Fantastic Glass *Transparent Solids* *1.2.3*

User Manual

www.fantasticdevelopment.co.uk

Contents

1.   About

Fantastic Glass is a set of tools developed by [Fantastic Development](https://www.fantasticdevelopment.co.uk) for creating and managing realistic and abstract objects with transparent volumes.

As well as including presets that demonstrate a diverse array of different types of materials, the parameters available allow for an incredibly varied range of realistic and abstract objects.
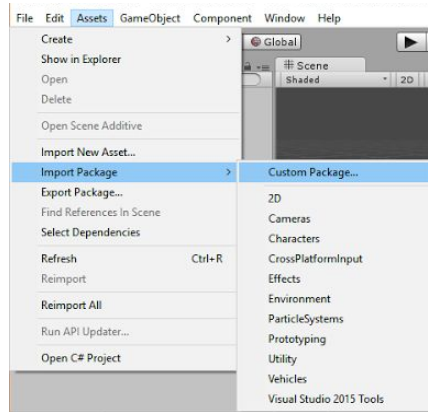
The following documentation aims to clearly explain how to use Fantastic Glass and provide resources for further learning as well as means of contacting Fantastic Development in the case of any issues.
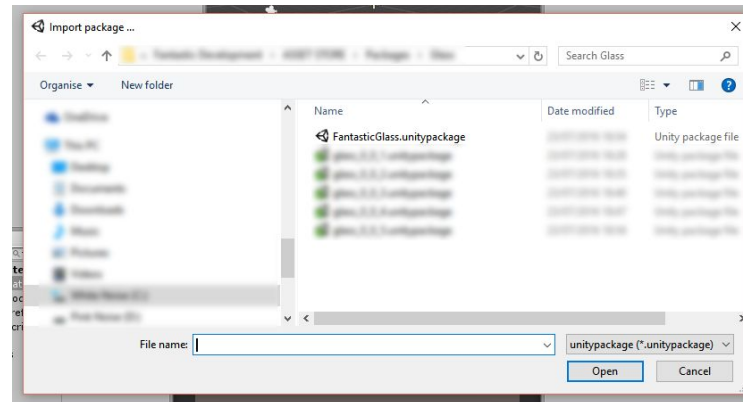
2.   Installation

To install Fantastic Glass, import the Asset Package into your project:

1.   In Unity Editor, select Assets > Import Package > Custom Package…
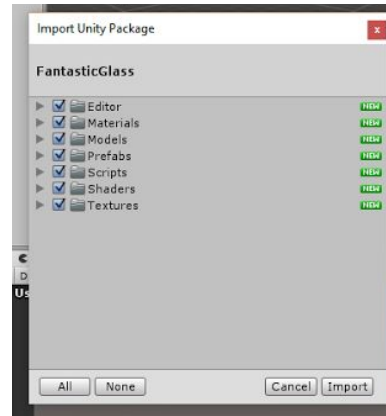

2.   Select the Fantastic Glass package you wish to import

3.   Import all assets from the package you require (Recommended: All) by selecting Import.

4.   Done! You should now have the latest Fantastic Glass assets in your project and be ready to finalise the installation with the Setup stage (Section 3. Setup).
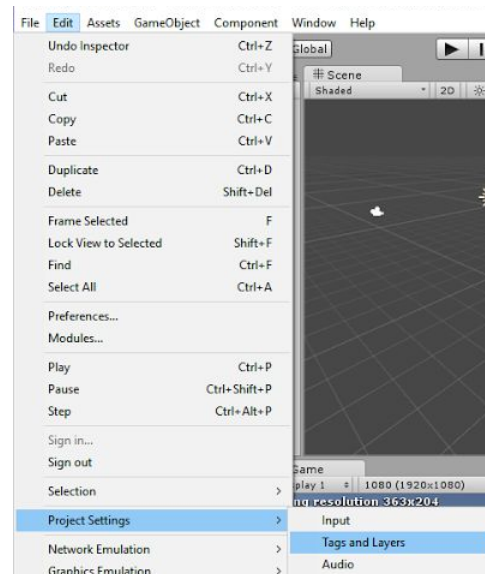
3. Setup

To complete the setup of Fantastic Glass, simply follow the next two short sets of instructions: 3.1 Layers, and 3.2 Resolution.

3.1 Layers

The following steps will guide your through creating the following Layers, if they do not yet exist:
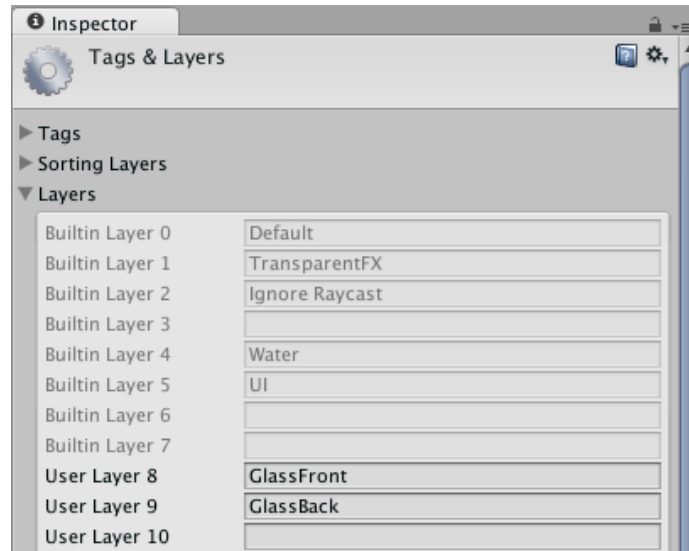
- **GlassFront**
- **GlassBack**

1.   Select Edit > Project Settings > Tags and Layers

2.   Add the tags into two separate empty layer slots.
        NOTE: the names must be entered exactly.

3.   Done! You are now ready to see Glass objects in Play mode. Follow the rest of the instructions in the next section to complete the setup.
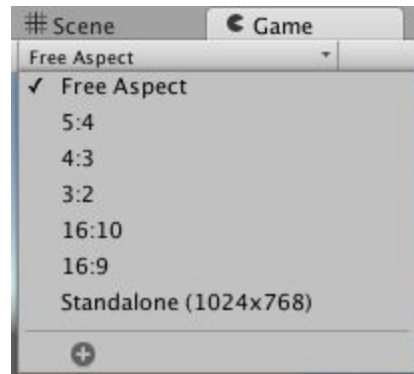
3.2   Resolution / Aspect

To avoid the depth textures not matching up to the objects on screen, you must create a view profile that matches your screen's resolution. Here is an example showing what to do if your screen is 1920x1080 (1080p):

