given surface or volume. Will there be a lot of gloss? Will the light enter inside the material? If yes, what will happen to this light? Everything is here, in the shader parameters.

One of the specificities of Iray Uber shader is to be a "PBR", meaning "Physically Based Rendering" shader. It does not mean that it is totally based on physical theoretical formula, but it means that it tries to :

- respect the fundamental laws of physics on the one side (Energy Conservation, Helmholtz reciprocity...),
- to use the existing physical formula when they exist and can be applied on the other side (Fresnel, Refraction...),
- to rely on some empirical models when they are the only solution available. It is the case for instance for the Bidirectional Reflectance Distribution Function -BRDF - used for the Gloss/Specular models. It is also probably the case for the BSDF (Scattering function) of the light which propagates through the volume of the skin or at least it is using statistical laws for light scattering.

When people speak of PBR, they often think that it is purely physical with 100% theoretical laws, so 100% accurate. This is not the case and this is normal since the only approaches of BRDF-BSDF for instance are either purely empirical (meaning that you get for formula out of experimental measurements) or semi-empirical (meaning that you do the same, but you manage to put a bit of real equations in the formula too).

1.3. What are the factors influencing the quality of the skin render ?

- First the render engine. Here we are lucky, Iray is a very good render engine.
- Second the lights. You can have the best shader, geometry, textures you want, if the lighting is bad, the render result will be disappointing. Always try to make an effort on lights, because this is a part of the render on which you have a total access and freedom (on the contrary of texture sets and geometry for instance where you have less possibilities). Using HDRI environment as the base of the light, even if you may keep its power low if you want, may be a good starting point.
- Third the details of the figure and of its "defects and reliefs". These details can come from the geometry itself, the geometry resolution (HD figures will give more details if they are well conceived) or from the additional texture maps such as bump and normal maps (normal map being normally the one providing the most accurate and finest details).
- Fourth the texture set used on the figure itself is a key factor of a successful render. If the maps are not detailed and/or not realistic you will probably have a poor skin render result, even if all the other criteria are met. In this case the shader can help a bit, but cannot totally repair the initial issue.
- Finally comes the shader. Indeed if all the criteria above are respected but your shader is not adapted to your situation, then the skin will probably will not look like a skin. It could look like plastic or metal. And this is not what we want.

There light be other factors, but these are the main ones.

II. THE IRAY UBER BASE SHADER FOR SKINS

2.1 Selection of the skin surfaces

In order to set up or modify the skin of your figure, you will have to select all the skin parts, with or without Lips and Nails and to go in the Surfaces Editor Tab. Note that you can select the surfaces using the Surfaces Selection Tool, or directly in the lists of the Surfaces Editor Tab.

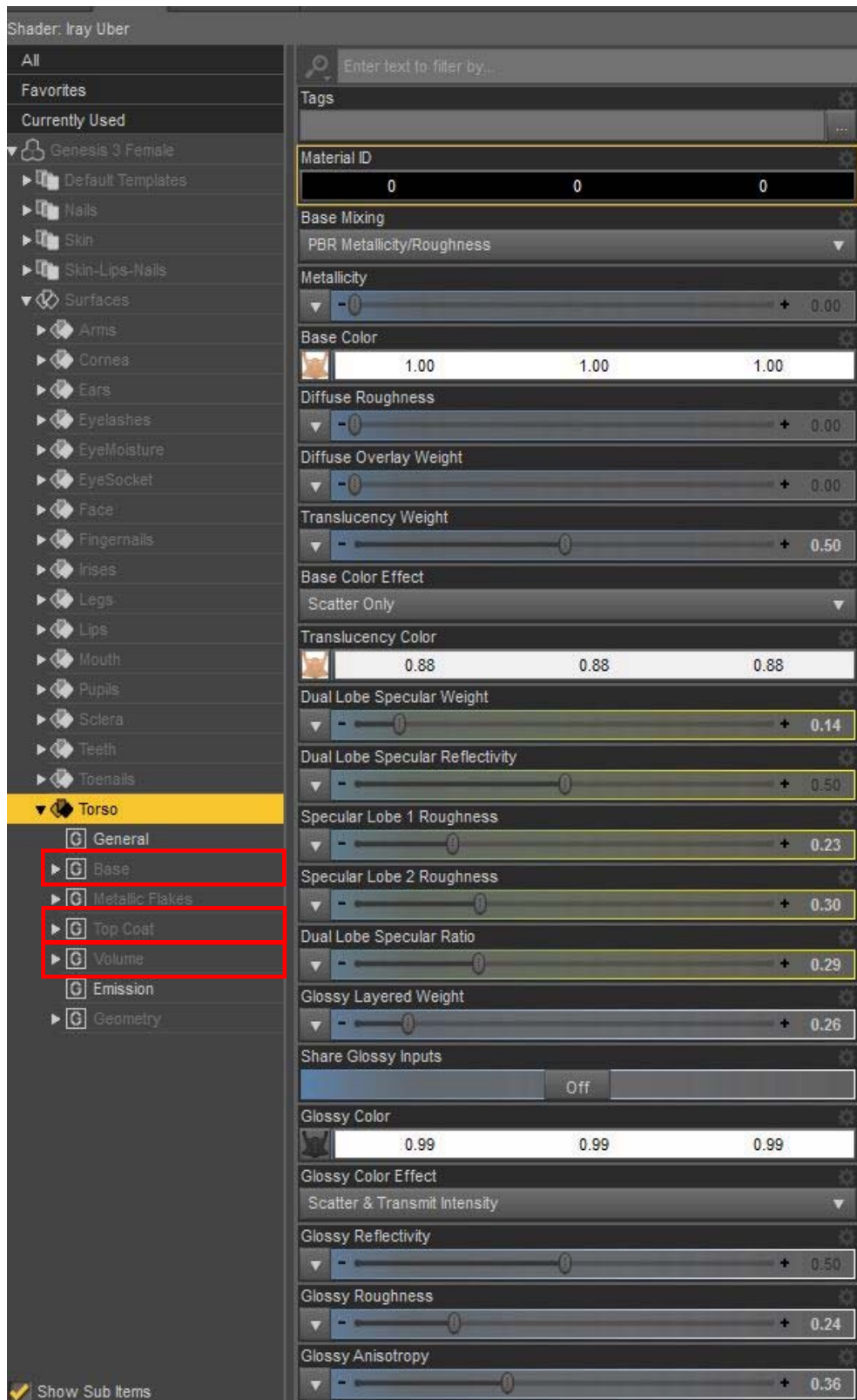
In general when you set up the gloss of the skin, you will exclude Nails which may present different gloss characteristics, and eventually Lips (depending on the type of make up and on the texture maps provided for Glossy Weight and Roughness), and when you set up the color and translucency, you select everything - eventually not the lips depending on the changes you make. If you work with the Ultimate Iray Skin Manager product, you simply have to select the figure, and in the interface choose if you want to include or exclude lips and/or nails.

2.2. Have a look in the list of properties

The list of properties of the shader is the huge vertical list available at the right of the Surfaces Editor Tab, showing all the available parameters (properties). Don't panic this seems complicated, but it is because it is hard to have a clear overview of it, and of the relative influence of each parameter. [Now select only one single skin surface of the figure](#), for instance the Torso, this way, we will be able to see which groups exist

and in which groups the key properties for skin shading are located. By groups I mean groups of properties (see next image).

You will find the following groups : General, Base, *Metallic Flakes*, Top Coat, Volume, Emission, Geometry, and sometimes - if you show hidden properties - some other groups such as Render Priority, Settings.



This list of groups can be simplified because some of these groups are almost never used (even if some exceptional exceptions may occur). These are the following Groups :

- The "General" Group is informative, no need to change it.
- The "Emission" group, which defines how the skin would emit light (not reflect, but emit), except for sci-fi figures or special effects, is most of the time unused too.
- The Geometry "Group" includes various information such as tiling, offset, opacity, displacement, which do not need to be changed. Please note that it is in general not recommended to use displacement because it requires to subdivide a lot the figure, and this is not good for your video memory.
- The two hidden groups, Render Priority and Settings do not need to be changed in our case of figure. Only Settings may have an influence on skin rendering because you define whether the roughness and glossiness is squared or not, but keeping the default squared option for both is perfectly fine.
- The "Metallic Flakes" Group is mostly used for car paints effects. This one is a particular case of figure, because [eventually](#), if the Metallic Flakes are properly set up, then they can be used to fake the skin gloss. But in most shaders, it is not the case. [Yet we'll mention it later on anyway as a gloss setting](#), even if it is not close to initial skin physics.

Finally the most interesting and mostly used groups to set up or modify a skin are "Base", "Top Coat" and "Volume". We are going to detail them here.

2.3 What is the "Base" Group used for? Description and comments

This part will present the different controls of the Base Group so that you can refer to it when the procedure to shade the skin will be explained. The Base Group is the widest one, the one around which the rest of the shader is built, and includes :

2.3.1 The Mixing sub-group, in which you have only one property, called the "Base Mixing", and which allows you to [choose between 3 different models of PBR](#).

- The first one, **PBR Metallicity / Roughness** is the default shader of Iray Uber Base, and as said in its name, it relies on the metallicity and roughness properties of the materials.
- The second Model, **PBR Specular / Glossiness** is pretty close to PBR Metallicity / Roughness, the main difference relying on the way the specular highlights (the white shiny highlights on the skin) are evaluated. In this second case, it is using controls for gloss which are closer to what you were used to have with the shaders used for 3Delight (using here the Glossiness property instead of the Roughness property used for the PBR Metallicity/Roughness, as well as an additional "Specular Color" called here "Glossy Specular"). The notion of metallicity disappears here.

- The third model, **Weighted** has this name because it "normalizes" the total contribution of the Diffuse parts and of the Glossy part, meaning that it "adjusts" them regarding the relative proportions (weights) you give to them. For instance means that if the "Diffuse Weight" is set to 0, the "Glossy Weight" (not null) can be modified as much as you want, it will not change the result, which is actually as if it was set to 1. The same way if the Glossy Weight is set to 0, you can change the Diffuse Weight as much as you want, it is considered as being 1. For any other cases, Daz Studio has a look at both contribution and normalizes them.

For skin shading, the majority of the shaders use PBR Metallicity/Roughness model. Some fewer shaders use PBR Specular/Glossiness model. Only a few shaders use the Weighted Model, but this is so far very occasional.

2.3.2 The Base Group also includes The Diffuse sub-group (depending on the PBR model chosen), which is the most important group to set up the Base of your shader since it provides the information for the reflection, the overlay and the translucency. Now let's have a closer look at the Diffuse sub-group in details.

2.3.2.a : The Diffuse includes The REFLECTION sub-group

The reflection includes all the diffuse characteristics of the skin, and more precisely focus on the "rough" base of the skin, the "Diffuse" one, in opposition with the Specular (glossy) characteristics of the skin.

This reflection is similar to the "Diffuse Color" used in a lot of shaders, but is named here **"Base Color"**. The Base Color, the Diffuse characteristic of the skin is roughly speaking the color the skin would take if there was no gloss, no top coat, no translucency and no scattering, well no "nothing else". It can be seen as the base on which you add, or from which you remove everything else in the shader.

The real "Base Color" computed takes into account the *color of the image map multiplied by the color used for the Base Color*. Changing this base color to something warmer or colder can already have a strong effect. It also takes into account the **Diffuse Strength** (allows to reduce or increase the quantity of light globally reflected, generally in the hidden properties of the shader), and in the Weighted model, the **Diffuse Weight**.



The properties of the base reflection of the skin

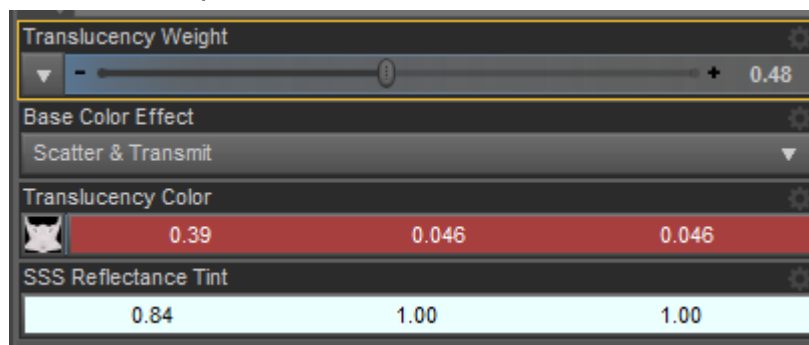
Is this diffuse reflection, in Iray Uber shader, purely **lambertian** (meaning that a surface reflecting the light appears equally bright from all direction)? Not exactly, because for more realism, Iray Uber Base reflection is based on an **Oren-Nayar** model which is a semi-empirical model for BRDF (how light is reflected in space) for Rough-opaque-diffuse surfaces. The curious ones can have a look on the internet for more details, but this is not fundamental for the rest of the tutorial. This simply explains why you have in the properties what is called the **Diffuse Roughness**, corresponding to the roughness of the Oren-Nayar Model. For a null roughness, Oren-Nayar comes back to the lambertian model. The more you increase the Diffuse Roughness, the more you go away from the original lambertian model, which is a model presenting the default of having to dark results on the border of curved objects. In the bibliography we can find roughness of around 0.5 to 0.6 for skin for Oren-Nayar model, but honestly, you can keep the default "0" value provided, it does not make a real difference on human shapes. What you can observe as a difference is mainly the perceived amount of light reflected. *With high values of roughness, the reflectivity looks lower (the figure looks darker) than with a null value of roughness.*

The **Metallicity**, available in the PBR Metallicity/Roughness model, must, in most cases of skin shading, remain at 0. This is the value which is used in Iray Uber Base for a non-metallic surface (di-electric) which is the case of skin.

2.3.2.b : The Overlay sub-group is less important to set up a shader. It is in general dedicated some texture color details you add above the skin, such as make up, moles, eyebrows, and which will not be discussed here, because this is not properly speaking the base of the skin shading.

2.3.2.c : The Translucency sub-group is, for skin shading, is very important because it defines not only **how much lights "enters inside" the skin (Translucency Weight)**, but also *begins to* describe **what happens to this light inside the volume** of the skin (**Translucency Color is the color of the light when entering the volume in the skin**).

I say "begins to", because what happens precisely to this part of the incoming light which goes into the volume of the skin is (how it is absorbed - by color -, the direction in which it is scattered, the amount or color of the Sub Surface Scattering (SSS), etc, etc...) is strongly dependent on what you set as properties in the "Volume" group of the skin, which is totally logical since it is not a Surface phenomenon but a Volume phenomenon.



The base properties of the Translucency of the skin

The two other important parameters of this Translucency group are the **Base Color Effect** and the **SSS reflectance Tint**, which is visible only if the Base Color Effect differs from "Scatter Only".

A lot of people want to understand the difference between the various Base Color Effects. This is why I am going to spend a bit more time on this.

When the Base Color Effect is set to "Scatter Only", the SSS reflectance tint will be ignored, and the color the light will "initially" take inside the volume (if there is no additional dispersion and scattering in the Volume group) is the one defined by the Translucency Color (Color of the Translucency Color Map multiplied by the Color of the Translucency Color).

With this setting "Scatter Only", you first define the transmitted light, then set the Diffuse part of the skin "layered" above it. Then you consider that all the light which is not reflected by the skin surface (Diffuse Part) is definitively and totally lost, it is considered as absorbed at the skin interface, and excluded of the rest of the calculations.

From the practical point of view, with this setting, the higher you set the Translucency Weight, the more you "replace" the Base Color by the Translucency Color, with "no special other interaction" between the two. This is the easiest case of figure to understand.

On the contrary, when the Base Color Effect is set to "Scatter Transmit", or "Scatter Transmit Intensity", then when some light is not reflected by the skin, it is not considered as being absorbed - lost forever, but it is considered as being transmitted to the translucency layer. The **SSS reflectance Tint** is then enabled, to allow you a correction of the color of the light reflected backwards (to the direction of the light source) "inside" the skin (we will detail that later on).

There is a simple test to check and maybe understand better this Scatter behavior. Take Genesis 8 Basic Male, select all skin-lips-nails parts, set "Thin Walled" (in Volume) to ON in order to disable additional volume effects, and set translucency weight to 0.5 so that he does totally not look like a candle.

Now, swap between **Scatter & Transmit** and **Scatter Only** as the **Base Color Effect** and you will see a small difference between Scatter & Transmit and Scatter Only, with more visible translucency for the Transmit Mode. This difference is small because the amount of light which is not reflected by the Diffuse Layer is small too.

Now here is the test you can make to see better the influence of this effect :

Show hidden properties of the shader (using the three lines at the top of the Surfaces Tab, and clicking on "Show Hidden Properties") and then set the **Diffuse Strength** (initially hidden) to 0.3 for instance (meaning the amount of light not reflected will be much higher). In this case, you will have a HUGE difference between Scatter & Transmit, where Genesis 8 looks like a candle, and Scatter Only, where he is only pretty dark (see image next page). It is because all this light which is not reflected because you lowered the Diffuse Strength is sent because of the Scatter & Transmit option, to the Translucency layer. Since this amount of light is this time important, the difference becomes very visible.

This is why, in general, very dark skins are set with a Scatter Only option for the Base Color (otherwise too much light is sent into the Translucency Layer), whereas clear skins can be set with both, with in general a preference by the artists for the Scatter &

Transmit option which allow send more light to the translucency layer and as a consequence to see better the "under skin" details (veins for instance).



Difference between Scatter Only and Scatter & Transmit for the Base Color Mode increases as the amount of reflected light decreases (this light which is lost on surfaces is not absorbed but Transmitted in the second case).

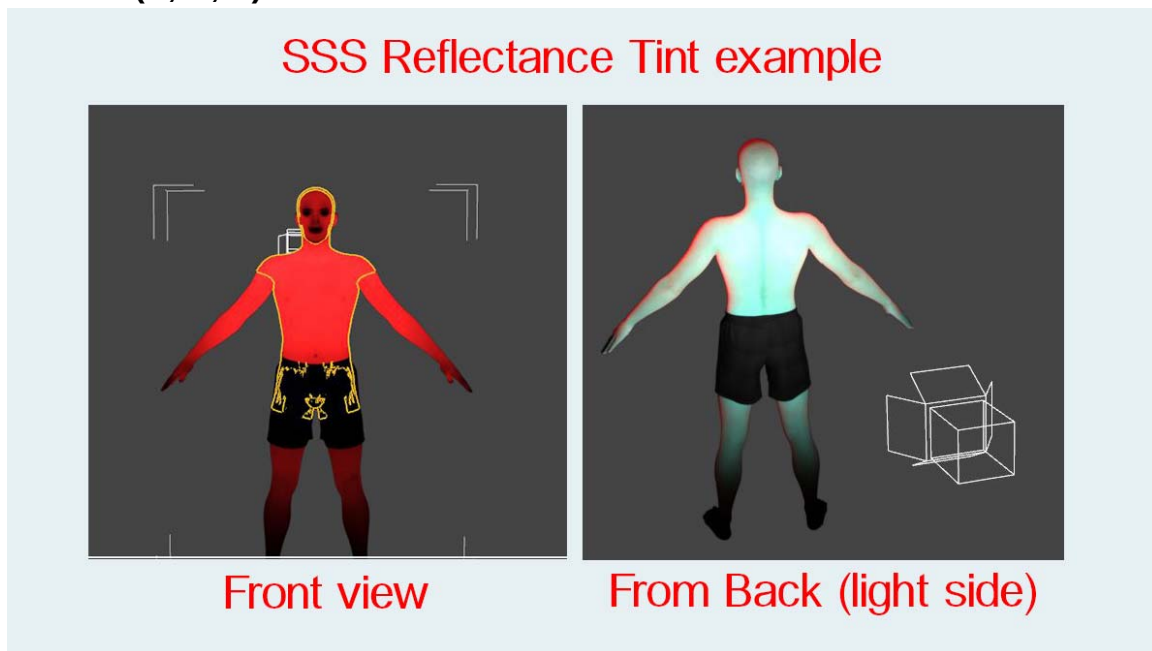
The main difference between Scatter Transmit and Scatter Transmit Intensity from what I understand, is that Scatter Transmit Intensity will not take into account the color of the light which is transferred to the translucency layer, it will only take into account the amount of light, regardless of the color.