1.   Open the drop-down menu.
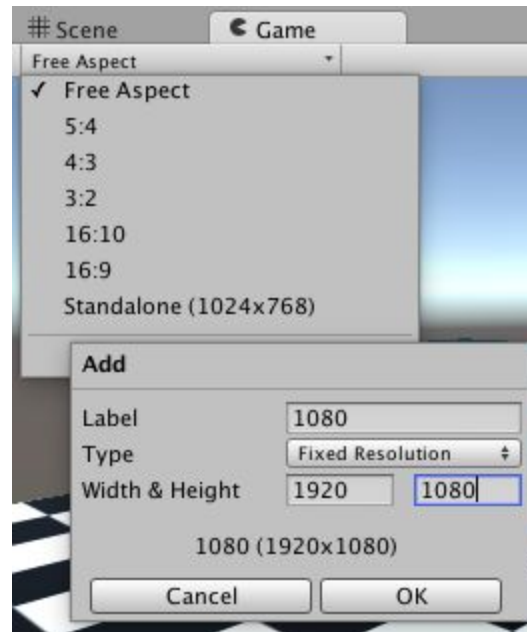

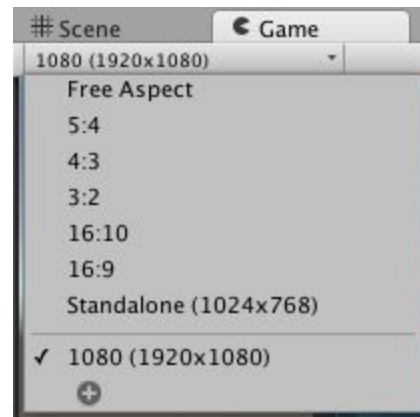2.   Click the ⊕ button to open the 'Add' dialogue.

3.   Fill in the width and height of your monitor and give the profile a name.

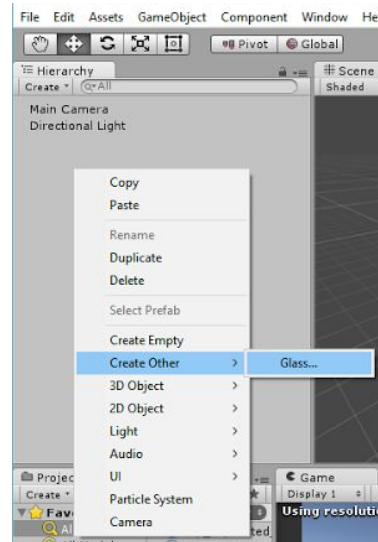4.   Done! Your new profile should be automatically selected.

4.   Usage

The following sections will show you how to use Fantastic Glass, focusing on creating new Glass objects and turning existing Game Objects into Glass Objects.

4.1   Creating new Glass objects

1. Right-click on a blank area in the Hierarchy window and choose Create Other > Glass…

OR choose the menu option GameObject > Create Other > Glass…
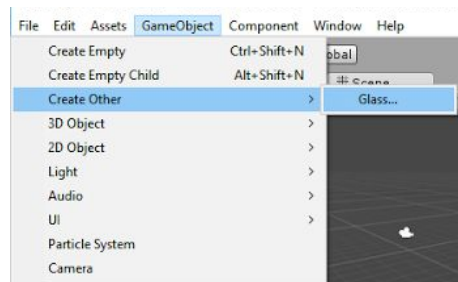
The Glass Maker window will now appear, showing the Create New GameObject section.
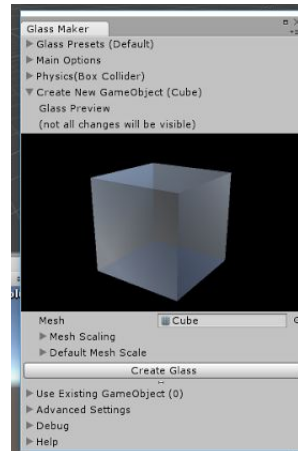
2.   Set your options in the Glass Maker. These can be found under the togglable sections such as Main Options, Physics, and Advanced Settings (details in Section 5):
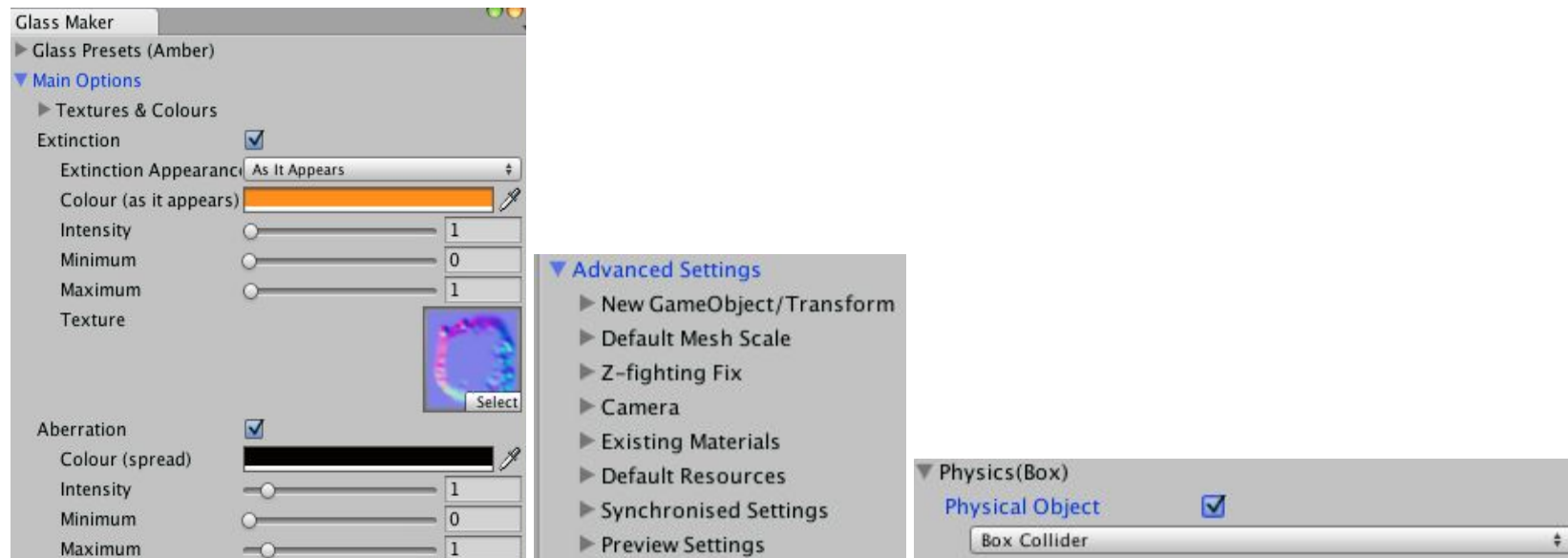
3.   Click the Create Glass button in the Create New Object.