What has to be understood concerning the **SSS Reflectance Tint** is that it is not a "global" correction of the Translucency Color. It will act only on the photons which went into the skin surface (in the Translucency Layer) and which are scattered back to the direction of the light source. This may not be easy to observe if the light source is an IBL, meaning that the light comes from "everywhere".

In order to see better how SSS reflectance Tint behaves, the best is to use a scene with a powerful spotlight only behind a figure, and to use "Scene Only" as the lighting mode. For this figure - in my case I used Genesis 8 Basic Male - you can set the volume effects to OFF (Thin Walled ON in Volume Group), so that they don't interfere with the result you see and change the final color.

Now when I use the settings showed next page (settings used for the test), I observe that if I have a look at the front side of the figure (the figure is between the camera and the light source), then what I see is translucency "only". But if I rotate the camera to see what happens on the back of the figure, the one which directly receives the light, then what I see is blue, meaning that the SSS Reflectance Tint is only visible on the surfaces areas which directly receive the light, and send in back in the half space the light is coming from. Take care that the result of the SSS Reflectance tint also

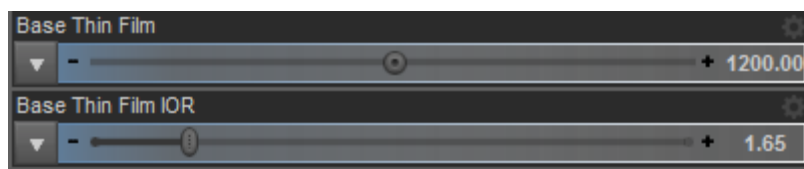
depends on the Base Color to, **since it is proportional to the product channel per channel (R, G, B) of both of them.**



The SSS Reflectance Tint is not applied to the whole Translucency Color, it is only for the light which is "reflected" (Reflectance) back to the source.

The settings I used for the upper example is Translucency Weight : 0.85, Translucency Color : 167,63,63, Base Color : 255, 255, 255, Diffuse Strength : 1, Thin Wall : ON, Base Color Effect : Scatter & Transmit, SSS Reflectance Tint : 35, 252, 255.

2.3.2.d : The Thin Film sub-group allows you to add a thin film of matter above this base layer. A thin film is a kind of "thin, constant thickness, refractive coating" put on a surface to give to it specific properties. For skin shading there is no real reason to use this thin film, but you can see it used in a few shaders, where it is most of the time to slightly modify the color (for high IOR) and lower the lightness of the skin. This is because it is sometimes used that I mention it here, otherwise it should not be used unless you perfectly know what you are doing with it. It can also be used for Sci-Fi and Fantasy.



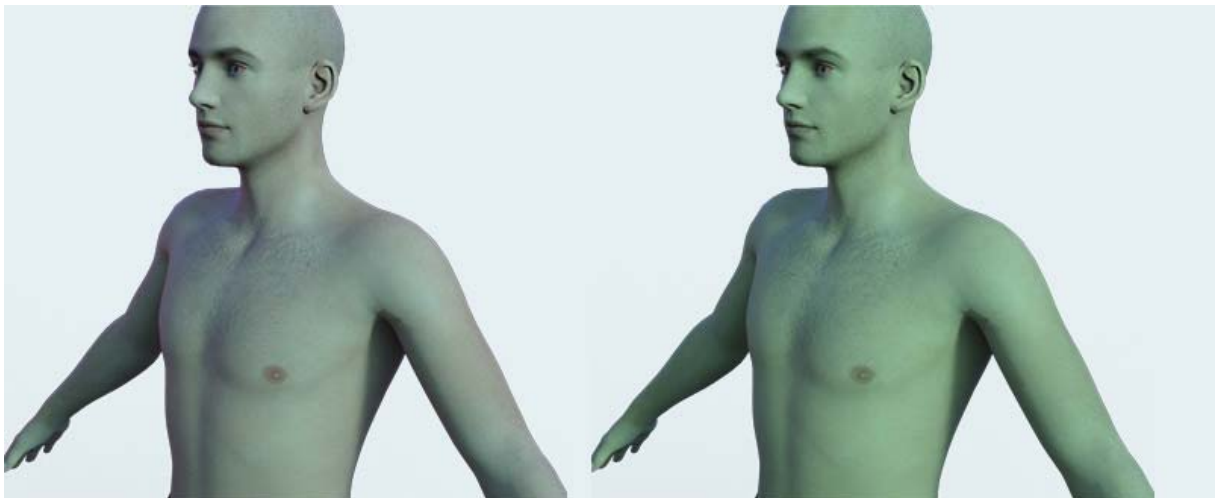
Thin Film properties

A thin film is basically, as you can see in its name "thin", which means that the physical approximations take into account the fact that it is extremely thin and that as a consequence there can be interferences between the parts of the light going out of the thin film :

- the first one directly reflected at the first air/thin film interface,
- the second one which is the ones refracted inside the thin film, then reflected back (on the thin film/ layer supporting the thin film interface) to the thin film layer and finally refracted to the air at the thin film/air interface.

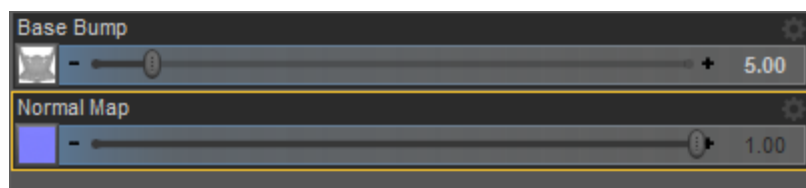
This is why the thin film needs to be thin, in general maximum a few micrometers. Since **the Base Thin Film** is in nanometers you should use values below 1000 nm if you want to stay below the micrometer range. The **Index of Refraction** (IOR) defines the way light is reflected and refracted at each interface, and thus impacts the result of this thin film effect.

The result in this case also depends if you use spectral rendering or not. Here are the results for a 300 nm Base Thin Film with an IOR of 2.5, with (left) and without (right) Spectral Rendering Enable ON (in Render Settings).



Since Thin Film is an interference effect, wavelength dependent, Spectral Rendering must be ON... but can be off too for uniform color.

2.3.2.e : The Bump sub-group includes the well known Base Bump (equivalent of Bump Strength) and Normal Map.



Properties of the Bump Group

The **Bump** and the **Normal Map** both basically have the same purpose, which is to use the shader in order to add some fine details to the shape - geometry - of the figure, which could not be done directly via the mesh, because it would require a too high resolution mesh. These are in general details of around one - or a bit less for high resolution maps - to several millimeters.

The main difference between Bump and Normal is that the Bump Maps are gray level maps, and can only give information about how much the mesh, at each point of the UV space, is supposed to be seen by the shader as being "above" or "below" the initial mesh.

A normal map presents additional information. It is not black and white, but is based on a RGB base, and using this RGB base you can give to the render engine an additional information which is the orientation of the normal to the surface for each point of the UV space (rapidly speaking everywhere on the mesh). This allows to add fine details to the mesh but furthermore to have better looking details thanks to the normal orientation information.

Both Bump and Normal map can be and are generally used in Iray. Concerning the things to know, the bump maps created for 3Delight require a much higher Bump Strength in Iray (the dial on the right of Base Bump) than in 3Delight, which explains why the upper limit for Base Bump is 50, and it is usual to see values such as 5 or more for the Base Bump. Bump is important in the global Glossy look of a figure.

The normal map is in general set at 1 and should not be changed since the maps are theoretically made to be used with this value, but you can lower this value if you want to attenuate the effect of this map if you find it basically too strong.

A final word about displacement (**Displacement Strength**), which is not in the "Bump" but in the "Geometry" category. When mapped, this can add details to the mesh by really "moving" the mesh, but to obtain this real mesh displacement, the mesh has to be REALLY subdivided, **using SubD Displacement Level**. Very rapidly, this becomes very difficult for the video cards or the CPU, so avoid using displacement in Iray, unless you are sure there is no other solution at all.

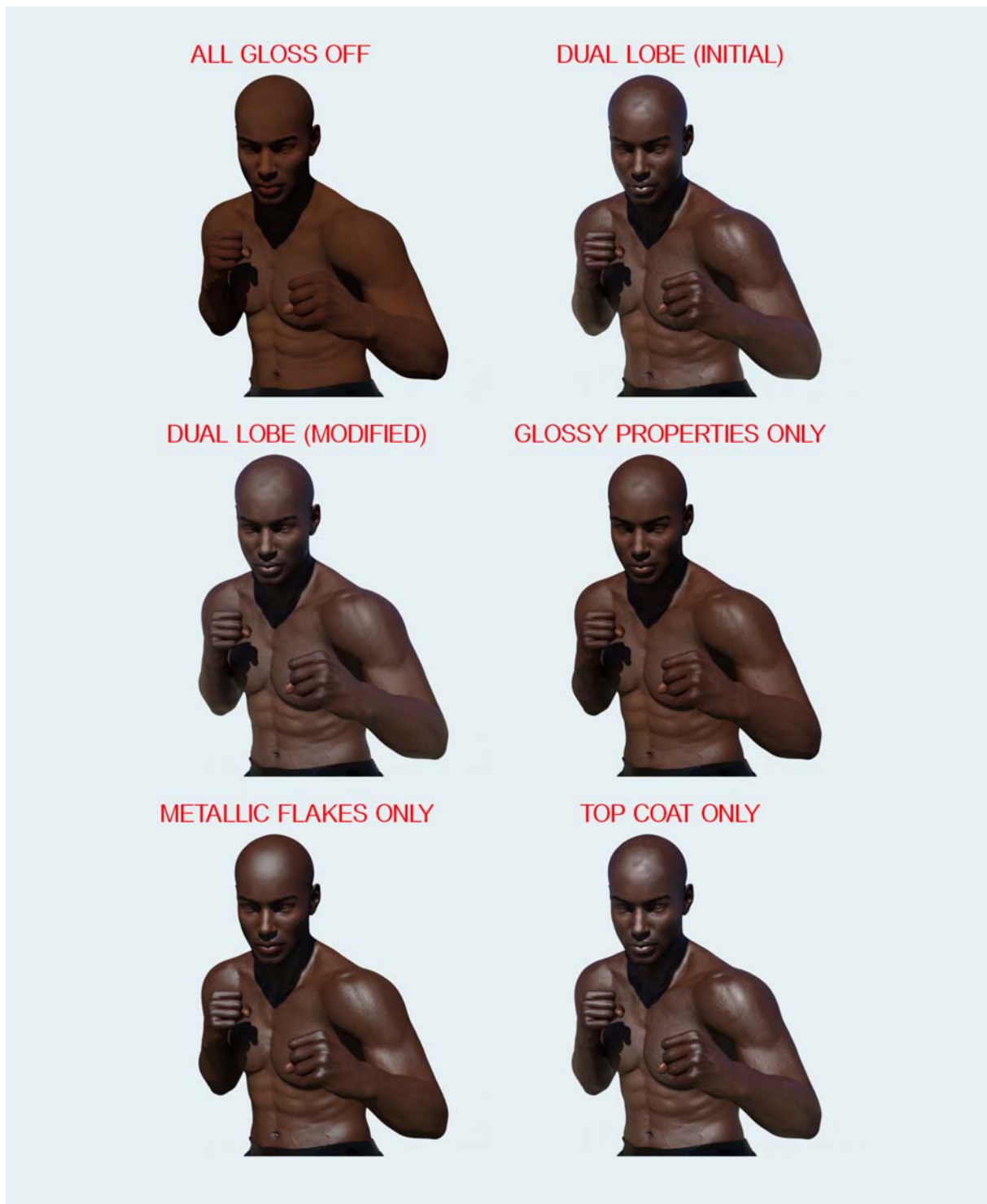
2.3.3 From Rough To Gloss

This is all for the Diffuse Base. Now, this base needs a gloss, because this is what happens on real people in real life, because otherwise the figures "look flat and lifeless". This is what you can do with two tools now in the BASE group (more ways available with other groups), one being new (the Dual Lobe Specular) the other available since Iray Uber is released (Glossy).

In order to show the visual impact of the gloss, for the beginners, I am going to show the same skin with various gloss settings, (first one being no gloss settings at all - which is horrible) in order to show what is gloss impact, and the properties which can be used to add gloss to the skin. I voluntary start with Darius 8 who has a dark skin (I initially tweaked a bit the Diffuse and Volume properties of the shader so that they correspond to my tastes). I use Darius because the glossy parts benefits a better contrast above the diffuse layer since the base is Dark.

I will show images : With NO GLOSS at all, with gloss obtained using Dual Lobe properties, or Glossy properties, or Metallic Flakes properties, or Top Coat properties. For Top Coat and Glossy properties, I transferred the maps of the Dual Lobe Specular Reflectivity to the Top Coat Weight and to the Glossy Layered Weight.

Please note that Top Coat and Metallic Flakes do not belong to the "Base" group, but I show them here because they are alternative way to add a glossy look to the skin.



Darius with various gloss obtained using different ways : Dual Lobe, Glossy, Metallic Flakes, Top Coat

What must be understood via these illustrations is that there are several ways, several groups, which can add a glossy look to the skin. The one you will choose to create a skin can depend on your preferences, or of the mapped properties for gloss

if you don't want to be forced to copy the maps from one property to another property. Personally I'm used to copy a lot to be able to choose what I want to do, this is why I created the "Map Manager" which does this job for me.

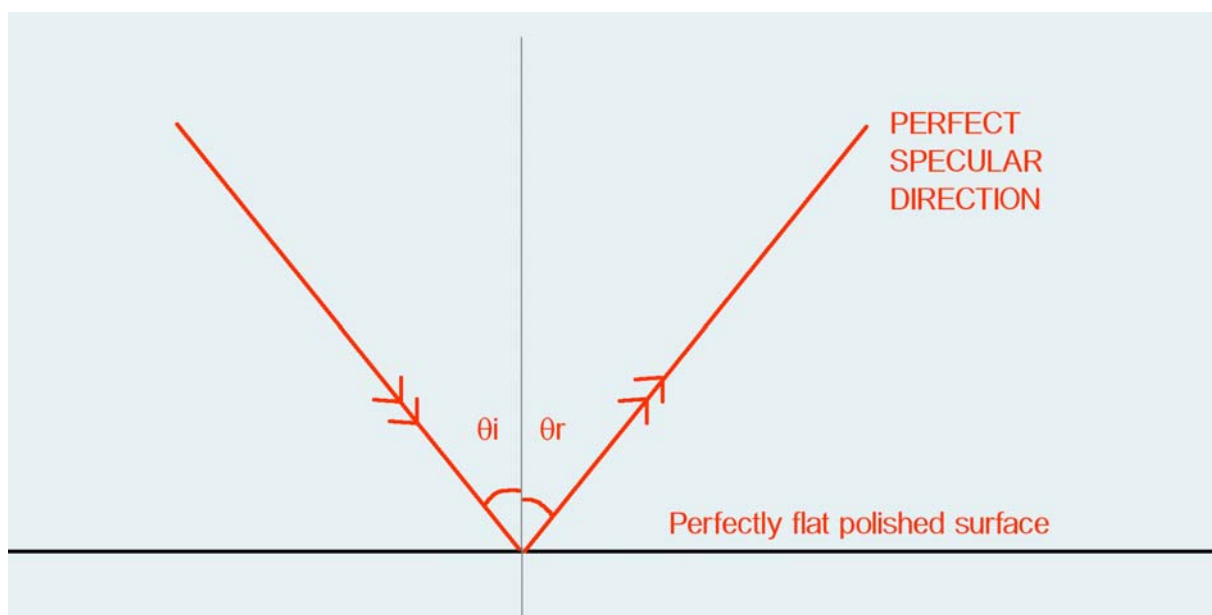
2.3.4 Dual Lobe Specular

The Dual Lobe Specular is a new part in the Iray Uber shader (since Daz Studio 4.10 if I remember well). It is automatically and only white, which is the case for the specular (the gloss) of all dielectric / non-metallic surfaces, which is the case of skin.

In comparison with the other triggers available to add gloss, this one presents the advantage of being able to use two lobes for the specular. So at this stage, the question may be what is a lobe for a specular?

2.3.4.a. A lobe for Specular?

In theory, for a perfectly polished surface (absolutely not rough, just like a mirror), for a given incoming ray of light, the specular direction of a ray of light is the SINGLE direction defined by laws of reflection on perfect mirrors. (the angle of reflection to the normal to the mirror θ_r is equal to the angle of incidence to the normal to the mirror θ_i , and they are coplanar).



Reflection on Mirror surfaces

In the real life, perfect mirrors are pretty rare, and the microscopic defects on the surface led to the use of BRDFs already mentioned in this document. The glossy models you have in Iray Uber are all based on BRDFs formulas.

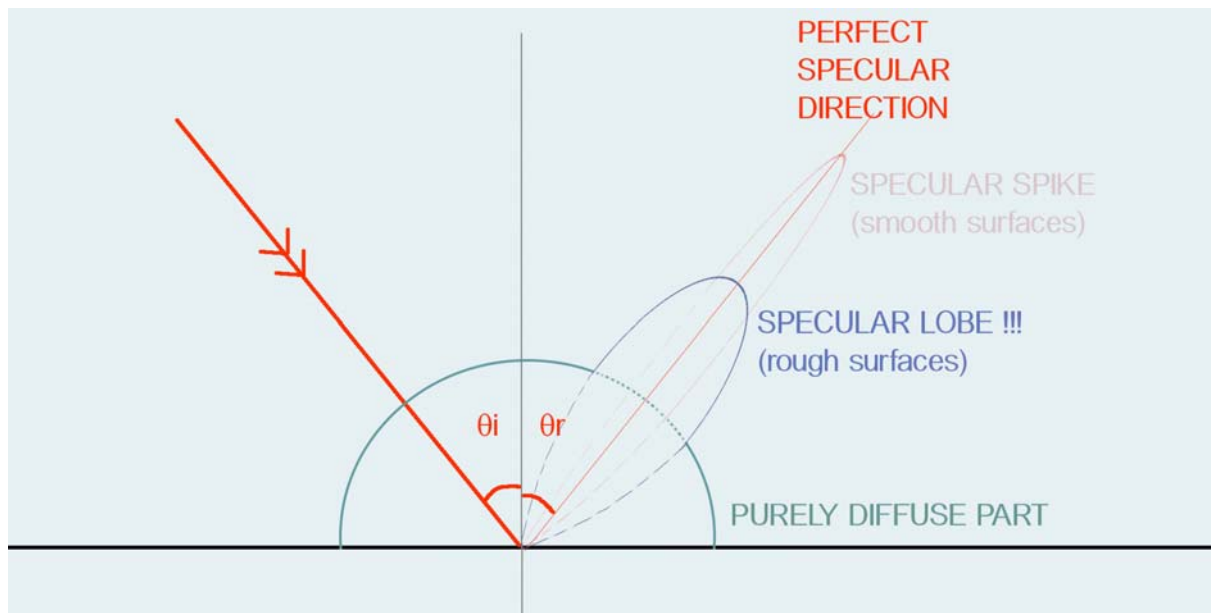
While I worked in the industry, I measured plenty of BRDFs in order to introduce coherent data in ray tracing softwares. The measurement principle of a BRDF is very simple (provided you have a good gonioreflectometer). With a laser diode, you send on the surface a beam which will represent the "incoming ray". With a detector fixed on a several axes goniometer, you make the detector rotate above the measured

sample, measuring the power of the reflected light in all the reflection space. And this gives you in the numerical data on the BRDF, for which you try to find the closest empirical BRDF model and settings for this model corresponding to your measurements.

In general, if you have a look at a "cut view" in the plane defined by the incoming ray of light and the normal to the surface, you will observe something looking like what I show in the next illustration (more or less depending on what you measure).

Well you will see a base repartition of the light in all the directions (diffuse part), and around what should have been the perfect specular direction you will observe a lobe, with a pretty gaussian shape. THIS is the specular lobe.

To be perfectly correct, specular pikes (more focused) may exist too (and co-exist with the lobe for a small range of roughness values). It can become visible rather for smooth surfaces, and you can eventually see them using more extended light sources for the measurements, because in general the sampling does not authorize to measure it otherwise.



Real BRDFs simplified principle (Specular Lobe)

In brief, here is what the specular lobe is. This is the fact that, due to the roughness, the reflected light "spreads" around the perfect specular direction. If the roughness is high, then it spreads a lot (large lobe). If the roughness becomes low, then the specular lobe is really close to the perfect specular Direction. You can eventually speak of a pike, but let's keep on calling it a lobe (thin lobe). Here I simplify a lot because you can also have retro reflection and off specular lobes, but this was just to have a simple view of what a specular lobe is.

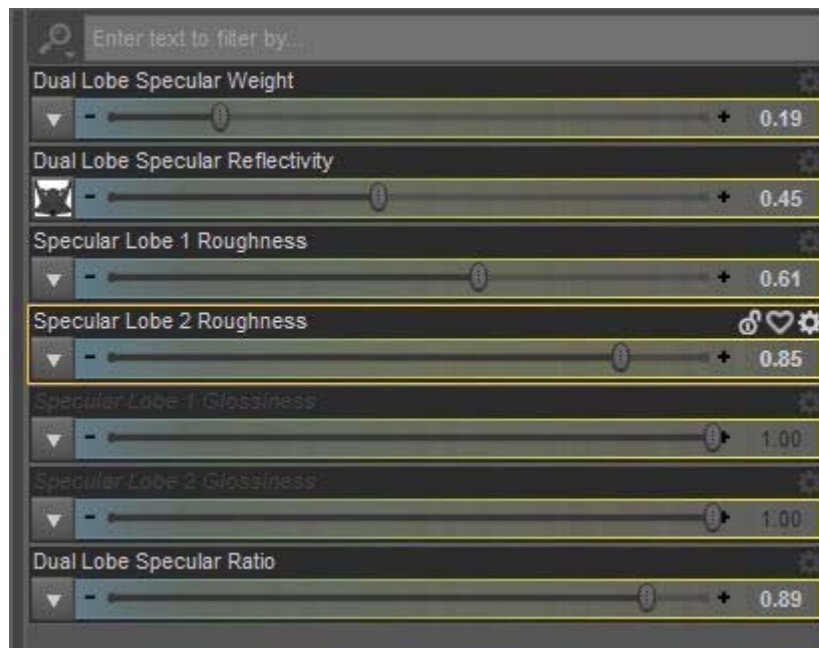
The **Roughness** you can find in the properties of the various glossy models available in the Iray Uber Shader work on this principle. The smaller it is, the closer you get to something very smooth-flat-mirror (the thinner lobe), and the bigger it is, the closer you get to something perfectly rough (like powder - I mention powder because it is one of the useable tools to check the calibration of gonireflectometers, because extremely rough).

2.3.4.b. A Dual Lobe Specular ?

The advantage of using two lobes is that you can cover a wider amount of cases of figure. For instance, you can take into account materials with both Specular Lobe and Specular Pikes. You can also use it to create a slightly rough base of glossy reflection and add a specular lobe above. And of course you can use only one of the lobes too.

In practice thanks to the *Dual Lobe* you can manage to have a better repartition of the highlights on a figure, even if this results has more impact for close ups, because one of the two lobes is theoretically mainly here to enhance the highlights on the micro defects of the skin (pores, wrinkles).

The properties you can modify in the Dual Lobe Specular Group are the following ones :



Properties of the Dual Lobe

Each Lobe is defined by its **Roughness** (**Glossiness** for the PBR Specular/Glossiness mixing mode).

The Roughness and Glossiness have opposite behaviors. Use High Roughness/Low Glossiness for very rough surfaces, Low Roughness/High Glossiness for very smooth surfaces. And of course, most of materials are between rough and smooth!

The relative proportion of each lobe in the final result is defined by the **Dual Lobe Specular Ratio**, for which a value of 1 represents the Lobe 1 only, a value of 0 represents the Lobe 2 only and between the two the relation seems to be linear (a ratio of 0.5 seems to represent the same amount of Lobe 1 and Lobe 2). You can have a look at the images next page.

The total power - the total amount - of this gloss (specular) part is controlled by the **Dual Lobe Specular Weight**. The more you increase it, the higher - the stronger - the white highlights will be, but their properties (gloss/rough) will not change since this is defined by their respective roughness and their ratio. This can be mapped, generally in order to adjust the amount of specular of particular area of the body (less oily, hairy..).

LOBE 1 ROUGHNESS AROUND 0.2
LOBE 2 ROUGHNESS AROUND 0.7

LOBE 1 ONLY



CLOSE UP



LOBE 2 ONLY



RATIO 0.6



Example of the Dual Lobe use to enhance very small details highlights (gloss)

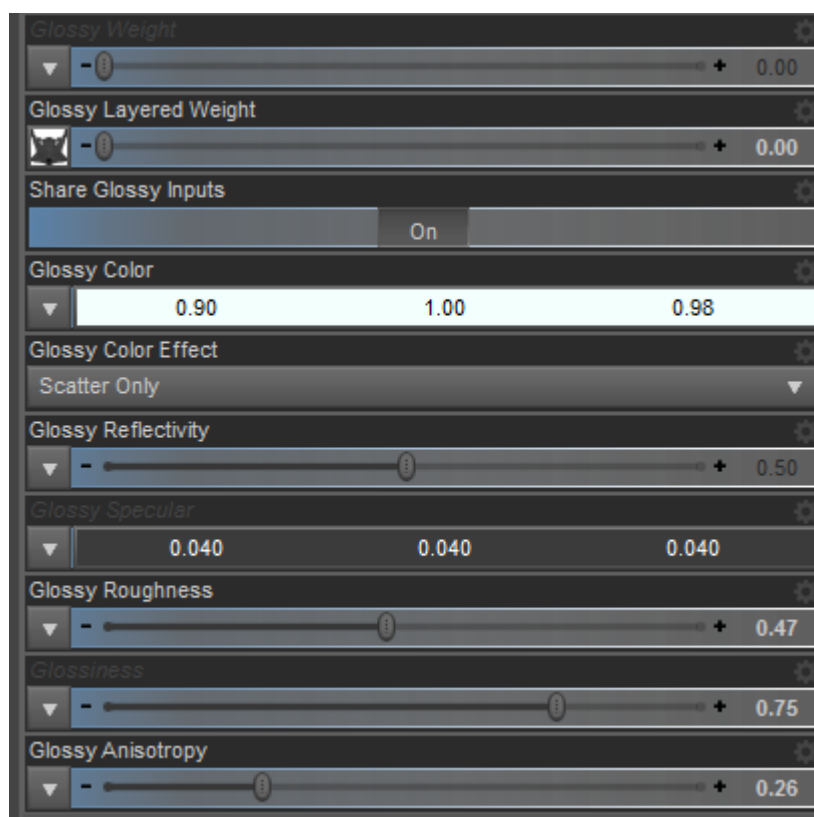
The **Dual Lobe Specular reflectivity** works differently from the Dual Lobe Specular Weight, meaning that you can set the reflectivity at 0, and you will still see some glossy highlights. This is not really documented, but here is my personal and humble opinion on the subject :I would refer to Daz Studio online documentation for the Glossy Reflectivity, which is probably the equivalent of the Dual Lobe Specular Reflectivity when you use the Glossy Layer instead of the Dual Lobe Layer. I quote here Daz Inc : "**Glossy Reflectivity** - The default setting is 0.50 and should generally be left here in most cases. This property roughly correlates to IOR and the settings of that property. The value is roughly the same as the IOR setting of 1.5, which is a good plastic base."

This is why I would personally not change at all or only change a only bit this Reflectivity, and this only to see if I can enhance the results after everything else is set up.

2.3.5 Glossy

The Glossy Sub-Group itself divided in 4 sub-groups, the most commonly used being the "Reflection" (Glossy Reflection) one. Amongst the other sub-groups, **Backscattering** is sometimes used in some skin shaders, but it has to be handled with care. The **refraction** Sub-Group has been also used for skin shading, even more occasionally, but this is not recommended unless there is no other way to reach the effect you want. The **anisotropy** can be used, but take care because it can show issues on UV seams which would reach to poor results.

2.3.5.a. Glossy Reflection + Anisotropy :



Properties of the Glossy Reflection

Glossy reflection is the most interesting and most used of these groups. For the PBR Specular/Glossiness and PBR Metallicity/Roughness the available properties are very close to the Dual Lobe Specular Group, except that this time, you have only one lobe, and that you can change the color of the Gloss (Using **Glossy Color**), which presents an interest for instance for Sci-fi or fantasy skins.

Let's begin with the easiest or most intuitive parameters :

The Glossy Layered Weight will define the amount of gloss you add above the Diffuse Base. The higher it is, the more the specular lobes will be visible. This is in general mapped, in order to take into account the areas on which the gloss amount must be reduced, maps which can also be used to have something less uniform for the macro and micro gloss repartition. You say "Layered" because you consider here that you place a layer of gloss above the rest.

As mentioned previously (Dual Lobe Part), the **Glossy Reflectivity** is linked to the optical index (I'm not sure but there might be a relation here with the Fresnel's coefficient) and should preferentially left exactly at or near to its initial and default value : 0.5.

The Glossy Roughness (Glossiness) is used for PBR Specular/Glossiness) behaves the same way as previously mentioned meaning that the higher you set the roughness - or the lower you set the Glossiness - the bigger and less "focused" the specular highlights will be and inversely. Please also note that since their apparent surface increases and since they seem to conserve their energy, large highlights will have less power per unit of surface area than the small ones. For normal skins you can choose Roughness in the range 0.4 - 0.65. For oily - wet skins you can decrease the roughness but you will rarely go below of 0.2- 0.25. Low values of Roughness (high values of Glossiness) will lead to very shiny surfaces... and inversely.



Evolution of Roughness from left to right : 0.3 - 0.49 - 0.65 (max recommended without roughness maps). Glossy Layered Weight adjusted for each case. Have a look at Head, Shoulders and Fingers to see the difference.

For values of Glossiness different from 1 or ou Glossy roughness different from 0, the **Glossy Anisotropy** can be used. **The glossy anisotropy** is used to simulate what happens on non isotropic surfaces - surfaces with directional properties - meaning for instance that the highlight properties in one direction is different from the highlight properties in another direction. You "stretch it". The most famous example is brushed metal. The amount of glossy anisotropy describes if the material is only slightly (low values) or highly (high values) non isotropic, meaning if the highlight is only slightly or highly deformed (still think of how highlights spread in one direction rather than in the other one for brushed metal).

Now if you say a material is non isotropic, you have to define this direction in which the highlight changes. This is done using the **Glossy Anisotropy Rotations** - located in the Anisotropy sub-group and active only if Anisotropy is active). This property "turns" the orientation-direction of the anisotropy between 0 (0) and 360 degrees (1 for anisotropy rotations). On human figures, this effect is not very predictable because of the shape and all the other skin properties. It is easier to set it up on more simple shapes, but in general, the skin being pretty isotropic, there should be no reason to use it (except maybe for fantasy or sci-fi skins)

The Glossy Color Effect works the same way as the base color effect, meaning that, if some light is supposedly lost - not reflected - by the Glossy Reflection, is it "forever lost" or is it kept in the calculus for other layers. In general you will see *no or almost no difference, except if you are using a non white or grey Glossy Color* (test a pure green), in which case you begin to see differences (the more saturated the colors, the most important the difference). But honestly, *using one or the other settings does not make a significant - or even visible - difference at the end.*

So now we have only three more properties to explain : Glossy Weight, Glossy Specular, and Share Glossy Inputs.

The Glossy Weight is used and visible only in the Weighted Model and is used as mentioned in the part 2.3.1 concerning the PBR mixing, in comparison with the Diffuse Weight.

The Glossy Specular is active only in the PBR Specular/Glossiness Model, and it gives the amount and color of the glossy specular highlights. What has to be known is that its color must be kept dark otherwise you could end up something with really like a "plastic" or "metallic" look. Furthermore for dielectric it must not be colored (meaning Red = Blue = Green component, and these components are lower than something around 50).

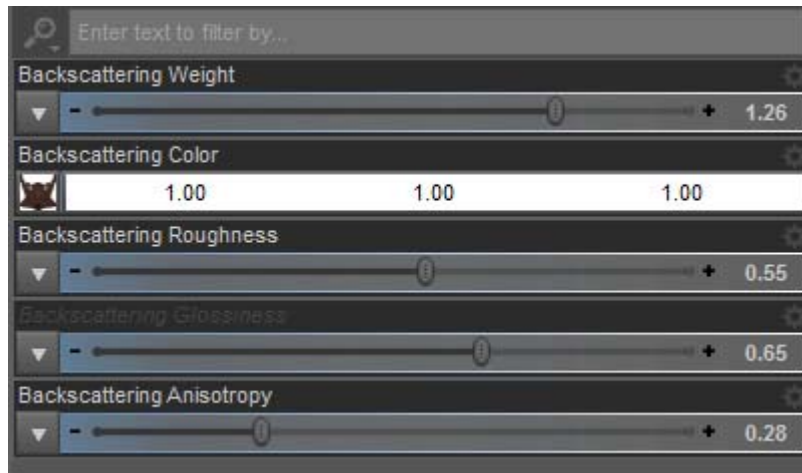
Share Glossy Inputs is in general set to ON. But if you set it to OFF it gives you an access to additional controls such as the Backscattering Color, and the Refraction Color and Refraction Roughness/Glossiness.

2.3.5.b. Backscattering :

Honestly I don't like to use backscattering because in my opinion not only this is not physical here, but also because I have the feeling that then the skin does not answers correctly to the modifications you make to lights and camera frames

because it is making too much an image of the environment. But since sometimes it is used in some skin shaders I am forced to mention it here.

Backscattering is a phenomenon in which the light is scattered back into direction of the light source of the light. Here it is a glossy backscattering for which you can define the roughness / glossiness. Here are the principal properties you can activate for Backscattering in Daz Studio.



Backscattering Properties

The Backscattering Weight defines the amount of Backscattering you want. If you activate it at its max whereas nothing is colored or mapped and roughness is null (glossiness is 1), here is what you will probably obtain (depending on the environment map).



Backscattering unmapped, 0 roughness, High Backscattering Weight (max)

The surface of the skin acts a bit like a mirror of the environment, it scatters the image of the environment "back". Of course the high values of backscattering are exaggerated but they give a nice idea of what happens.

Now the second important parameter is the **Backscattering Roughness**. When you increase its Roughness (or decrease its Glossiness), the backscattering becomes "blurry" and this is on what some artists rely to give a sheen impression - which can sometimes work pretty well. Doing this also gives you an access to **Backscattering Anisotropy**. The Backscattering Anisotropy works the same way Glossy Anisotropy does. In this case of figure you can use it to change a bit the shape of the Backscattering.



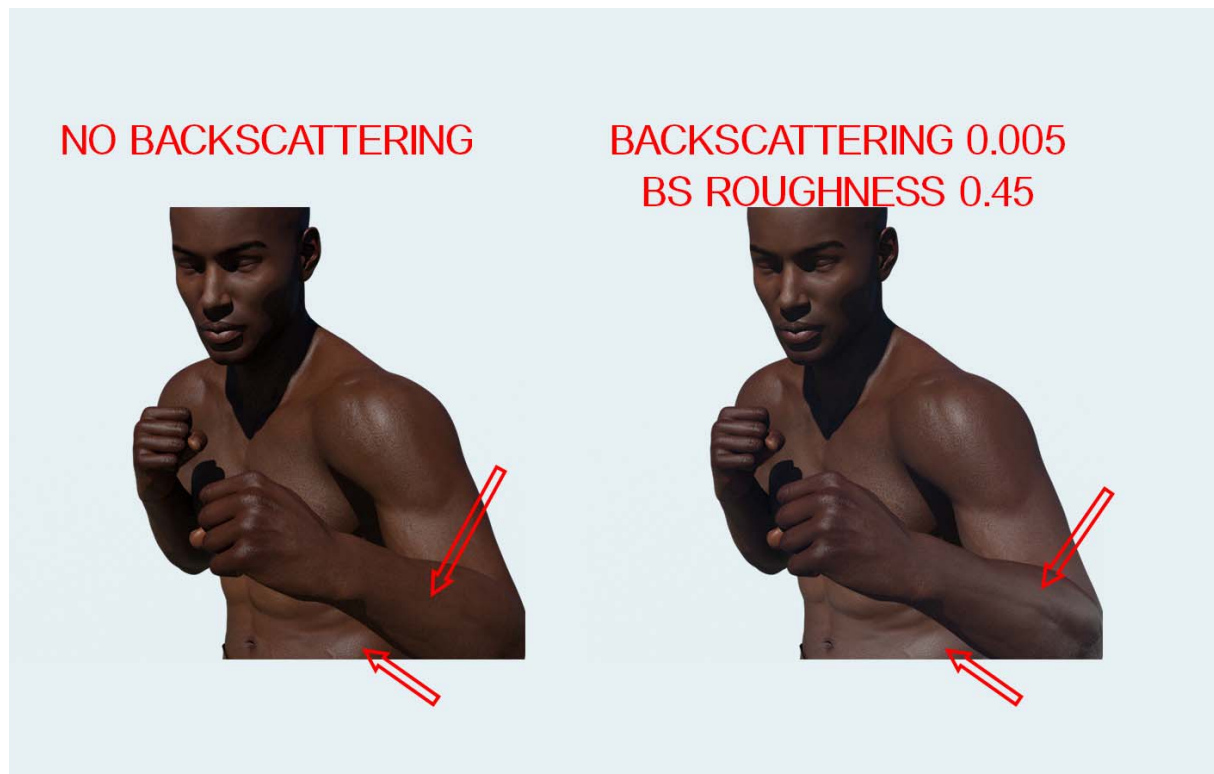
Backscattering unmapped, High 0.6 roughness, High Backscattering Weight (max)

Now if you go to very low values of backscattering weight, such as 0.005 in my next image, and proper values of roughness (around 0.4) you can add indeed some interesting kind of sheen to the figure. On the left on the next image, I set the backscattering Weight to 0. On the right, I set it to 0.005 with a roughness of 0.45. Of course what you will set on your own side will depend on your skin, lighting conditions, camera frame - this is just an example. And using this in my case of figure, this gives this impression of sheen, resulting maybe in a better result. What I

regret is that looking from certain angles, it is not good looking, clearly too much backscattering, and from different angles it is perfect.