4.   Done! You can now close this window if your are finished, press Create Glass again to create another Glass object with the same settings, or change the settings and create a different new Glass object.

4.2   Turning existing objects into Glass

1. Select all of the objects you wish to turn into the same type of Glass.
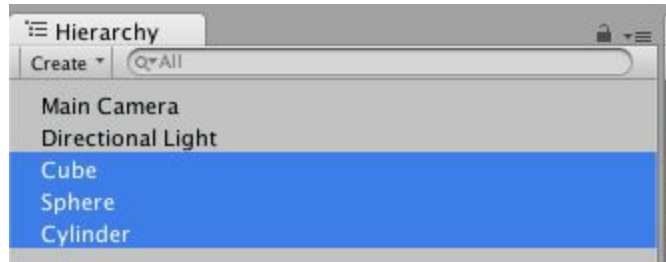
2.   Right-click on one of the selected objects (you can skip to here if you only wish to use one object) and choose Create Other > Glass…
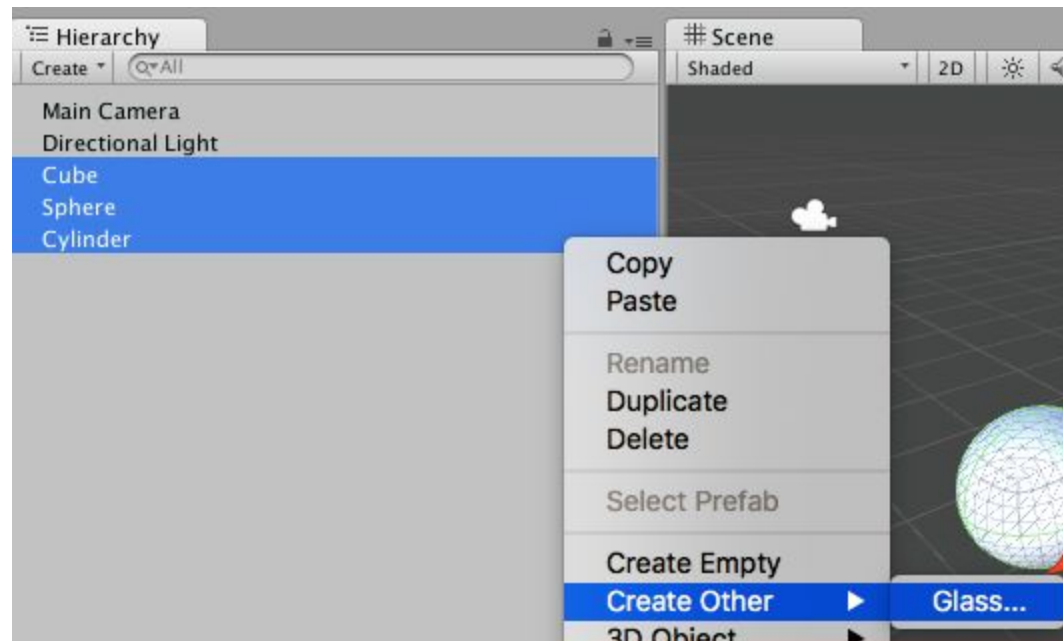
OR choose the menu option GameObject > Create Other > Glass… while they are selected.

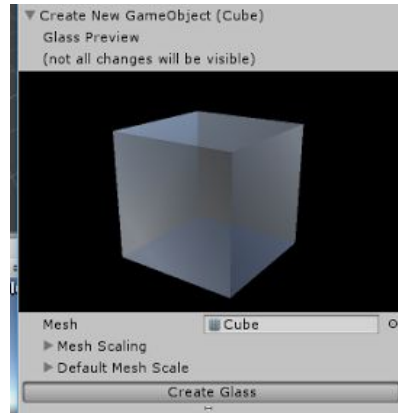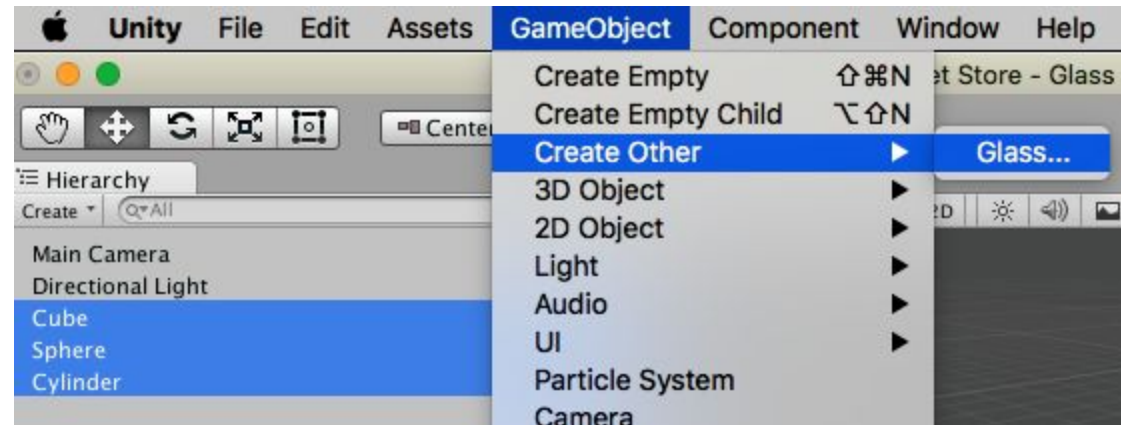3.   Set your options in the Glass Maker. These can be found under the togglable sections such as Main Options, Physics, and Advanced Settings (details in Section 5):
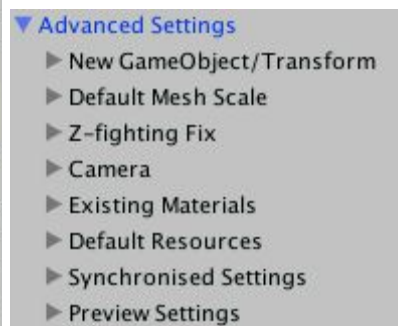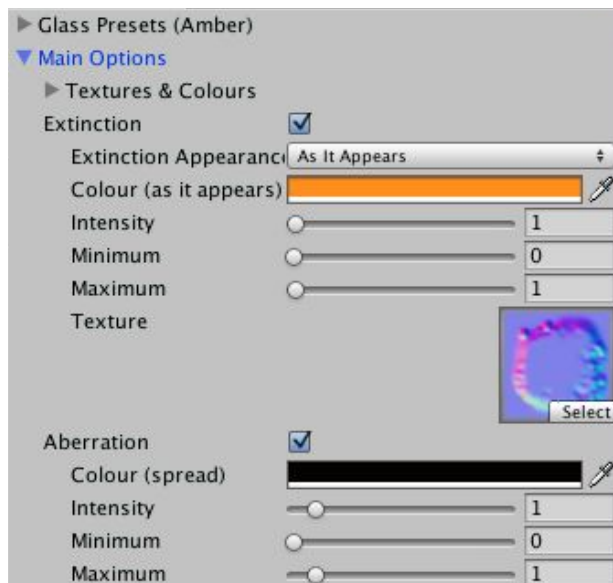
4.	Click the 'Turn to Glass' button in the Use Existing Object section.
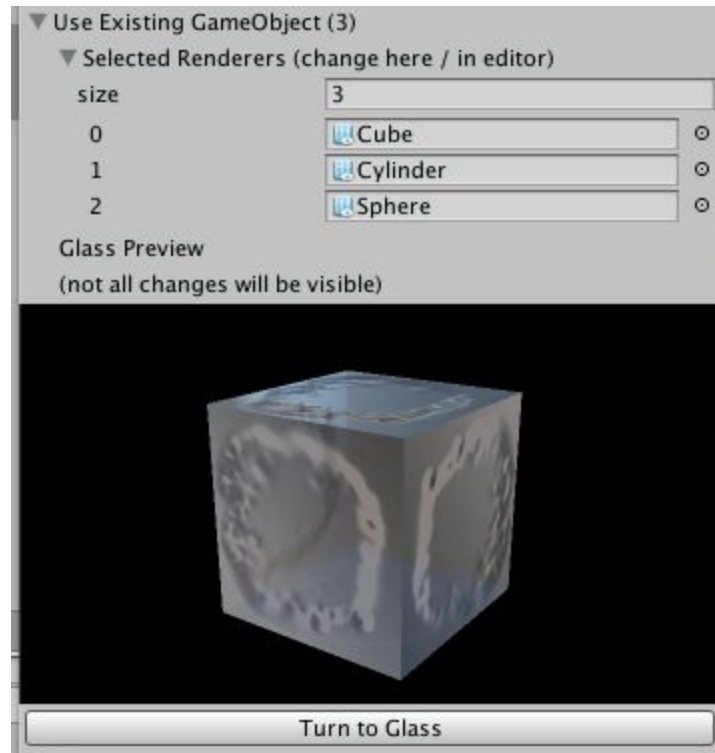
5.	Done! Your objects are set up as Glass objects and you can now close the Glass Maker window.