But if you readjust its weight so that it is then fine where it was previously too high, then it becomes too low where it previously looked good. In brief, this is a good solution to add sheen where you want for a static render with given lights and camera frame, but in my opinion it needs to be readjusted too often.

So Backscattering or not? Well this is a matter of use and preferences I guess.



Comparison between no backscattering (left) and 0.45 Backscattering roughness, Low Backscattering Weight (0.005)

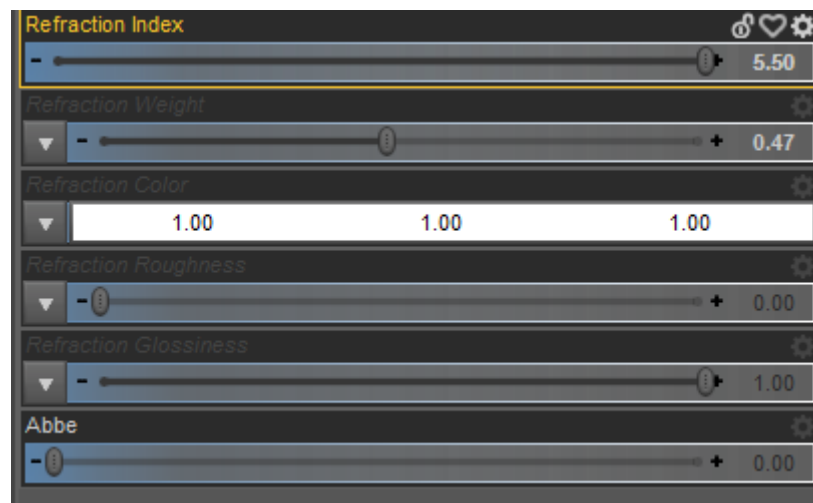
The Backscattering Color can be used to modify the color of the Backscattering and is accessible ONLY IF you de-activate the Share Glossy Inputs (set it to OFF) located in the Glossy/Reflection group. You can then map it or not, or you can simply go in the color diagram to set something slightly more bluish for a better visual impact.

2.3.5.c. Refraction

Refraction is the last of the groups of Base/Glossy/ subgroup. The same way as for backscattering, I don't like to use it and mention it here briefly because some - and maybe you - use it with interesting results when using it too.

In general by default the **Refraction Weight** (which defines the amount of refraction) is, and should be null. In the PBR Weighted model, the refraction Weight will act only on the Glossy layer level (Strictly positive Glossy Weights), whereas in PBR

Metallicity / Roughness and PBR Specular/Glossiness this time refraction will apply to the whole BASE layer. In this cases, refraction will automatically add transparency to this base layer, meaning that the air/skin interface begins to act like an air/transparent glass interface.



Properties of Refraction

The **Refraction Color** (giving a color to the light coming inside the material), as well as the **Refraction Roughness or Glossiness** are accessible only if **"Share Glossy Inputs"** is set to OFF. In this case, increasing the roughness or decreasing the glossiness tend to reduce the amount of light going inside the material because of refraction (the surface being rough), reducing the perception of the phenomenon when rendering.

The **Refraction Index** is the Index of refraction of the surface, meaning in general something between 1.3 and 1.6 for skin, and determines along with the other parameters the orientation and amount of light going inside the skin.

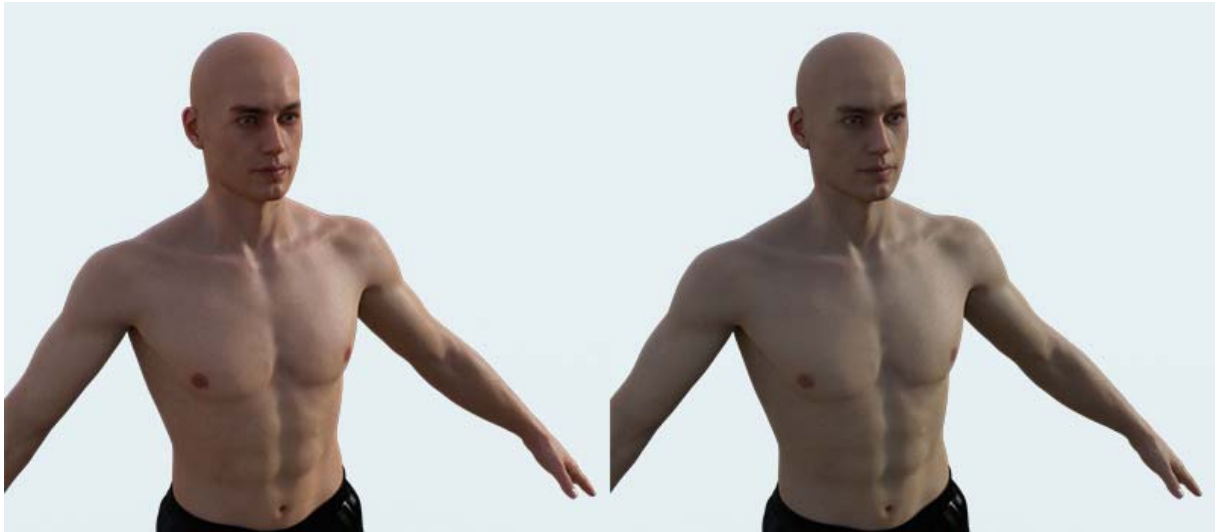
In practice, Refraction can eventually be used without too much pejorative effects if **"Thin Walled"** (the option allowing volume calculations of lights inside the skin) is OFF (which is generally the case), because in this case the transmission and scattering of light will "kill" the perception of "Glass", of "transparency", which is not the case for **"Thin Walled"** ON. Thin Walled is located in the "Volume Group".

When you are in this case (plus not in the PBR weighted mode) *refraction is used to send more light in the Volume of the figure*, with eventually a color correction.

If you activate the **Abbe** number, you add chromatic dispersion to the refracted light (meaning that depending on the color - on the wavelength - the refractive index changes), but in this case you do not take into account the Refraction Roughness property any more (which could be a kind of surface dispersion at the interface). When Abbe number is activated, of course you will see different results if you allow or not the Spectral Rendering in render settings. Abbe also requires **"Thin Walled"** to be ON.

In practice I do not advise to use dispersion unless you know what you are doing. There are probably other safer means to reach the effect you want.

In the following example I used M8 as provided, turned Refraction weight to 0.33, Share Glossy inputs to OFF, Refraction Color to something slightly Blue and roughness to 0.11 (this probably does not make a big difference). I did this because I wanted to have a colder figure (inject more blue light in the figure).



Even if not the better mean, refraction can be used to adjust the skin tone of figures. On the left without refraction, on the right with refraction. I could have used other means to reach a similar or maybe better result.

2.4 CONCLUSION TO SET UP THE BASE LAYER

A good setting of the base layer is... at the base of everything.

Because it is by using what is sent from this base to the volume of the figure that all the transmission and scattering (including SSS) phenomena will be calculated. Because it is above this base that you can add layers such as for instance the Top Coat Layer or the Metallic Flakes Layer.

2.4.1. Define the Base Color and Basic Translucency settings :

As you saw, a lot of settings can be accessed in this base layer, but if you have a closer look, you will see that only a few of them REALLY matters :

The **Base Mixing** to choose your PBR model (choose Metallicity/Roughness or Specular/Glossiness, avoid the third one if you are not used to skin shading).

The **Base Color** and eventually the **Diffuse Strength** define a Layer which will be placed above the Translucency Layer. This Translucency Layer is defined by **Translucency Color** and **Translucency Weight** (amount), and you decide if the energy "lost" on the Base Color Layer is lost (**Scatter Only**) or sent to the translucency layer (**Scatter Transmit** modes). In this second case you have access to a color control able to correct the change of the Translucency tint due to this additional light sent from Base Color to Translucency using the **SSS Reflectance Tint**.

Sometimes you can find useful to set "Thin Walled" ON in the Volume group in order to set up the base color independently of the volume transmission and scattering

effects. Sometimes it is better to let "Thin Walled" to OFF especially if the translucency Weight is high, and/or if the SSS Mode is Chromatic, otherwise the differences between skin with and without volume effects are so big that setting up the base color (Diffuse Layer) "alone" with volume properties OFF is almost useless.

2.4.2. Add or adjust gloss

At this stage, the minimal base is defined in term of color, but you have to **add gloss** to it so that the skin shines a bit, like in real life. You have several options : Either you use the **Dual Lobe Specular**, or the **"Glossy"** properties. You can choose to use both, but if you set up properly one of them, it will often be enough. Remember at this stage that you can also choose to use none of them and obtain your gloss effect either by the Metallic Flakes or by the Top Coat.

In any cases, you do not have many important properties :

For Dual Lobe Specular as well as for the Glossy (... and the top coat, and the Metallic flakes...), what really matters in order to define the gloss is **first its amount using the "Weight" properties**, and **then** if the highlights are small and shiny like on smooth surfaces or on the contrary large and less shiny like on rough surfaces using the **"Roughness" properties** - for PBR Metallicity / Roughness - or the **"Glossiness" properties** - for PBR Specular / Glossiness.

The Weight properties are : **Glossy Layered Weight** or **Dual Lobe Specular Weight**. These will probably be mapped - except if the PA made another choice - in order to take into account the locations on the skin needing more or less gloss. This is the best choice to change the amount of gloss for a given roughness/glossiness.

The Roughness/Glossiness properties are : **Dual Lobe (1 and 2) Roughness** (or Glossiness), **Glossy Roughness** (or Glossiness). Very easy to adjust : small Roughness values will provide very small highlights as if the skin was wet. The 0.4-0.65 range is a good range of values. The higher you raise the roughness, the more rough the skin will look and this is the contrary for glossiness. In general, lowering the roughness (increasing the glossiness) will require a lowering of the Glossy Weight in order to compensate the fact that there is for lower roughness more light reflected per unit of surface area.

The **reflectivity** should not be modified.

At this stage, the glossiness of the skin is defined. After that you can of course if you want play a bit with Backscattering or Refraction, but this is not fundamental. You should use them only if you want the effects you want them to bring to you, and that they are the only way to obtain these effects.

2.4.3. Adjust the Bump

At the end you can adjust the bump if you want too. Some Base Bump settings might look good from a given distance, but become too strong when you make close ups, or not visible enough when the camera goes far away. In this case simply change the Base Bump (the dial at the right of the map) to get the best result for your given render. If the bump adjustment changed the perceived glossy look too much, you

may want to finally readjust a bit the glossy look. And this is done, the Base layer is then ready to be the base of the other layers!

2.4.4. Eventually play with the Gamma for image maps

Adjusting the gamma of image maps can radically change the look of the skin you are working with. In practice you will mainly change the gamma of the Base Color Maps, but if your figure use high levels of Translucency (and even more with a Chromatic SSS mode), you will also see strong changes when modifying the Gamma of Translucency Color Maps.

In order to change the gamma, you can browse all the maps related to a property in the Surfaces Tab editor, then left click on the image icon in the image slot of the mapped, and click on "Image Editor". It pops up a small window in which you will be able to change the gamma. And you have to do this for all the images you want. There is no Undo in Daz Studio for the gamma change, meaning that if you want to revert, you can not simply to "Undo", you have to change it again via the Surface Editor Tab. For the ones who use Ultimate Iray Skin Manager, it has a special feature to simplify this task.



Example of gamma change for Base Color and Translucency Color Maps

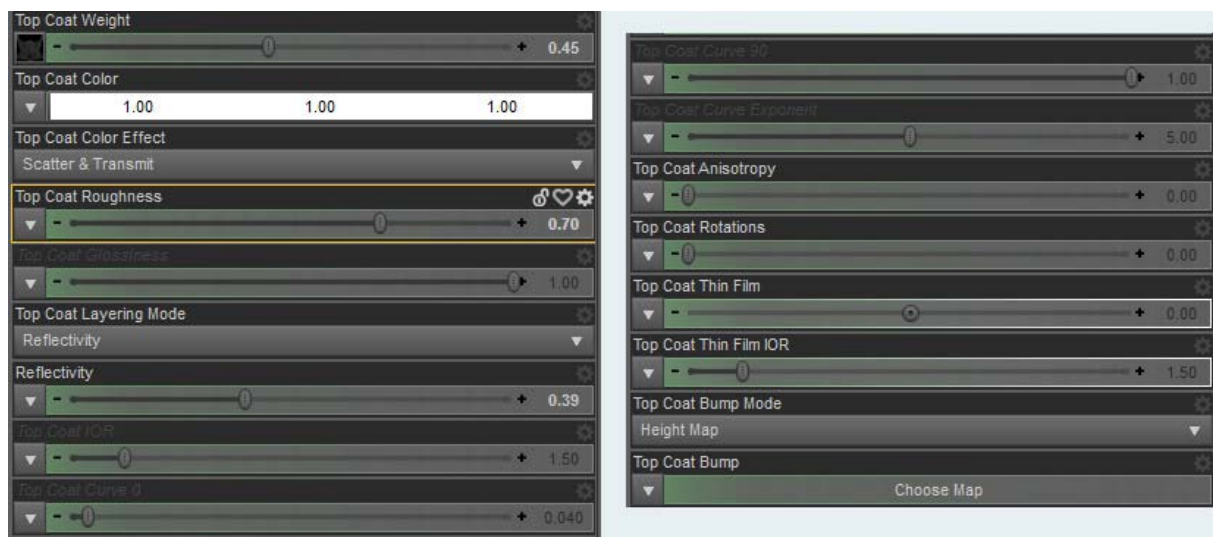
What must be understood when you change a Gamma is that it is not related to the surface or the figure you are working on, but it is related to the map for which you change this gamma, meaning that, if the gamma of a map is changed all the

surfaces, all the mapped properties, all the figures using this map will use the new gamma.

2.5 What is the "Top Coat" Group used for? Description and comments

In the Top Coat Group, you will find the "Top Coat Weight", the property which will activate the use of a Top Coat as soon as its value is not null. This layer or material that you add, this top coat, has four different possible ways to be used, defined in the TC Layering Mode. This top coat layer is added ABOVE all the other layers, most of them being already mentioned in this tutorial. **The top Coat Weight** simply drives the strength, the weight, with which this top coat is added above the other layers. It is in general mapped, in order to take into account the areas on the figure requiring more or less top coat, and/or to add noise to it and avoid something too uniform as a result.

The top coat is often but not automatically used in skin shading. In general it is used to add even more gloss above the skin, or add a gloss with different properties as the ones used for the Gloss of the Base Layers (part 2.3 of this document), or to add a wet look to the skin (if properly set up).



Top Coat Properties

These four modes are available in the **Top Coat Layering Mode** property, and include :

- Reflectivity
- Weighted
- Fresnel
- Custom Curve.

2.5.1 Properties shared by the four modes :

These four modes, which will be detailed later on, share common properties, which are :

- **The Top Coat Color** which is the color this top coat will use. In general, it is white and should remain white since it is often used to simulate or enhance already existing Reflectivity, Gloss or Fresnel. You can eventually use other colors but mainly for Sci-Fi or Fantasy skins purposes.

- In case you use other colors for the top coat color, the choice you make for the **Top Coat Layering Mode** can really make a difference (otherwise not), since you can decide if the light of the top Coat interface is also transmitted to the other Layers below (Scatter & Transmit), or is Scattered Only (reflected). You can see the difference in the case of figure where I unmap the Top Coat Weight (to have something not influenced by the maps), where I set the Top Coat Mode to Weighted with a pretty strong weight (0.62) and a pretty low roughness 0.31, and with the top coat Color set to Blue-Green. I don't have a clear explanation why, probably because the Transmission essentially is linked to the color information, but Scatter & Transmit intensity does not seem to present difference with Scatter Only.



Top Layering Mode : Impact of the Top Coat Layering Mode for colored Top Coat Colors.

In conclusion, if you have a white color for the Top Coat color, the choice of the Layering Mode does not matter. If you don't, then you will see a difference between Scatter Only the other possible choices.

- **The Top Coat Roughness (Glossiness** for PBR Specular/Glossiness Mixing Mode), which will act exactly as all the Roughness properties we saw so far, meaning that the lower the roughness is, the more shiny, smooth looking, with bright and small highlights the surface looks. The higher the roughness is, the less shiny, rough looking, with larger and less bright highlights the surface looks. And inversely for the Glossiness. (see image of **2.3.4.a**)

- **The Top Coat Anisotropy**, which is the same kind of anisotropy of the one presented for the Glossy Anisotropy, and which allows you to "Stretch" the glossy highlights more or less in a given direction, this direction being determined by **the Top Coat Rotations** (0 = 0 degrees, 0.25 = 90 degrees, 1 = 360 degrees). I can show you the example of what can be reached this way, with a 0.053 roughness (very shiny), without for anisotropy a maximum anisotropy (Top Coat Anisotropy = 1), and respectively a 0 and a 0.25 Top Coat Rotations (i.e. Top Coat Anisotropy Rotations).

In general there is no reason on a human skin to use Top Coat Anisotropy.



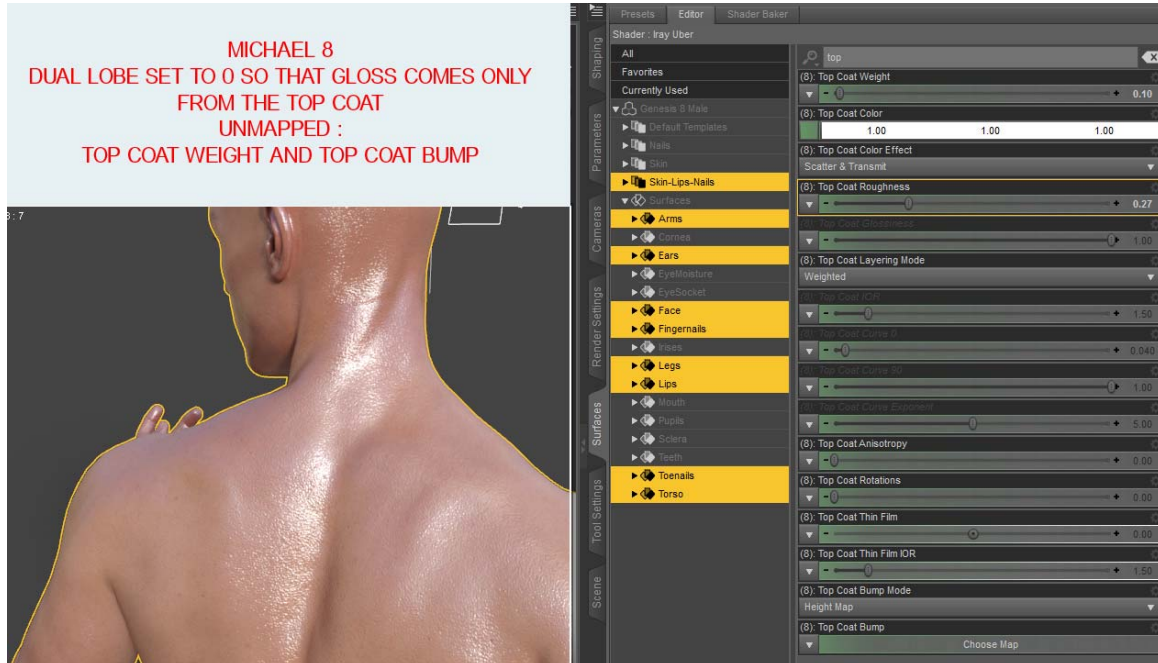
Example of Top Coat Anisotropy and influence of Rotations

- **The Top Coat Thin Film** and **Top Coat Thin Film IOR** work exactly as described in **2.3.2.d**, except that this time the thin film is placed over the Top Coat Layer and not over the Base Layer. It is the same for all "Thin Films", they are placed above the Layer they belong to and behave all the same regarding their thickness and IOR. If you have no specific reasons to use a Thin film here, you can forget this property.

- Finally you will find the **Top Coat Bump Mode** and **Top Coat Bump**.

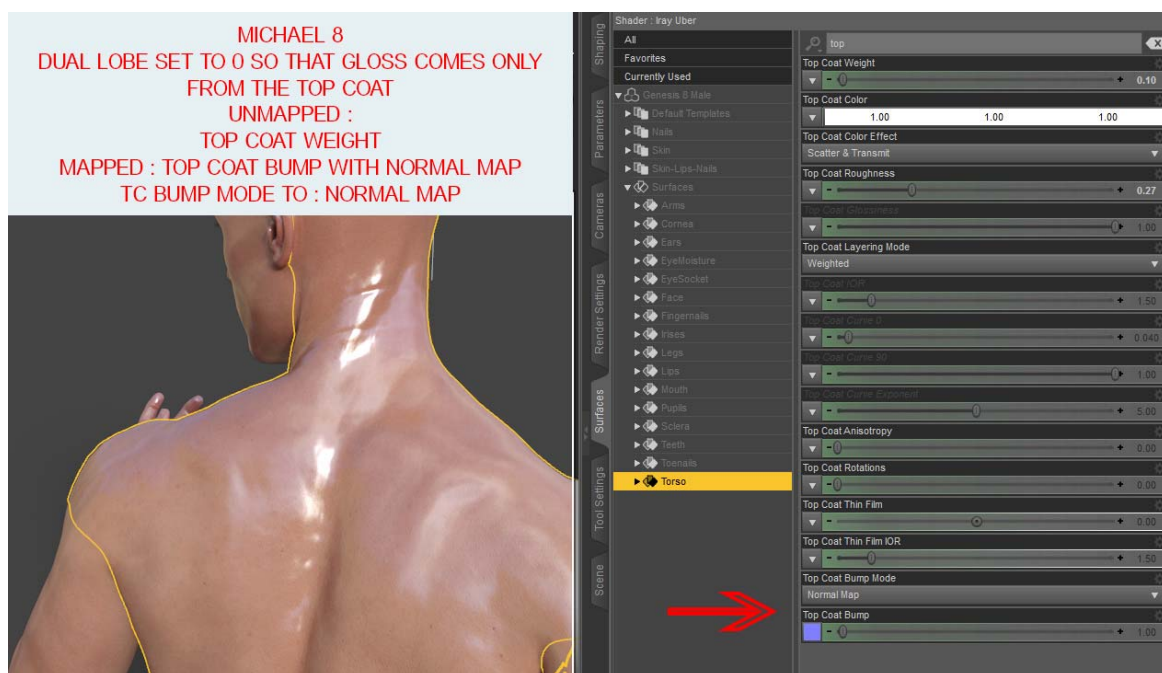
In the **Top Coat Bump** you can use either a gray level map which will be considered as a Bump Map as soon as you choose to use Height Map in the Top Coat Bump Mode, or a normal map, and in this case you choose Normal Map as the Top Coat Bump Mode. From what I experimented, here is what I observed :

Without Map added here, the "perceived Bump" of the Top Coat is influenced only by the Base Bump.



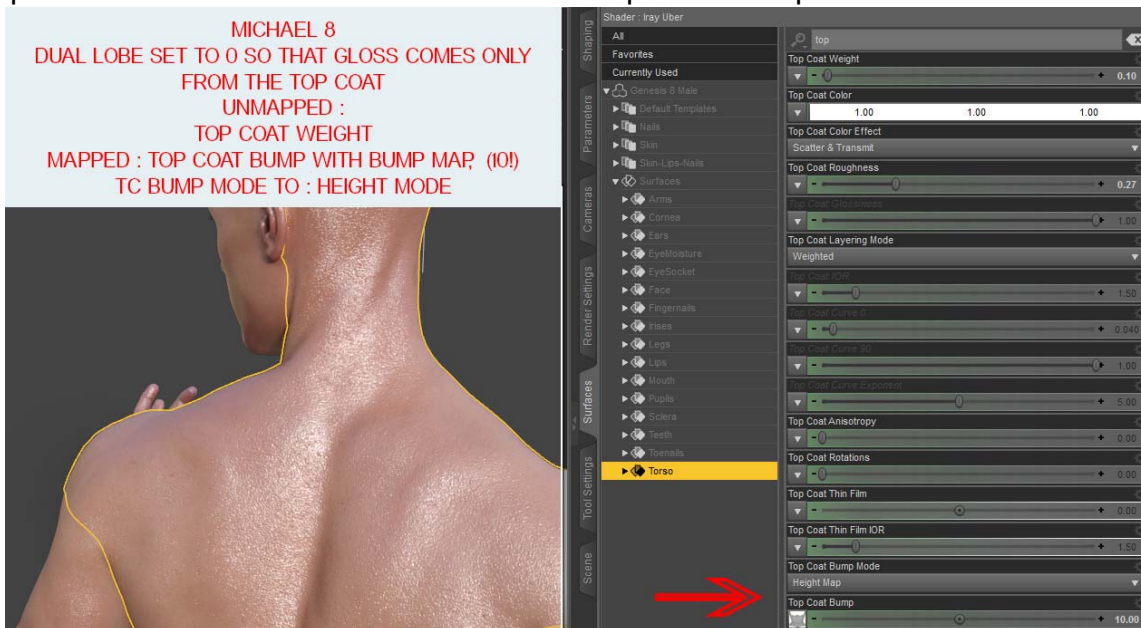
The Gloss here ONLY comes from the Top Coat, which is totally unmapped. The Gloss variations ("noise") you see come from the Base Bump.

If you use the figure Normal Map for the top Coat Bump, then the Top Coat Bump will be too "flat" - except if you have a very noisy normal map.



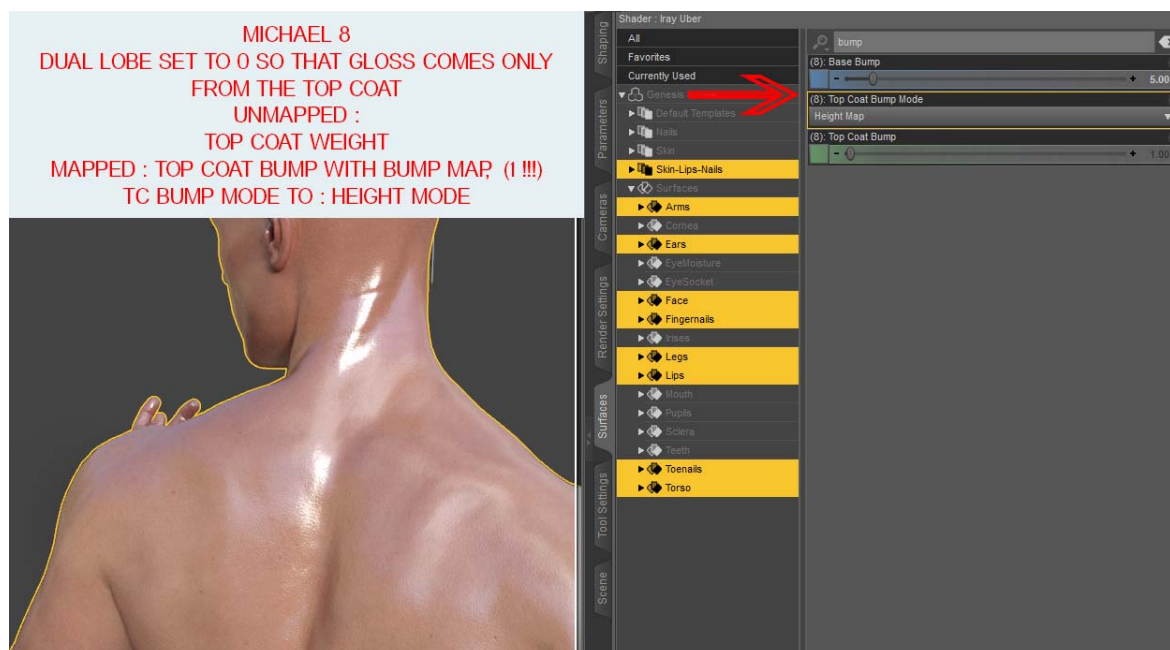
The Gloss comes from the Top Coat, which uses Normal Map for the Top Coat Bump

If you add the Base Bump map here or other any Bump Map, then the bump which is perceived in the render is the one of this Top Coat Bump.



The Gloss here ONLY comes from the Top Coat, which is using the Base Bump Maps in the Top Coat Bump, with an important strength for the Top Coat Bump maps (value at 10). The Gloss variations ("noise") you see come from this Top Coat Bump.

If the Strength of the Top Coat Bump is lower than the one of the Base Bump, as soon as you map the Top Coat Bump, this is this Top Coat Bump which will be taken into consideration for the Top Coat calculation. You can compare the next result, where the Top Coat Bump is only set to 1, to the first result. In both cases, the Base Bump is set at 5.



The Gloss here ONLY comes from the Top Coat, which is using the Base Bump Maps in the Top Coat Bump, with an low strength for the Top Coat Bump maps (1).

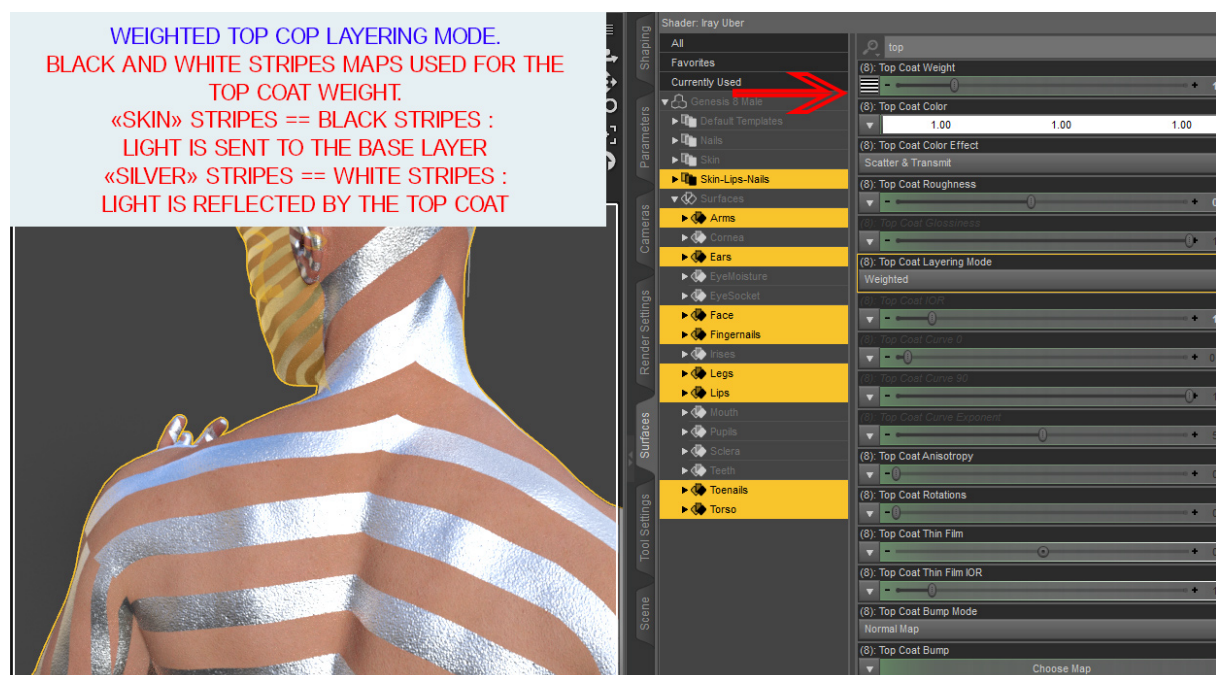
This means that when the Top Coat Bump is unmapped, there will anyway be a bump used for the Top Coat, which is the Base Bump. Yet, in this case, you cannot set separately the strength of the Base Bump and the one of the Top Coat Bump, as is the case when you use a map for the Top Coat Bump.

2.5.2 The Four Modes

2.5.2.a The Weighted Mode

I begin by the Weighted Top Coat Layering Mode because this is the easiest to understand. The Top Coat amount on the whole surface is, in this case, directly determined by the Top Coat Weight. Of course the roughness acts on how shiny it looks.

This is the Top Coat Weight Map and Top Coat Weight which define exactly the amount of light reflected (100% reflection for white, 0% for black), and the light which is not reflected is automatically transmitted to the layers bellow the Top Coat. *In all other cases, this is not only the maps, but the physics too.*



In the weighted Layering Mode, the Top Coat Weight ONLY is used to compute how much light is reflected on the top coat and how much light is used for the layers bellow (Base in General)

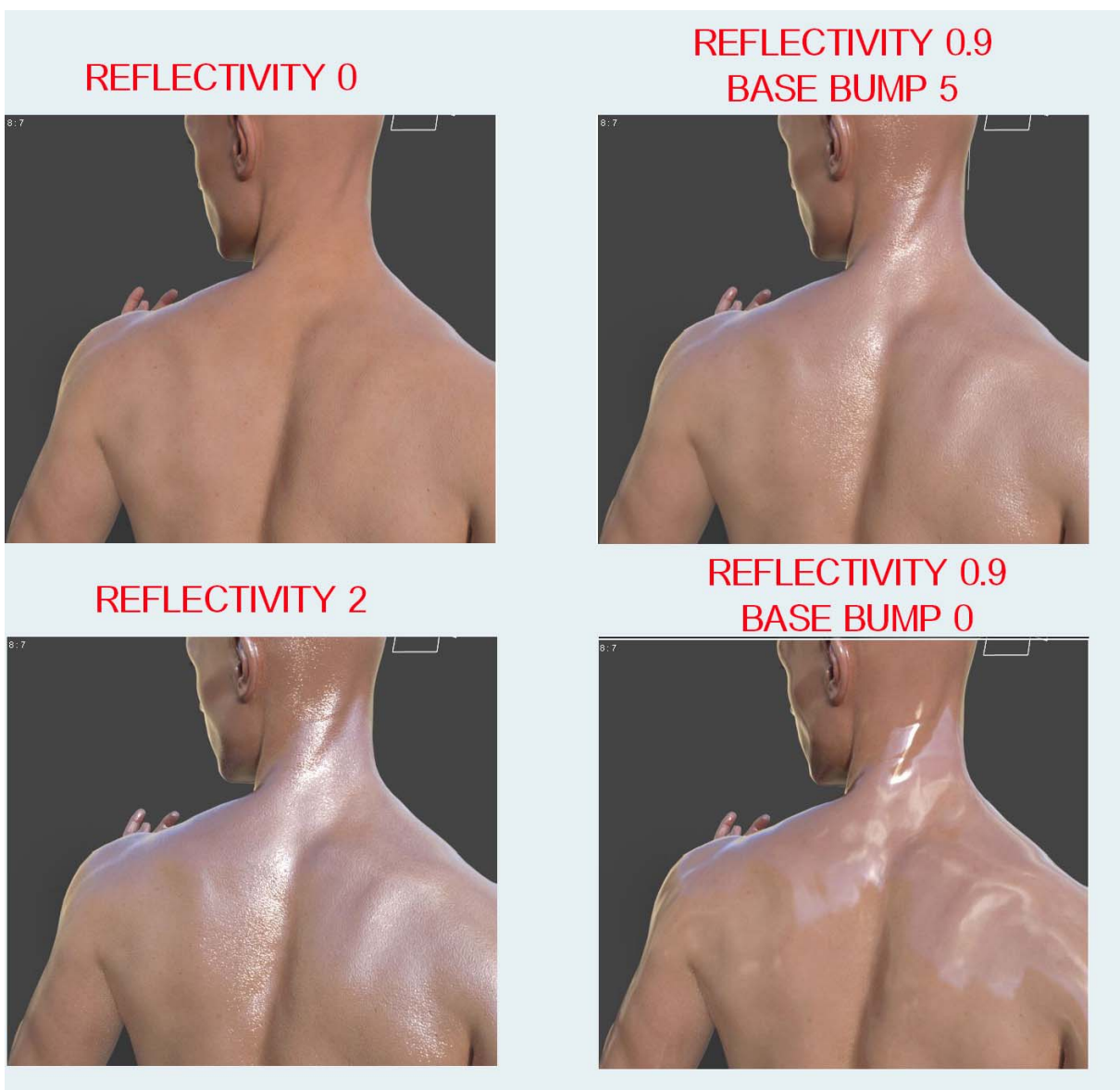
In general you don't have pure black and white, but gray levels. The weighted mode is not often used, maybe because the less physical of all the modes proposed.

2.5.2.b The Reflectivity Mode

In this case, the Top Coat is reflective, and if the amount of top coat is still driven by the Top Coat Weight, this time, the reflectivity is driven by the "**Reflectivity**" dial. It does not mean that it behaves like a mirror, and that at with a reflectivity of 1 you will have a mirror, because it is a refractive/reflective interface, which means that a large part of the light reaches the base layer. For a reflectivity of 0, the Top Coat is not reflective at all.

If nothing is bumped, it acts like a "film of transparent plastic" above the skin. As soon as surfaces have bump, it provides effects similar to gloss effects observed in the "Top Coat Bump" part of this document.

The next image is an overview of what you can have in term of effect. In this case nothing is mapped in the Top Coat properties, and the Top Coat Weight was set to 5 in order to have a better view of the results.



The Reflectivity Mode

2.5.2.c The Fresnel Mode

In this case, the Fresnel equations are used in order to determine how light is reflected and refracted on the Top Coat surface (If you are curious have a look on the web to see how funny they are). They depend on the optical index of the layer (well of the two media, one being here the air), and this is why you have access in this case to the **Top Coat IOR** which will drive these reflection/refraction. This is interesting, because in nature, all surfaces obey on each surface area to Fresnel equations. Some say "Everything has Fresnel".

In theory it may be better to use a 0 - 0.1 roughness in this case because the equations assume that the surface is perfectly flat where the equations are used, but in practice it works too with higher values of roughness.

The following image show the difference between a Top Coat with on the left a weight of 0 (i.e. no Top Coat), and on the right a weight of 1 - unmapped, a Top Coat IOR of 1.3 (water), and a Top Coat Roughness of 0. Please note that activating Fresnel Mode tend to change the global skin Tone.



The Fresnel Mode

2.5.2.d The Custom Curve Mode

The custom Curve Mode is using a custom curve based on Fresnel Schlick's approximation, which is itself an approximation of the Fresnel equations. *Schlick's equation is a very good approximation for the reflection/refraction of dielectric (non conductive, like skin) media.*

Using the custom Curve Mode gives you an access to three parameters : **Top Coat Curve 0**, **Top Coat Curve 90**, **Top Coat Curve Exponent**. The subject is not well documented, but the default properties seem to work particularly well.