5.   Glass Settings

This section will define the majority of the settings available in each Glass object that contribute to its appearance.

5.1   Distortion
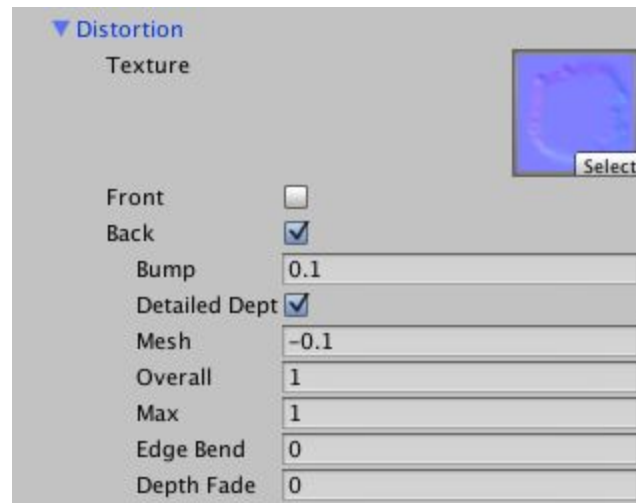
As you can see, the front and back faces can have different settings, including being disabled completely.

5.1.1 Bump

This value defines the intensity of distortion applied based on the colour of the pixel in the texture shared with the Bump effect.

5.1.2 Mesh

This value defines the intensity of distortion applied based on the normal of the mesh face.
How the normal values are calculated and then interpreted is dependant on the Normal Technique (accessible by GlassManager > Depth > Depth & Normal Techniques).

5.1.3 Overall

This value defines the overall magnitude of the effect e.g. setting it to 0 will result in no distortion, regardless of the Mesh Normal and Bump values.

5.1.4 Max

This value defines the maximum amount of distortion that will be applied to any pixel.

5.1.4 Edge Bend

This value defines the amount the distortion in a way that causes it to wrap around edges.

5.1.4 Depth Fade

This value defines the amount the distortion is faded out in lower depth e.g. having objects near the surface of water (made of Glass) be less distorted.

5.2   Extinction

Extinction defines the rate at which color is absorbed by the object.
For convenience, the option to set this based on the appearance of the effect is also supplied and set by default.
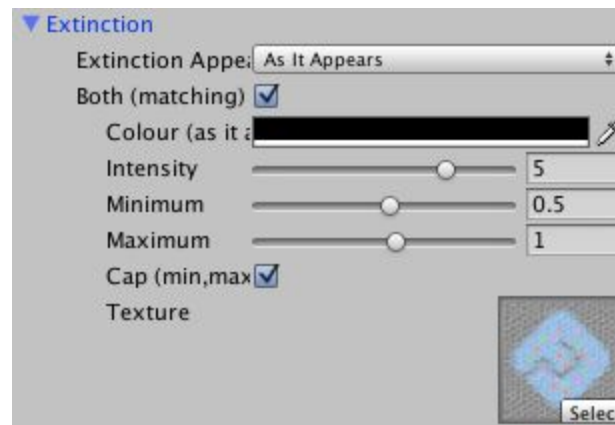
Here you can see Both (matching) selected and therefore only one set of options is displayed.
When deselected, both Front and Back sections are available.
The last section edited will be used to define the shared settings when switching.

5.2.2 Colour & Extinction Appearance

This colour option is either the Extinction that will occur or is the inverse colour which will appear as a result of the Extinction, depending on the Extinction Appearance option.

The Extinction intensity is derived from the Depth value of each pixel; depth values are calculated and then interpreted dependant on the Depth Technique (accessible by Glass Manager>Depth>Depth & Normal Techniques).

5.2.2 Minimum

This value is used to interpolate the range of Extinction values and defines the '0' value.

When Cap Values is applied, this value also defines the Minimum amount of extinction that will be applied, regardless of material depth.