Let's begin by the **Exponent**. This is probably the exponent used in the Schlick's approximation which is : " $F_0 + (1 - F_0) \times (1 - \cos(\theta))^5$ ". In this case, even if this can be modified, it is better not to change it since it seems to be a constant of the equation and not a variable. Yet, if you try to change it and you remark that the visual result is better, feel free to do it. There are already so many approximations.

Now let's have a look at the **Top Coat Curve 90**. It is the value of the equation for an angle θ of 90 degrees. If, in the formula we use 90 for the angle θ , then the cosine becomes 0 and the approximation becomes : $F_0 + (1 - F_0) \times (1 - 0)$, i.e. $F_0 + (1 - F_0) = F_0 - F_0 + 1 = 1$ (I detailed the calculus for the ones who don't love mathematics). So logically, the Top Coat Curve 90 should remain at 1, as said in the documentation. Yet, same remark as for the Top Curve Exponent, if you try something else and prefer the result, feel free to do it, but remember that is not what the approximation says.

Finally, let's have a look at the Top Coat Curve 0. It is the value of the equation for an angle θ of 0 degrees. In this case, if we replace it in the formula, we get :

$$F_0 + (1 - F_0) \times (1 - 1) = F_0 + (1 - F_0) \times 0 = F_0 + 0 = F_0.$$

Now we know that the Top Coat Curve 0 is F_0 , but what is F_0 ?

$F_0 = ((n_1 - n_2) / (n_1 + n_2))^2$. In our case, one of the middle is the air ($n = 1$), so **Top Coat Curve 0, which is F_0** depends only on **the optical index** you want to give to the Top Coat Layer. For instance for an optical index of 1.5, you have 0.04 (you can use excel for faster calculations with different IOR), and for an optical index of 1.3, you have 0.017 for Top Coat Curve 0.



Using the Schlick's approximation (Top Coat Custom Curve Layering Mode), with a Top Coat Curve 0 at 0.017 to simulate water. ALL other Gloss settings are OFF. Roughness is 0. Of course lights and Bump matter in the final result.

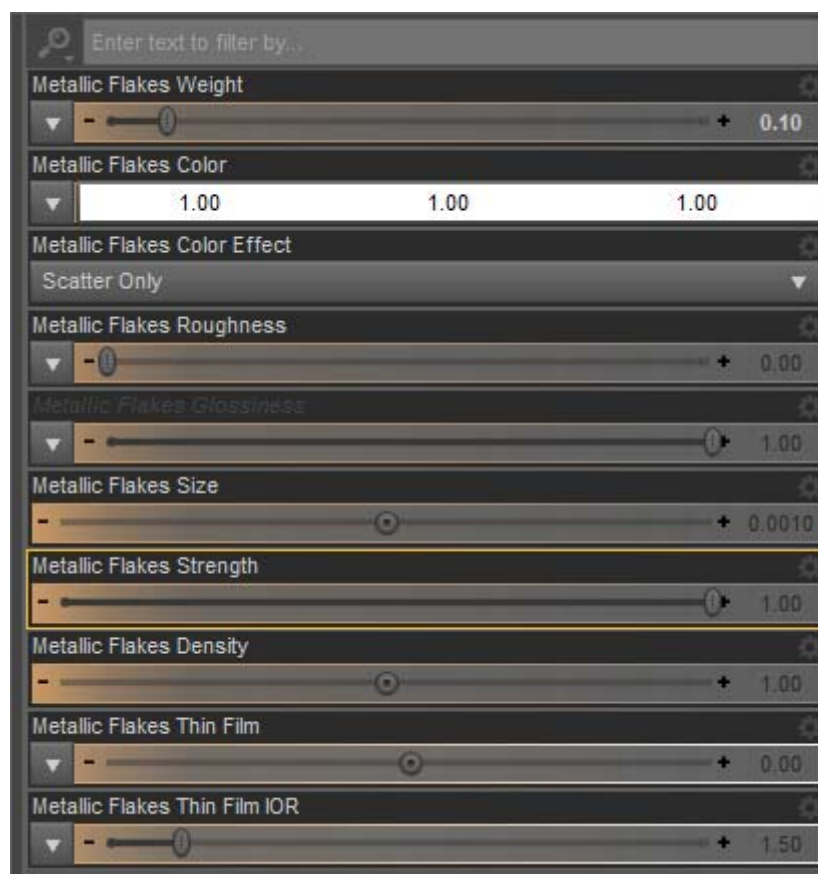
By the way 0.04 is the default value provided for Top Coat Curve 0, which, as a consequence corresponds to a default IOR of 1.5 for the Top Coat. This means also that Top Coat Curve 0 values should remain very small, for instance 0.11 is the value you should use for an IOR of 2, and 0.36 is the value you would put for an IOR of 4 which is already a HUGE IOR. I would say if you want to remain in something plausible, stay below 0.1.

2.6 A word about Metallic Flakes

Even if it is not physical to use the "Metallic Flakes cheat" to fake gloss on the skin, this solution is pretty efficient in term of visual impact, this is why I am forced to mention it at this stage of the tutorial.

The metallic Flakes is considered by the shader as being above the Base Layer of the shader, and below the Top Coat Layer. For the shader, it REALLY adds metallic flakes above this base layer.

The properties which can be modified to adjust the metallic flakes are the following ones :



Metallic Flakes properties

As usually, the two last settings of this layer, which are Metallic Flakes Thin Film and Metallic Flakes Thin Film IOR work exactly as described in **2.3.2.d**, except that this time the thin film is placed over the Metallic Flakes Layer and not over the Base Layer.

The **Metallic Flakes Weight** defines the strength with which the metallic Flakes effect will be applied (the weight of this layer). It can be eventually mapped with the maps used for the Glossy Layered Weight or the Dual Lobe Specular Weight. If unmapped, the typical interesting range of values is 0.05-0.3 (depending on other settings).



Left, Metallic Flakes Weight =0, right Metallic Flakes Weight =1, all other Metallic Flakes properties at their default values, all other gloss settings to 0.

The **Metallic Flakes Color** is the color of the Flakes themselves. For Gloss effects, it is better keep them white. Using the Base Color Map can also be interesting.

The **Metallic Flakes Roughness** works exactly as all the Roughness properties (Glossy, Top Coat, Dual Lobe..) mentioned so far. If you chose the PBR Specular/Glossiness, the Glossiness will like<< usually replace the Roughness. Set the Roughness lower or the Glossiness higher to increase the shiny look of the skin, and inversely.

And now we arrive at the three properties really dedicated to repartition and effect of the flakes :

The **Metallic Flakes Size** will define the size of the flakes. If you want to have a look at what the flakes "really" look like, simply set the size at 2 or 3, this gives a good idea. For skin shading the interesting range of size is 0.01 up to 0.05.

The following image shows two examples of metallic Flakes Size and Roughness combination for a same value of all other Metallic Flakes settings.



*Example of what can be obtained using various Metallic Flakes Size and Roughness.
All other Gloss settings of all other layers are set to OFF.*

The **Metallic Flakes Strength** defines if the Flakes effect will be very visible (1) or if you will almost not be able to discern a flake from its neighbor flakes (low values). Considering that the purpose is to have nice noisy highlights, keeping the strength at 1 is a good idea.

The **Metallic Flakes Density** increase the amount of flakes per unit of surface area. If you want to increase the number of flakes on a given surface, increase the density. and inversely. In general it does not need to be changed or not a lot - for skin, but if you feel you need it, a comfortable range is 0.3 - 3, but you when you change the density, you might to have to adjust a bit the Weight of this layer.

2.7 Volume Group : transmission and scattering

At this stage of the tutorial, we have already detailed the Base settings of the skin, allowing to set up the Base skin color and glossy properties - whereas they are directly in the base, or added via a top coat or metallic flakes, as well as the translucency. But as I mentioned it in the translucency part, what you set up for translucency, i.e. the Weight and the Color, is just the base of everything which is going to happen in the volume of the figure, which is light transmission and scattering.

I kept this for the end because it is an important part of skin shading, which is not always obvious to understand without clear explanations.

What you have to understand it that the volume effect will be applied to the light which is considered as entering inside the skin, in the volume of the body. This means that, if the translucency weight is 0, or if the translucency Color is black, then Iray will consider that nothing is sent to the volume, so the SSS Reflectance Tint as well as all the Volume information will be useless.

The same way, the Thin Film option in the Volume Group is extremely important. When you set it to OFF, the light inside the skin is considered as being propagating in a volume and transmission and scattering are computed. If it is set to ON, then the volume calculations will be off (as if inside the skin, lights was propagating in air, not in volume).

So the conditions you have to respect in order to enable volume transmission and scattering are :

- Thin Film ON (Volume Group)
- Translucency Weight strictly positive, (Base/Diffuse Group)
- Translucency Color not black, (Base/Diffuse Group)

In order to describe what happens to the light inside the Voume, Iray Uber is then based on two and only two phenomena :

- [Transmission and](#)
- [Scattering, which occurs beyond the surface, i.e. Sub-Surface Scattering \(SSS\).](#)

The big difference between the two of them is that, in transmission, the light tends to keep it original direction, whereas for SSS, you can define if the light scatters more or less front (into the original light direction) or back (scatters back to the light source) or presents in-between directional features.



The properties of the Volume Group

2.7.1. Understanding Transmission

When light propagates inside a volume it "spreads out" because it scatters at least a bit anyway, and is absorbed. But this absorption is not the same for all the wavelengths (colors) of the light. Roughly speaking, the blue is the most absorbed color, the green is a bit less absorbed than the blue, but much less absorbed than the red.

This is what **the Transmitted Measurement Distance** (called TMD in the rest of the document) and the **Transmitted Color** are used for : to specify how much this light is absorbed. They work together, defining one without the other is a non sense.

Something important to know is that, in the most commonly used models for absorption, light Energy/Intensity, in an absorbing volume, decreases exponentially as a function of the distance into the material we calculate it. We can suppose such or similar models are used in our render engine. The formula generally used is : $I(x) = I_0 \cdot \exp(-\alpha \cdot x)$ Where I is the intensity of a light beam, α is the coefficient of absorption, and x the distance in the material between the point where I_0 is estimated, and the point where $I(x)$ is calculated. Using this, we can understand [the propagation in the skin will result in a exponential decrease of the light intensity - for each color channel, defined by the TMD and Transmitted Color](#). In real world, the absorption is a function of the wavelength (color) of the light. It seems that in our case, it has been decided to treat this color channel per color channel, Red Channel, Blue Channel, Green Channel.

What is important to understand here is that, for instance when you use a **Transmitted Color** of (253, 200, 150) with a **TMD** of 0.01, it means that the color measured after 0.01 for the white light (255, 255, 255) has been absorbed differently on each channel to result in the Transmitted Color. But if you calculate the corresponding absorption coefficients of each color channel and re-use them to calculate the "remaining color" at other distances, you see that things go very fast, in my example :

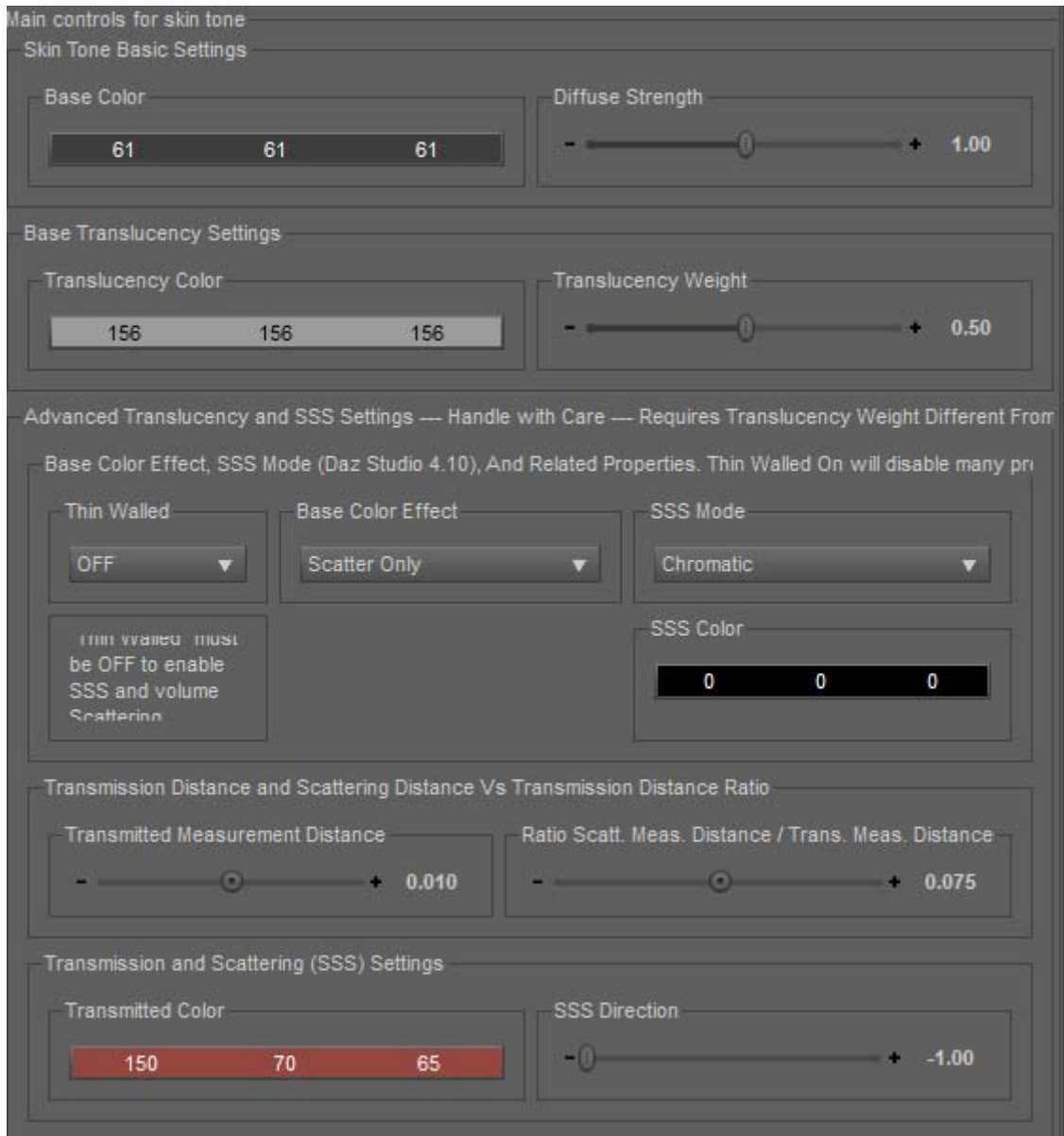
- at a propagation distance of 0.05, the color of the non-absorbed light would be (245, 75, 17), and
- at a propagation distance of 0.1, the color of the non-absorbed light would be (235, 22, 1) meaning that almost all the blue light disappeared as well as almost 90% of the green light.
- at a propagation distance of 0.25, the color of non absorbed light would be (209, 0, 0) which would mean that there would be only the Red Channel left.

[This is why setting up the couple "Transmitted Measurement Distance" / "Transmitted Color" is very important : it tells you how much of each color \(Red, Green, Blue\) remains in the skin after a given propagation distance.](#)

The next image shows various transmitted lights through Genesis 8 Basic Male, for a given, [constant, Transmitted Color of \(150, 70, 65\), and varying Transmitted Measurement Distances](#). The base Color of the skin has been unmapped, and set to dark gray, and the Translucency Color has been unmapped to and set to medium gray, so that the only colors you see come from Transmission. All the Gloss (and Top

Coat) weights have been set to 0. The SSS has been switched off (SSS amount = 0 or SSS Color = black) to avoid any interference with the observation.

A light white light is placed behind the figure, and we have a look to the front of the figure to see only what happens to the transmitted light.



Initial Settings to test the couple Transmitted Measurement Distance / Transmitted Color

On the results next page, you can see that

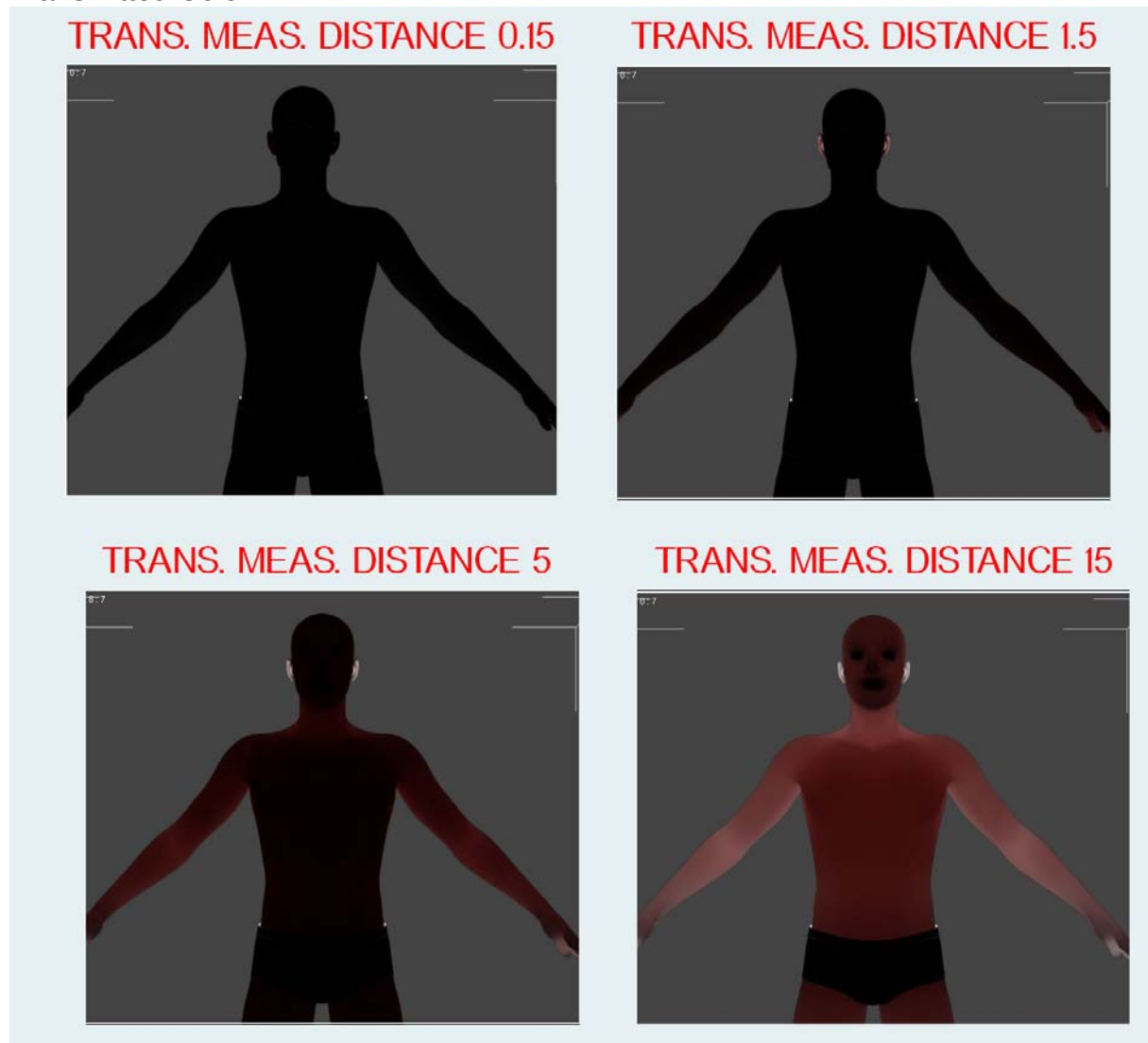
- for a TMD of 0.01, there is no light going through the figure : all the light, whatever the channel is absorbed well before being able to go out of the figure. This will not be illustrated in the image. Black is black, not a lot to show...
- for a TMD of 0.15, only the ears become "very slightly" reddish. Green and Blue have been totally absorbed on the "around 1 cm of the ear", and only a little proportion of the Red Channel was able to reach the output interface. In the rest of

the body, since the light has a longer path to make before it reaches the output interface, everything has been absorbed.

- For a TMD of 1.5, the fingers become reddish and the ear become almost pink-white. For the ears, it comes from the fact that the Transmitted Measurement Distance now being smaller than the thickness of the ears, the light has been LESS absorbed than what you specify in the Transmitted Color. You have more Red, more Green, and more Blue than what you see in this color. If you use a small calculator it will confirm that for a propagation of 0.5 (for the ear thickness) would result in a (213, 165, 161) color, really close to the color we observe. For the fingers, the color of the exiting light is almost the one of the "Transmitted Color" because the propagation length through the fingers is almost the Transmitted Measurement Distance.

- For a TMD of 5, some thicker parts of the body let some lights go through, but the torso and the head, larger than the rest as still opaque.

- For a TMD of 15, as expected, the light is able to propagate through the volume to the exit surface for almost the whole body, with more reddish colors for the thicker parts, the colors on the thinner parts (thinner than the TMD) being less saturated because less Green and Blue have been absorbed than what is specified in the Transmitted Color.



Evolution of the transmitted light as a function of the Transmitted Measurement Distance for a given (150, 70, 65) transmitted Color

In brief : the transmitted Color is NOT the color of the transmitted light BUT the color of the transmitted light FOR a given propagation length in the volume, which is defined by the Transmitted Measurement Distance. For propagation distances below this TMD, the light will be less absorbed, for propagation distances above this TMD it will be more absorbed, and this, color channel per color channel with an exponent function. So this can change very fast!

Another important point is the fact that this color of the transmitted light is multiplied, channel per channel (Red with Red, Green with Green, Blue with Blue) with the Translucency color. Meaning that, if you have a translucency color with only Red for instance (Blue and Green are OFF) you will never be able to have some transmitted light which will be something else than Red (well, or black if there is no red in the Transmitted Color). All the other color channels are automatically multiplied, in this case, by 0, so are null.

The final I'd like to mention here is that as long as you don't use the "Chromatic" mode for SSS, you can play rather "safely" with those two parameters, the only risks being to go too far in the settings and look like a candle. But as soon as to use the "Chromatic" mode for SSS, things become a bit more complex. It's time now to speak about SSS, the last point of this tutorial.

2.7.2. Understanding scattering, SSS in MONO MODE

Let's work first on the Mono Mode of the SSS. You can set it in "SSS Mode". This is the easier one to understand.

First remark, as for all the volume lights, it is multiplied channel per channel by the Translucency Color, meaning that if you set a pure Red (255, 0, 0) translucency and a pure Blue SSS (0, 0, 255), the result will be pure Black (i.e. no SSS).

The settings for the SSS in this "Mono" mode are :

- Scattering Measurement Distance,
- SSS amount
- SSS direction.

As soon as you set the **SSS amount** strictly positive, then some Sub Surface Scattering will be applied to the light inside the volume (you know, the one which comes from the translucency and which is then transmitted).

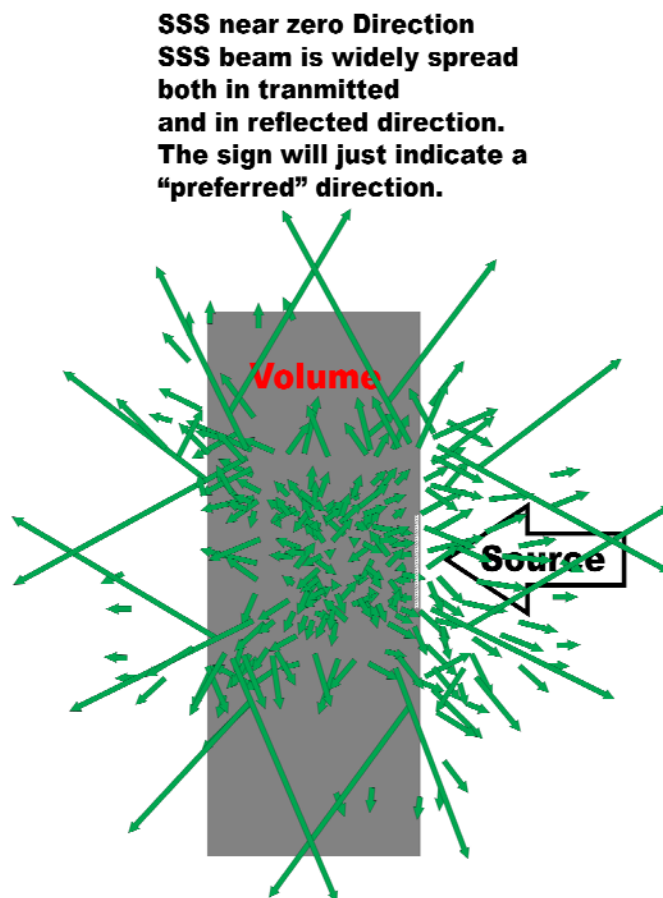
The stronger you set the SSS amount, the more the light in the volume of your figure will be used and scattered for SSS (otherwise it is just "transmitted and absorbed").

In general SSS is used to send light backwards, to the direction it comes from. It can also be helpful to send light backwards if the transmission is set so that a small amount of light goes through the figure. It can help to lower this amount of light transmitted through the whole volume.

In this case, of figure, the "Mono" mode, the SSS does not really contain any Color information. You will not use it to change directly the color of the light inside the volume (even if there is an indirect consequence due to absorption). You will use it to modify the "repartition", of the light in the volume, specifying if it rather go forward in its natural propagation direction, or if it is scattered backwards to the half space

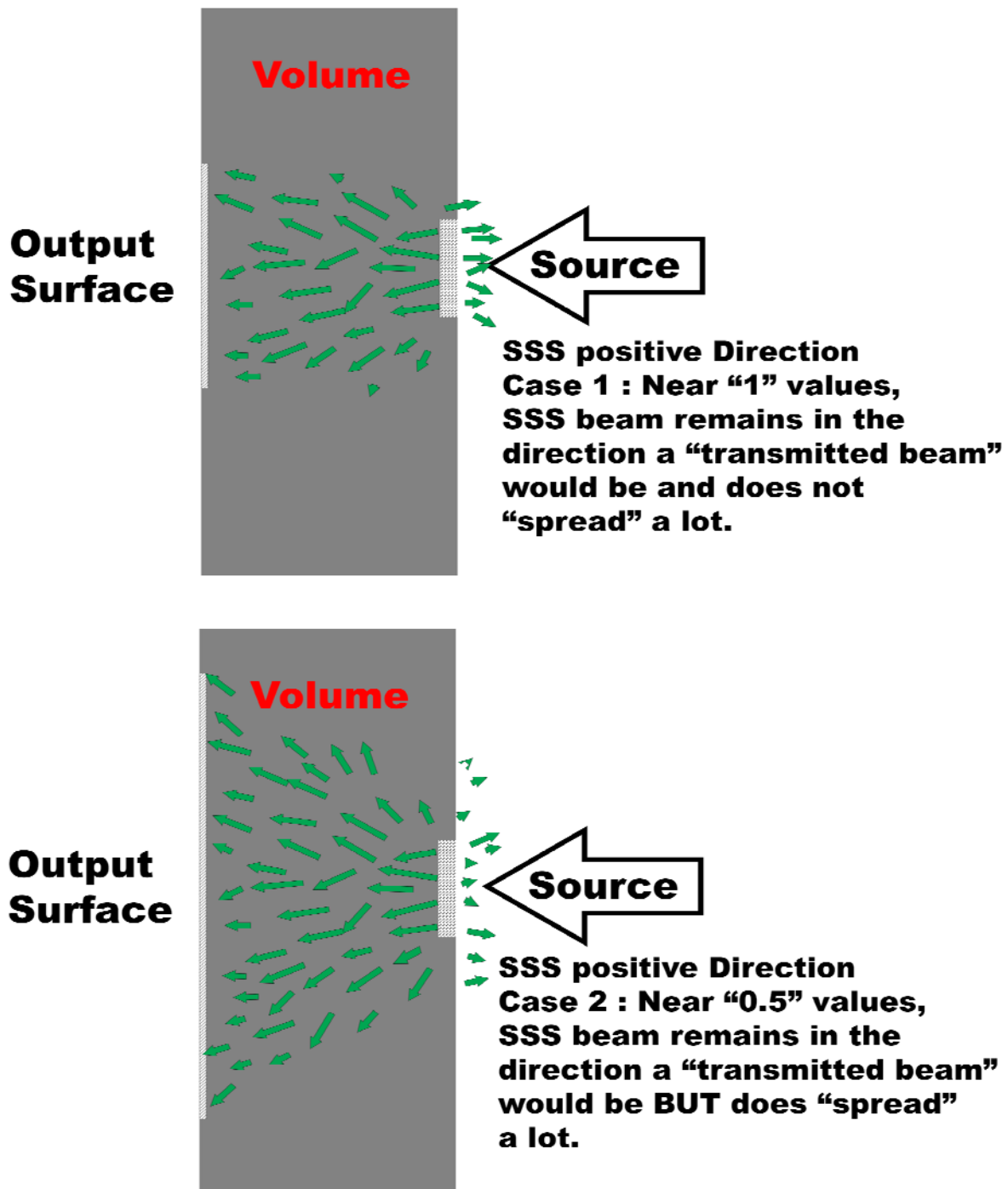
where light source is located. This repartition is defined by the **SSS direction**, which can go from -1 to 1.

- For values near 1, the light scattered by SSS is strongly "focused" around the incident direction (more precisely what would be the direction of a transmitted beam of light if it was not scattered backwards to the direction of the light source).
- For positive SSS directions the preferred direction of the light resulting SSS is the direction of propagation of the incoming light, meaning that light does not scatter back a lot. When you decrease the positive value, you "spread" the SSS beam more and more around the main direction. The output surface for a given input surface becomes bigger, and of course the amount of energy per unit of output surface area is decreasing.
- The more you get close to 0, the more the resulting SSS beam will be "isotropic", (which will be the case for 0) meaning that the SSS beam will spread out in all the directions, sending by the way more light backwards, to the half space the light beam was coming from. But there is for it not preferred direction. You will not have a lot of difference between positive and negative around 0.
- The lower you decrease the direction (negative values), the more the light is scattered back to the direction of the light source it was coming from. This is why if you use SSS to scatter light back, then low or negative values should be preferred.

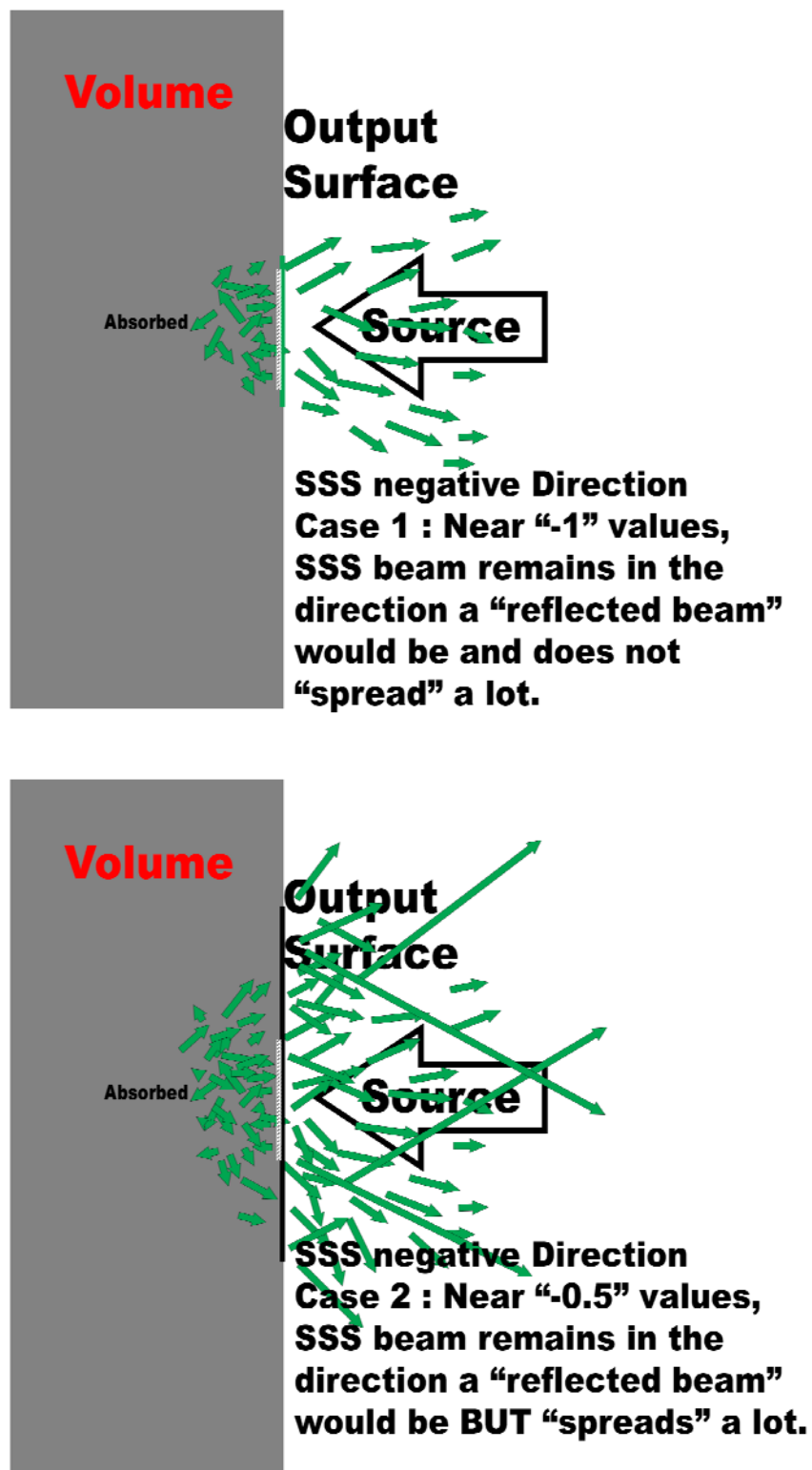


Extremely schematic view of the light paths for SSS Direction = 0

The images next page give schematic views of the principle of the influence of the directions of the SSS. These are very schematic and are only made to give a better idea of what is happening.