5.2.3 Maximum

This value is used to interpolate the range of extinction values and defines the '1' value.

When Cap Values is applied, this value also defines the Maximum amount of extinction that will be applied, regardless of material depth.

5.2.4 Texture

This allows you to set the color of extinction from a texture. It will be multiplied by the Intensity color. For convenience, when a texture is set after it being blank, the Intensity color is set to white (appearance) so as to result in an extinction that looks like the texture.

5.3   Aberration

Aberration defines the rate at which colours will spread out within the object.
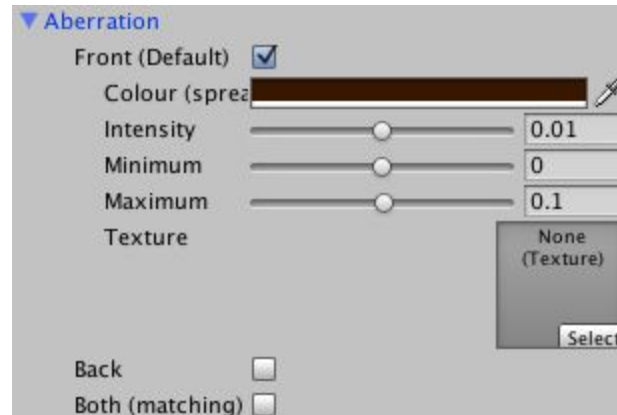
Here you can see only the Front section is displayed as Back and Both are disabled.

5.2.2 Colour

This colour option defines the rate at which each colour spreads. The alpha channel also affects the overall rate.

5.2.2 Minimum

This value defines the minimum amount of Aberration that will be applied, regardless of material depth.

5.2.3 Maximum

This value defines the maximum amount of Aberration that will be applied to any pixel.

5.2.4 Texture

This allows you to set the color of Aberration from a texture. It is multiplied by the Colour option.

5.3   Surface

As you can see the surface values are defined per-face.

5.3.1 Glossiness

This functions the same as the Standard surface shader's Glossiness texture input and can by multiplied by the Amount value.

5.3.1 Metallic

This functions the same as the Standard surface shader's Metallic texture input and can by multiplied by the Amount value.
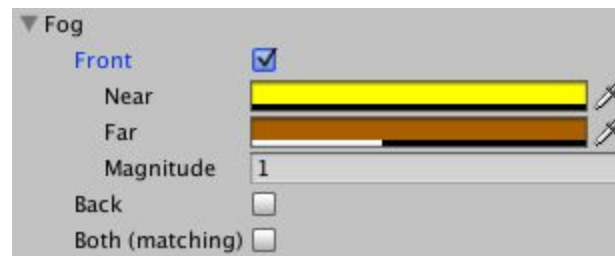
5.3.1 Glow

This functions similar to the the Standard surface shader's Emission texture input, however, it uses the calculated Glass's Albedo and Glossiness values as its base.

5.4   Fog

Fog defines colourisation at the nearest and furthest depth within the object. The depth used is magnified by the Magnitude value.

5.5   Physics

When enabled, a RigidBody and the chosen Collider will be attached to the GameObject.

When a non-convex Mesh Collider is chosen, the RigidBody will be set to Kinematic as non-kinematic non-convex meshes are not allowed in Unity.

5.6   Textures & Colours

5.6.1 Albedo Texture

This texture will be multiplied by the Albedo Colour to give the material's Diffuse colour. It's visibility is affected by the Albedo Texture's alpha channel, the Albedo Colour's alpha value and the Opacity value.

5.6.2 Textures Section

'Textures' - which is outside of the Settings section in its own section - allows you to see and assign textures to all settings that accept them.
It is also useful for making sure your textures match in resolution.
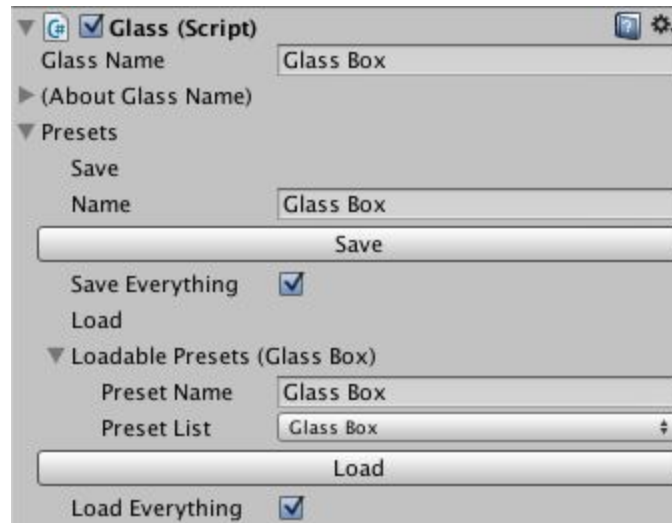
5.7 Bump

This section defines the bump intensity caused by the shared distortion texture.

6.   Editing Glass Objects

6.1   Presets

You can both save to and load from Presets.


This can be done in Play and Editor mode.