Extremely schematic view of the light paths for SSS Positive Directions

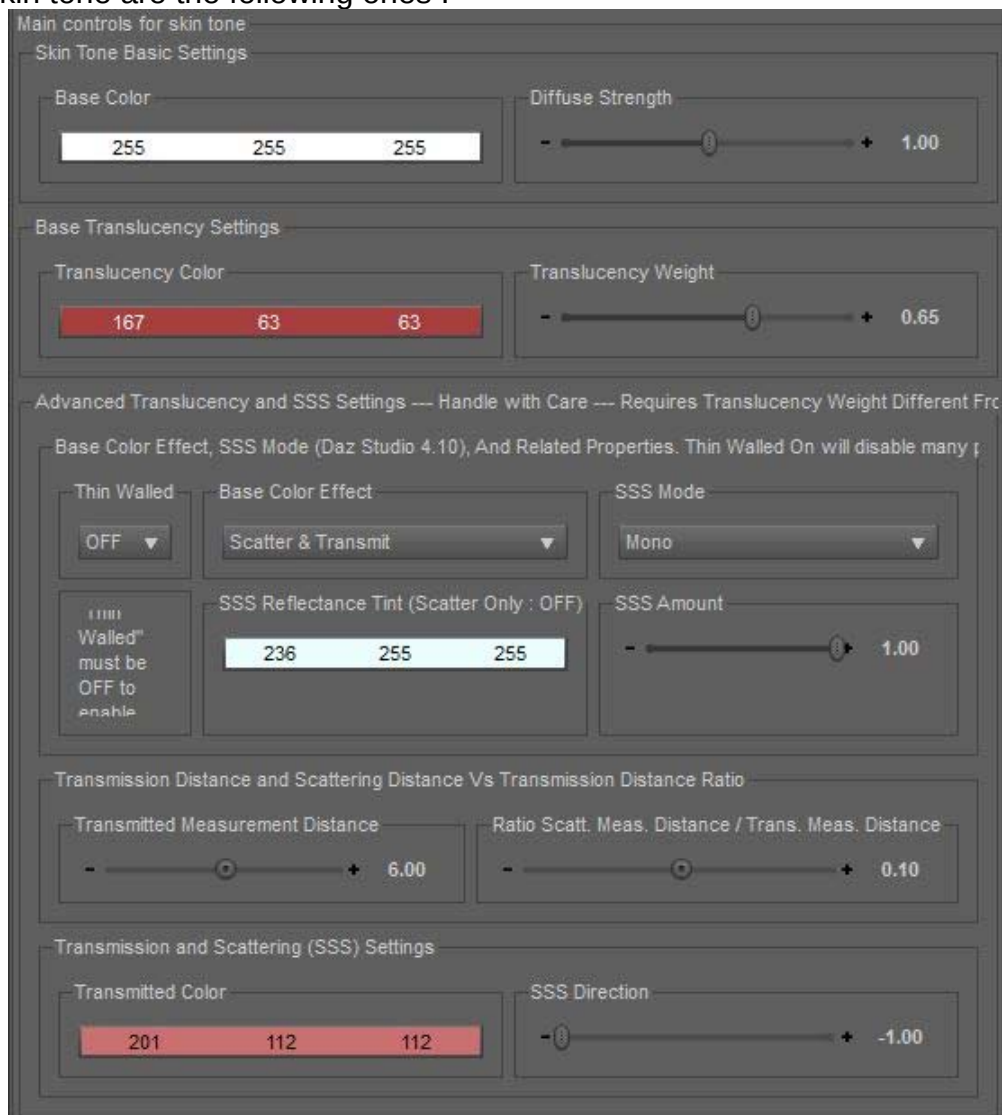


Extremely schematic view of the light paths for SSS Negative Directions

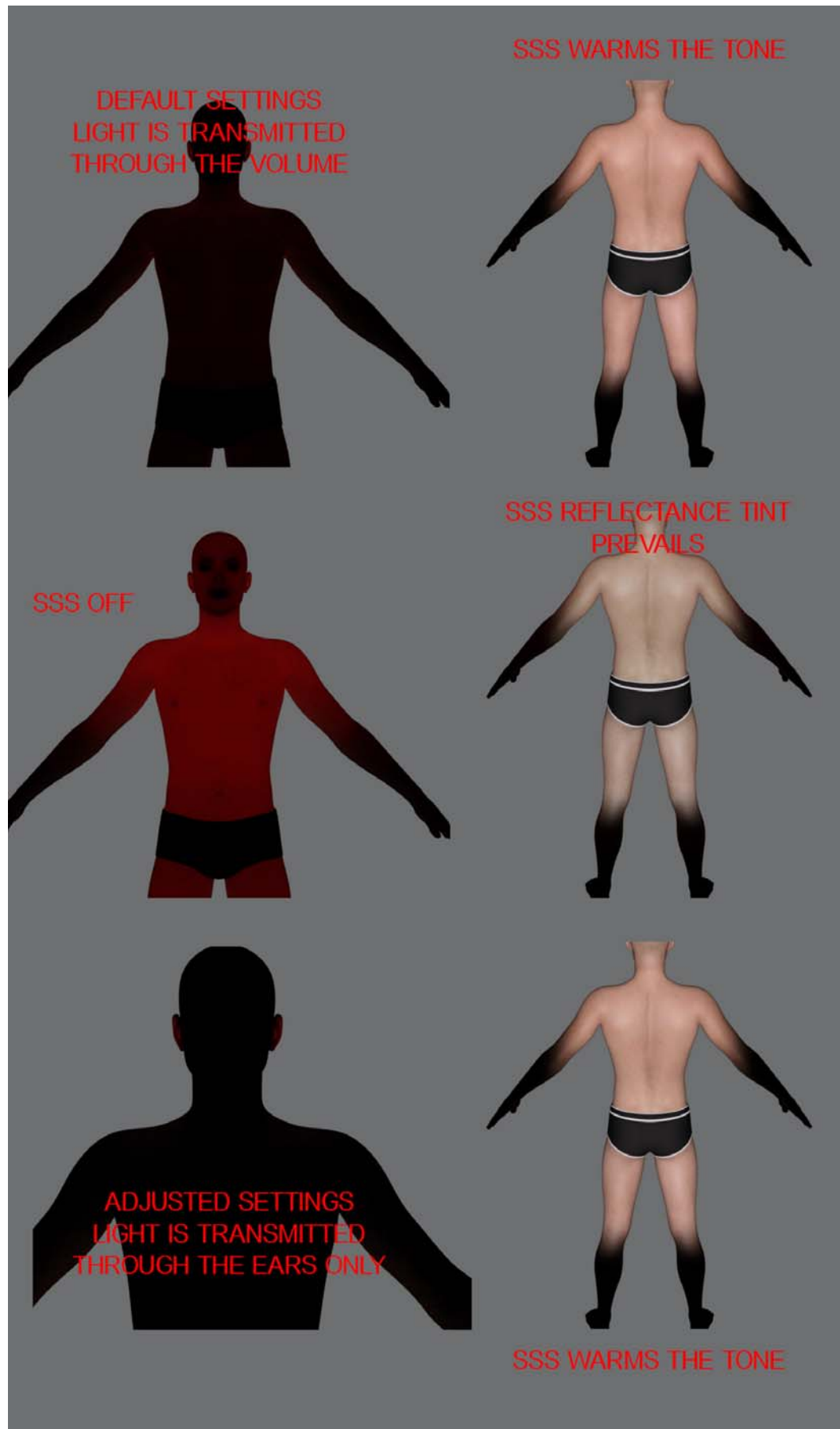
The **Scattering Measurement Distance** is also very important. It is the propagation distance, in the volume, at which the light reaches the SSS amount. It means for instance that if the Scattering Measurement Distance is small, the SSS amount will be reached fast. Try to avoid setting it too small or too big, especially in comparison with the Transmitted measurement distance, but keep it pretty small in comparison with the Body dimension (thickness).

In order to illustrate the influence of the SSS we are going to show several renders , with different SSS conditions. All of them are made using Genesis 8 Basic Male, with a strong surface backlight behind him, and no environment light. This way the front face of Genesis will show the influence of SSS on the transmitted light, and the back part of Genesis will show the influence of SSS on back-scattered light.

The settings which will be used on the last (bottom) figure, in order to prevent transmitted light through the body but preserve ear translucency and SSS warming the skin tone are the following ones :



Settings used on the skin of the last example of next image. Updated : Transmitted Color, Transmitted and Scattering measurement distances, Transmitted Color, SSS Direction.



Example of influence of Volume settings on skin rendering

2.7.3. Scattering (SSS) in CHROMATIC MODE

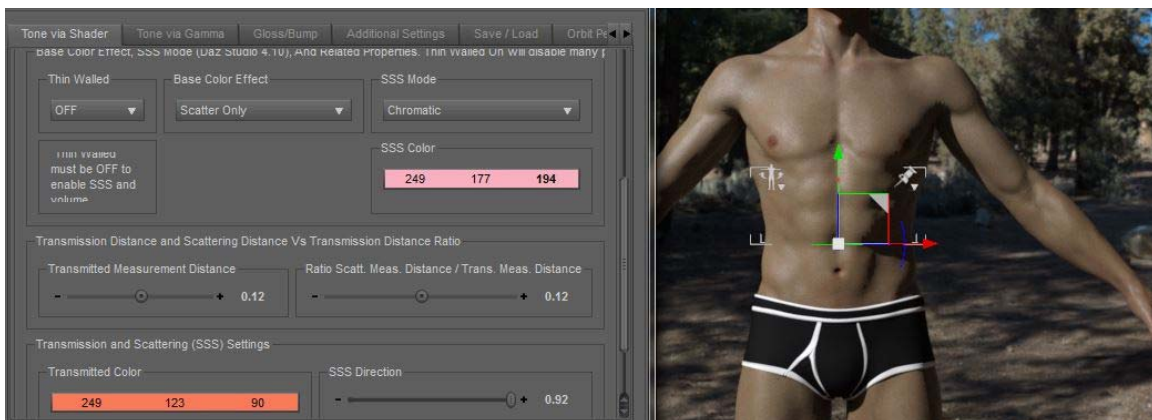
In the "Mono" SSS Mode, the SSS color was directly computed based on what as set for the transmitted color, and the SSS Amount was defined by the user at the Scattering Measurement Distance. In the chromatic mode, you can now define an SSS color for the Transmitted Measurement Distance instead of an SSS amount.

This is a brand new feature, and for now, at the time this tutorial is written, it has a known issue. This issue is that some volume settings will lead to a transparent figure, or at least transparent pixels. You can eventually see some black pixels. Sometimes adding a background behind this figure, such as for instance the environment dome, will then solve the issue, but it does not seem automatic. This transparent pixel issue occurs for various sets of Transmitted and scattering measurement distances coupled with various SSS color and transmitted colors. This is for now pretty unpredictable. Some tests tend to show that if any of the blue channel of these components is 0, or any channel of the SSS color is null, then pixel transparency will show up, but it also appears in other circumstances. It seems also to happen more often is Scattering Measurement Distance is lower than Transmitted Measurement Distance but this would need to be confirmed.

Now the properties available to set up this SSS are the same as the ones for the Mono mode, with the same type influence, except that this time the SSS amount is replaced by the SSS color.

Concerning the **SSS Direction** :

If possible, avoid positive, or near 1 directions. This leads to very weird and unrealistic results for a very wide range of Volume settings, as shown in the next image.



Example of the "bad" influence of a high positive (0.92) SSS Direction

Try to stay with a low positive, or 0, or negative SSS Direction, this is where the effect will be the best for skin rendering.

Once the SSS direction is set up, in chromatic Mode, the SSS color is not easy to define, because the final result will strongly depend on the four properties all together (relative to each other) : Transmitted Color at Transmitted Measurement Distance, SSS Color and Scattering Measurement Distance.

Concerning the **Scattering Measurement Distance**, and even more especially if you work with an highly translucent figure (Translucency Weight > 0.7), then the best thing for you is to set it five to ten times lower than the Transmitted Measurement Distance, otherwise the risk is that the final skin tone will be very difficult to reach. In those conditions of high translucency, don't set the global transmission (Transmitted Color at TMD) to high to avoid a wax effect on thin parts of the body (or everywhere). A nice idea here would be to set the Transmitted Measurement distance in the 0.1-1 range, then set the Transmitted Color to give proper results with this distance, and as a third stage to set a Scattering Measurement Distance around five to ten times lower than the Transmitted one. The final touch will be to adjust the color, and this is where it becomes funny.

Using an environment light (light comes from all directions), you will fast remark that for a wide range of Transmitted Color, Transmitted Measurement Distance, and Scattering Measurement Distances, the SSS Color has a counter-intuitive effect on the final skin tone, as you can see in the next image.



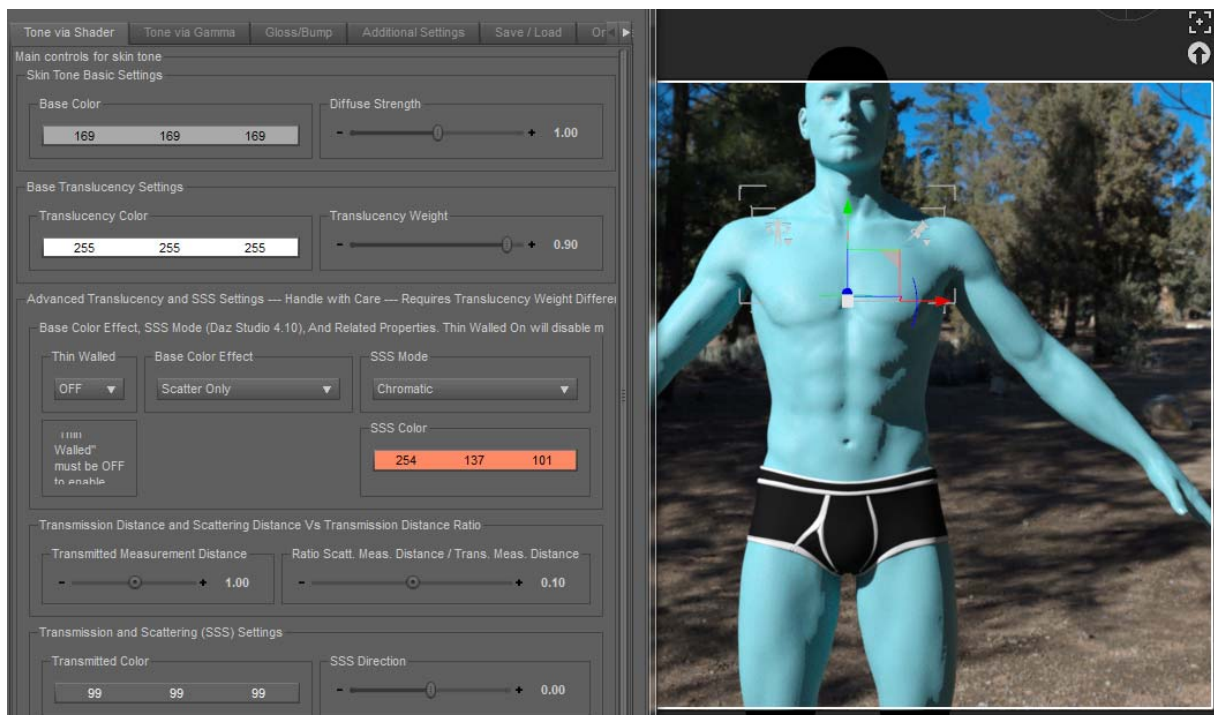
Michael 8 - 2 different transmitted colors - skin tone evolution for different SSS Colors

For instance if you set a low Red, low Green, high Blue color for SSS, "initially with the intention to" have more Blue at the end, you will almost always end up with a

much more reddish color for the skin as it initially was, and this for a very wide range of transmission conditions. Actually if you have a look at the previous image, the skin Tone you observe is in general pretty close to the complementary color of the Color you set for the SSS Color.

One of the way to think about that would be to say, and this is purely hypothetical, this is simply a way to think things in order to help in the choice of SSS Color : if the SSS Color is the Color of the SSS at the Scattering Measurement Distance, then it means that at this distance, the "complementary" color has been "removed" from the white so that the remaining Color is the SSS Color. And where did this "removed" light go? Well it was back-scattered to the light source thanks to the SSS. Thinking this way, this helps to understand how the SSS Color can influence the final skin Tone in such a counter-intuitive way. Of course, all this is also influenced by the Transmission phenomenon and the Translucency Color which prevents the light from being "white" when entering the skin (if it uses a color map and/or if the Translucency Color has a strictly positive Saturation), but globally, you will "add" something close the complementary color of what you choose for SSS color.

Here is for instance what I have for SSS (and skin) color if I unmap everything, and I set all other colors to gray levels. Blue is the complementary Color for orange.



Don't think about the direct color. Think about the complementary color.

As a conclusion, the Chromatic Mode, even if it may be more "rich" at the end than the Mono Mode for SSS, is not easy to set up, especially for high Translucency figures, but a few tips can help, such as setting a low Scattering Measurement Distance, a null or negative SSS direction, and remembering that the visible color evolution is better anticipated if you think "complementary colors".

2.8 Conclusion and possible methodology

As mentioned at the beginning of this tutorial, skin shading is only a part of a good skin rendering, which also requires an effort in lighting, texture maps, fine geometries, and subject framing.

The basics of skin shading is very simple, and is made of successive steps.

If you create a shader from scratch, or transfer it from another shader, then think that the results will be better if you add maps to some properties, such as Translucency Color - if you have no dedicated map for Translucency Color, you can use the Base Color Map. The results are also better if you use maps for any "Weight" property related to the type of gloss you will use (since you have several ways to reach the gloss you want). For these gloss properties you can use the Specular Maps if you come from 3Delight for instance. Concerning the other maps, using Bump maps is fundamental, at least in order to have nice and believable specular highlights (except maybe if you use the Metallic Flakes for the gloss), and normal map are recommended to add nice small details to the figure. And of course, but this is obvious, the Base Color must be mapped too.

If you modify an existing shader, all those properties - except maybe the Normal Map - should already be mapped. If you change the method to create the Gloss of the skin, then don't forget to move the Weight Maps to the "Weight" property of the new method you use.

Concerning the surfaces selection, I would advice to select Skin/Lips/Nails, set up the whole skin, and at the end, when you are happy with what you have, refine the Nails and the Lips Gloss (mainly) and scattering (eventually).

Once everything is properly mapped and selected you can go in the Surfaces Editor Tab and begin, this seems logical to say that, by the base, i.e. the "Base" group. When you select several surfaces, you cannot easily access this group. What I personally did is to select the group and enter a few letters in the "Enter text to filter by..." line at the top of Surfaces Editor Tab. For instance for the Glossy properties I wrote "Glossy", and the properties were filtered. For the translucency I wrote "Trans", which gives both access to "Translucency" and to "Transmitted". You can also, if you have it, use the Ultimate Iray Skin Manager which does the surface selection for you and organizes all the key properties by theme so that you can access them efficiently.

First, you will have to make the first very important choice, which is, which PBR model you are going to use. In the Mixing Mode, I would advice you to take PBR Metallicity/Roughness (my preference) or PBR Specular/Glossiness. Use the weighted Mode only if you have a specific reason to choose this one instead of the others. For the rest of this summary, I am going to choose the PBR Metallicity/Roughness, but remember that for the Specular/Glossiness, you just have to replace Roughness by Glossiness and to remember that both act in opposite ways (low glossiness correspond to high roughness and inversely).

In the wide majority of cases, except maybe if you use Fresnel Top coat or a few rare other cases of figure, you can set up the skin Tone and the skin Gloss separately, and then "refine" their interaction once both are set up. You can also add other effects at the end, but you should always begin by the Tone and the Gloss.

Creating or adjusting the skin tone is often more complex than the Gloss, because it is linked to many parameters : the Base Color, the diffuse Strength (hidden and almost never used - leave it at 1 if you have no reason to change it), the Translucency (Weight and Color, with or without SSS reflectance Tint influence), and all the volume phenomena which are the light transmission, and the light scattering (SSS). In brief, this is where you may suffer the most. Actually instead of "Skin Tone", it would be more interesting to speak about Tone and volume transmission and Scattering properties.

The first thing you will set up is whether or not you adjust the Base Color map by changing a bit the Base Color associated to it. In general this is only used for small adjustments, where you remove a bit of blue, or of green, or of Red.

The second property you will set up is the Translucency Color (which conditions, with the Base Color Effect Option, the Color of the light entering into the volume of the skin), as well as the Translucency Weight (the amount of the light sent in the volume of the skin). Take care that the higher you set the Translucency Weight, the more the volume effects (Transmission, scattering) are important in the final skin Tone and scattering properties.

As soon as Translucency is ON (weight different from 0), things become complex because you are forced to work on everything almost simultaneously. If you are working on an existing shader, you have, normally, values already set up for the transmission and the SSS, and you can start from them and modify them eventually, keeping in mind that translucency Color and Weight impacts everything in the volume. If you create a shader from scratch, you have to set up something for the volume, the "starting point" from which you will be able to make the modifications that you want on the skin Ton. If you don't know what to take, you can start with very standard values of Transmitted Measurement Distance (0.1 -1) and Transmitted Color around (200-240, 150-170, 120-140), with a Mono SSS mode, and SSS amount of 0.5, direction of -0.5 and Scattering Measurement distance around or below Transmitted Measurement Distance. This is just an example of a pretty robust setting to start with.

You can if you want also set the Base Color Effect to Scatter and Transmit, which makes the SSS reflectance Tint available. It is one more property to adjust the skin, but this is also another property to handle amongst already so many properties...

A good idea is to "freeze" temporarily Base Color and Translucency Weight, and to work on Translucency Color, Transmission distance and color, and SSS amount and Scattering distance, with a preference for Amount and Color first. This can be enough, if not, you have to rework on base Color and Translucency Weight. The best thing is maybe to have a look at the video tutorial here. Finally you can opt for a SSS Color Mode, but then things are a bit more complex, I would not recommend this for beginners.

Each time you do a modification to the Translucency and volume properties, have a look at your figure from different angles, and with different types of lights (Front spot Only, Back spot Only, Environment), in order to check that the light is transmitted THROUGH the figure only where it should be (on the thinner parts of the figure such

as ears), but not where it should not, and to check that the skin Tone (plud SSS plus Transmission) is fine on all sides of your figure.

Creating or adjusting the Gloss is much more easy, since you work almost only on the Weight and the Roughness of the Gloss in most cases, and eventually help the gloss effect by readjusting a bit the Base Bump. The principle is simple : adjust the Weight (more or less visible effect), adjust the roughness (more of less "small and shiny" highlights), eventually adjust the bump... Then re-do the three adjustments until you are happy. In the case you use the Dual Lobe, it is a bit longer since you have 2 roughness properties to change, as well as the balance of them, but the idea is the same. In the case you are using the Metallic Flakes for the gloss, this is also very easy since you have only two of three properties to modify to reach a gloss effect. Remember you can eventually use the top coat for the gloss of for a part of the gloss. You can use several methods if you consider that there is no other more simple solution to reach your goal.

Normally, at this stage, the skin of your figure should already look fine, and what you can do is slightly adjust each parameters if you find for instance that there is a bit too much gloss somewhere, or if the skin is finally a bit to orange, but this should be only fine tuning.

For the rest of the potential helpful element you will find Top Coat, Anisotropy and Backscattering. Backscattering is not fundamental, but can eventually bring a bit of velvet effect on static renders. Adding a top coat above all that, if you find it necessary, is also very simple, and is not obligatory, unless you need to add a Top Coat effect that you cannot reach with other properties. If it is the case, remember that the Top Coat can have its own bump effect too. Top coat is often useful for Wet skin effects. Of course, for all these, you can also play a bit with anisotropy and anisotropy rotations, but this is not fundamental at all and it can lead to seams issues and unrealistic results.

At this stage, the best suggestion I could make is to have a look at the video tutorial to have a better overview of the skin evolution as a function of the parameters.

I hoped that this tutorial helped you to understand the essentials of skin shading. The best way to improve now is to practice and practice again. Happy rendering!