When saving or loading from Presets during Play, you will not be given any confirmation or warning messages, however, information and guidance will be printed to the Console.
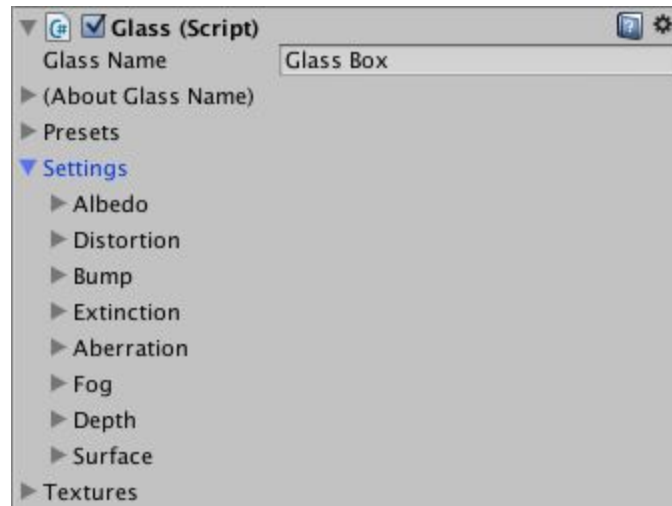
Presets are a good way of making changes during Play where you can see the results in the Game view, saving them to a Preset, and then loading those Preset values to your Glass object if you are happy. This means you can make changes to multiple objects during Play without restarting.
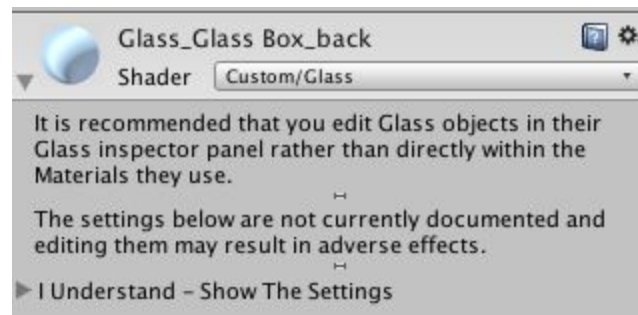
6.2   Editing Materials
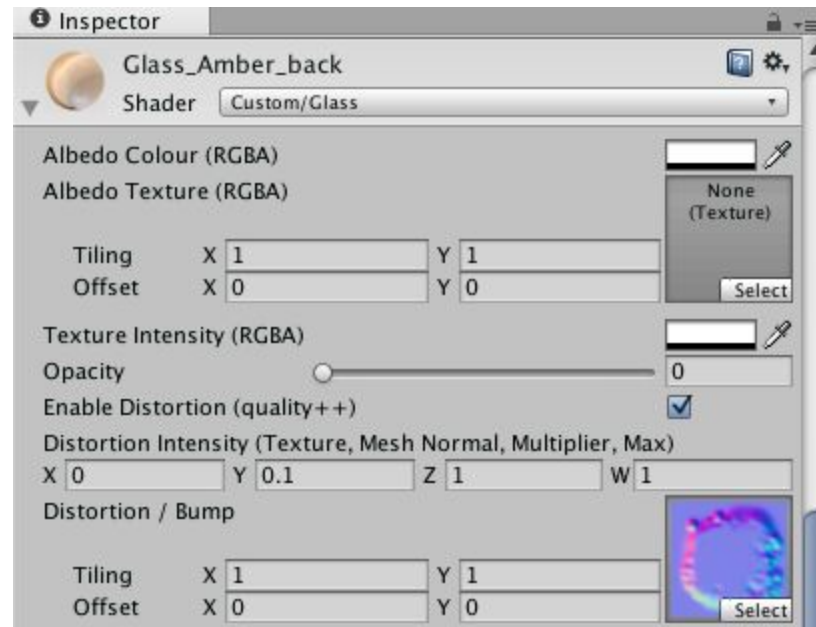
[fig.6.1] - do not edit via this interface

[fig.6.2] - make changes to glass via this section of the Inspector GUI

It is not recommended that you edit the materials directly *[fig.6.1]*. Instead, it is recommended that any changes be made in the Glass's own Editor GUI *[fig.6.2]*.

Currently, the materials' Inspector interface is hidden behind a warning that reveals the default GUI generated by Unity. Changes here don't feed back into the Glass class. As such, any changes you make to the materials will not be retained in the Glass class. Additionally when you change or view the settings via the Glass Inspector GUI they will overwrite any changes made elsewhere.

6.3   Settings

The options available in the Settings section are the same as those provided by the Glass Maker tool and laid out in a similar fashion under togglable descriptive headings.

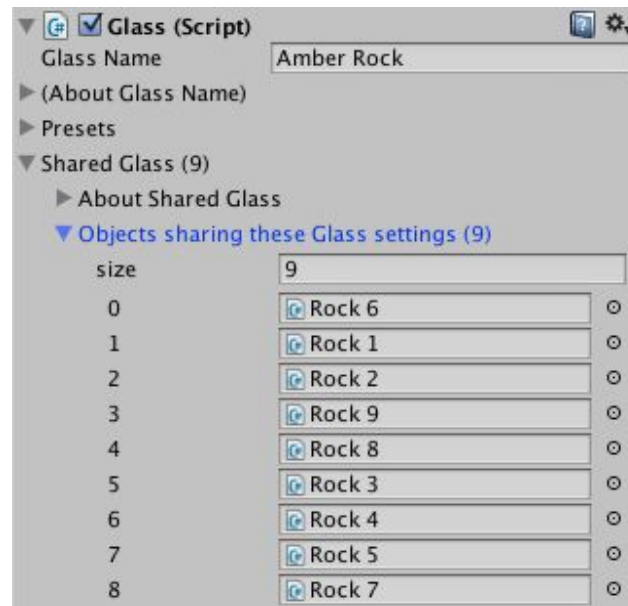### 6.4   Synchronising Glass

To assist in editing multiple Glass objects simultaneously, Glass objects that match will synchronise any changes made. Synchronisation can be disabled in the Glass Manager - an object that is created when Glass objects exist in a scene.
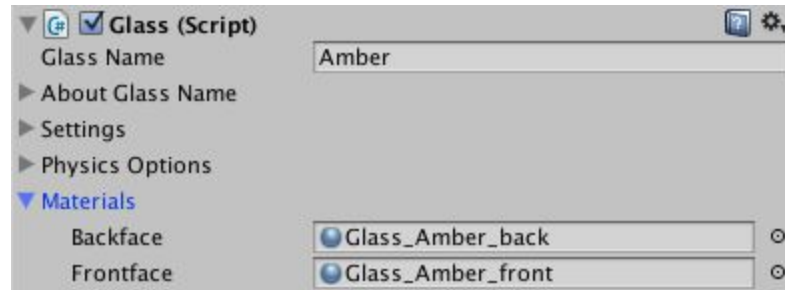
6.4.   1 Glass Matching

By default, 'matching' Glass objects are those whose Glass Name *[fig.6.3]* is the same.

You can change the matching method in the Glass Manager to be those that have matching materials.

6.5   Changing Materials

[fig.6.4]

If you wish to change the materials attached to a Glass object, it is recommended that you do so via the Materials section *[fig.6.4]* as this will synchronise changes with matching Glass objects.
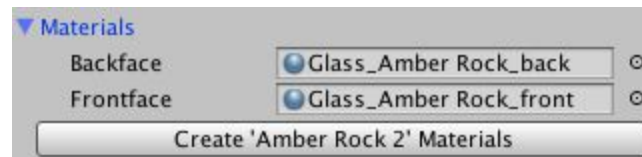
6.6   Creating Materials / New Glass in-Editor

If you want to branch off into a new Glass type from something you're working on or you wish to change the Glass assigned to an object without going to the Glass Maker:

1.   Give your Glass a new Glass Name
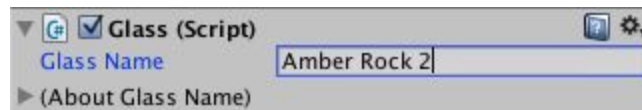
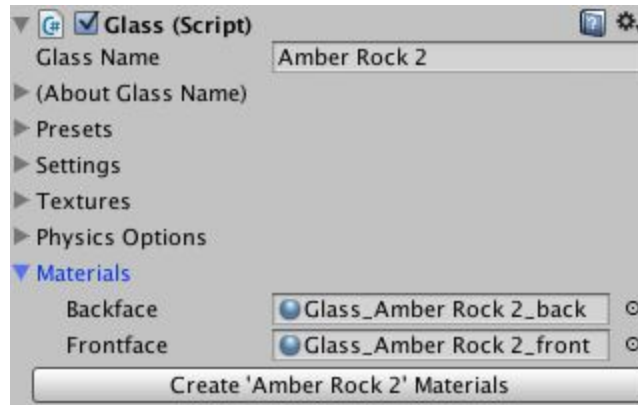2.   Open up its Materials section, then click the Create 'New Name' Materials
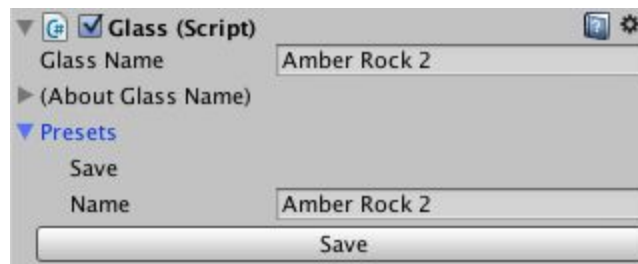
3.   You have now created a new set of materials for his Glass. They have automatically been assigned the current settings and set as the Glass object's materials.

It is also recommended that you save this new Glass object as its own Preset (the Name is automatically updated when you change the Glass Name).
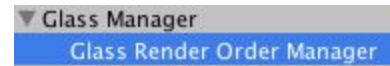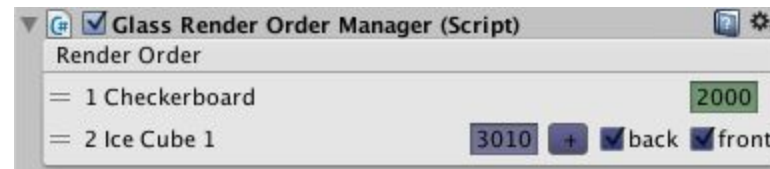
7.   Render Order Manager [Fantastic Glass 1.2]

With Fantastic Glass 1.2 we introduced the Render Order Manager (ROM) which gives you the ability to quickly and easily manage the render order of Glass and other objects in your scene.

7.1   Layout

You will find the ROM in the scene hierarchy underneath the Glass Manager.

Each Glass type in your scene is listed in the ROM in render-order, under its name, along with its Render Queue value, toggle values for its Front and Back face, and a + or - button to add or remove copies, depending on whether it is an additional rendering instance or the original.

7.2   Changing Render Order

To change the order of objects in your scene using two methods:

7.2.1 Drag

Simply dragging any entry to a new position in the list will change its order as well as adjusting the objects around it.

7.2.2 Manual Entry

You can manually edit the Render Queue value for any object in the list. Once an edit is accepted the list will be automatically reordered.

7.3   Faces

The front and back faces of all Glass objects and copies can be toggled on or off. This can be useful if you wish to render the back face of an object behind another Glass object before rendering the front face, so as to only have the front face affect the inner object and the back face and inner object to not interact.

A good example of this is in an included scene showing a pint glass with liquid and glass objects within it. In this scene, the pint glass front and back are rendered separately. This scene is demonstrated in more detail in the section on **Detailed Depth** (**8.2**).

7.4 Copies

You can render a Glass object (or either of its faces) any number of times. To add an additional render stage for a Glass object, click the + button on its entry. To remove a render stage, click the - button on the copy's entry.

When copies are used, the instance number is visible on every entry for the original and its copies.
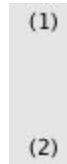

A good example of this is in an included scene showing a pint glass with liquid and glass objects within it. In this scene, the pint glass front and back are rendered separately. This scene is demonstrated in more detail in the section on **Detailed Depth** (**8.2**).

8.   Depth Complexity & Techniques [Fantastic Glass 1.2]

Depth is a key component in providing many of the rendering effects achieved with Fantastic Glass. It is used primarily as a means of estimating the thickness of the mesh at any pixel and using this value to determine the intensity of effects such as colour extinction, fog, aberration, distortion etc.
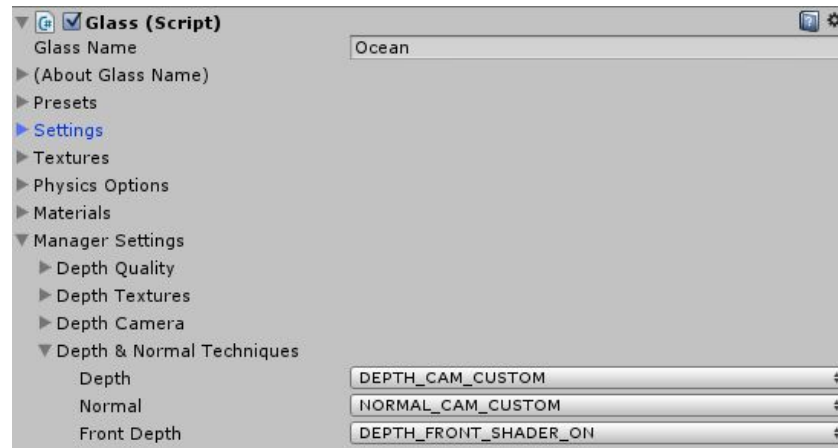
There are several techniques available in Fantastic Glass for determining the depth (Custom, Unity, Shader) and two of them (Custom, Unity) require the rendering of a depth texture (it is also used in most cases to store & retrieve normal values).

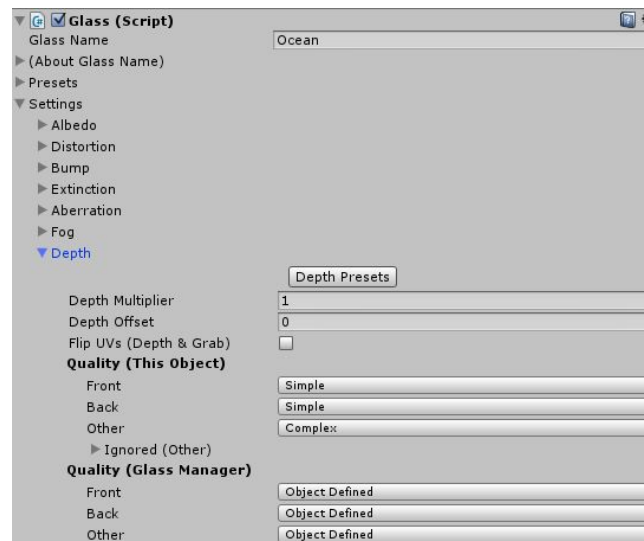Depth Techniques are available from the Glass Manager inspector:
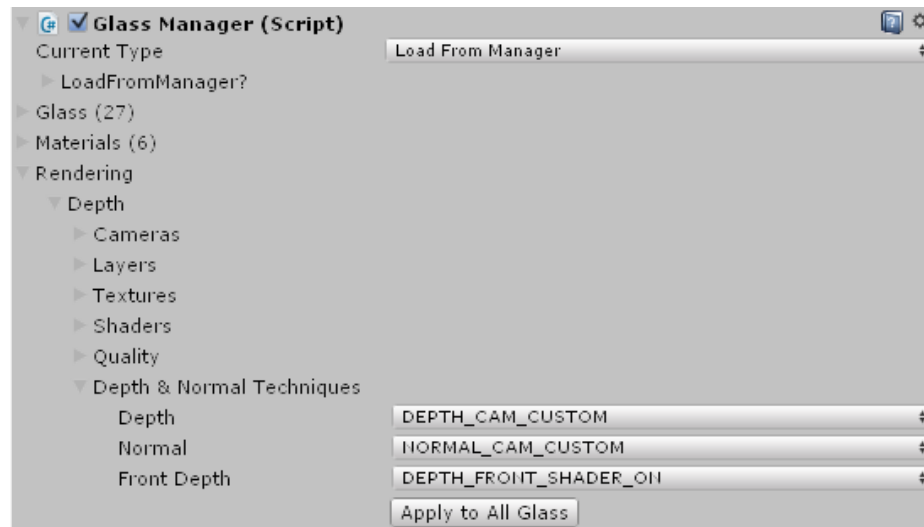
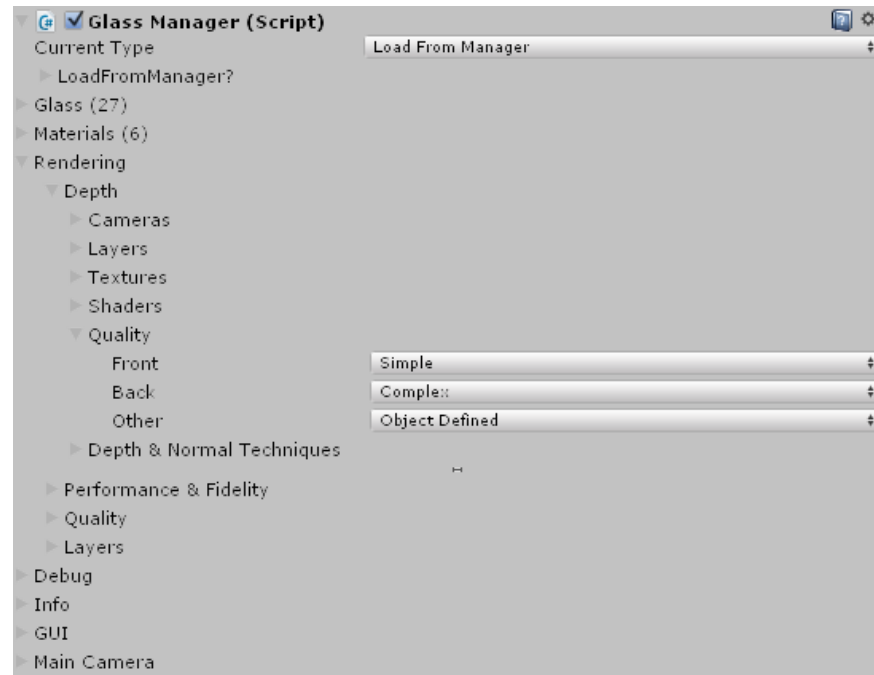and any Glass object inspector:

Due to different requirements in visual results, Fantastic Glass provides the option of using one of two types of depth textures.

Simple and Complex depth can be defined per-Glass object:

or overridden by the Glass Manager (FG automatically uses whichever was last modified):

8.1   Simple Depth

The simple depth texture is rendered using the whole scene without any other known details.
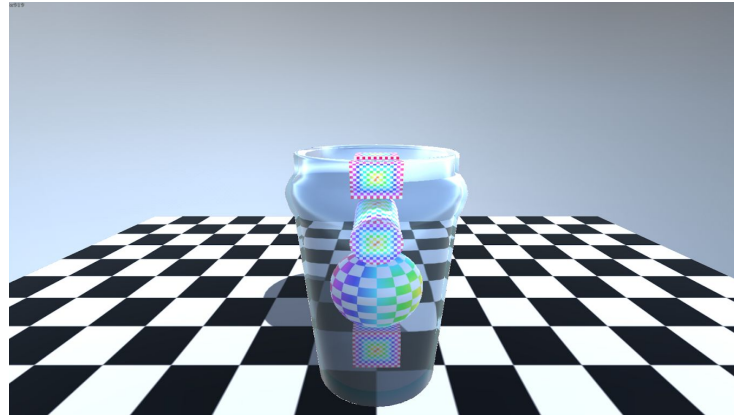
It is recommended where performance is important and is used by default where there is only one Glass type in the scene.

8.1.1 Simple Front

For simple front depth, one depth texture is created showing only the front-most depth of the front-facing pixels of ALL Glass objects in the scene.

8.1.2 Simple Back

For simple back depth, one depth texture is created showing only the front-most depth of the back-facing pixels of ALL Glass objects in the scene.
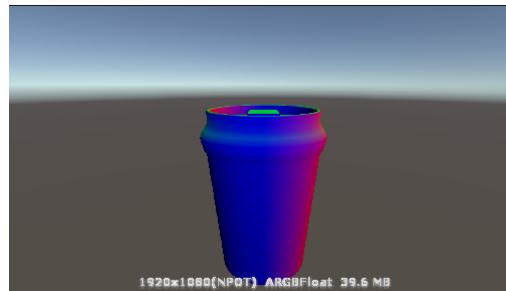
8.1.2 Simple Other

For simple other depth texture, one depth texture is created showing only the front-most depth of the front-facing pixels of ALL NON-GLass objects in the scene.

8.2   Complex Depth

The complex depth texture is rendered depending on the type of depth (front, depth, other), the Glass object that will use the depth, and any Glass objects it wishes to ignore the depth of.

It is recommended where a more exact understanding of the depth is required for a Glass object.

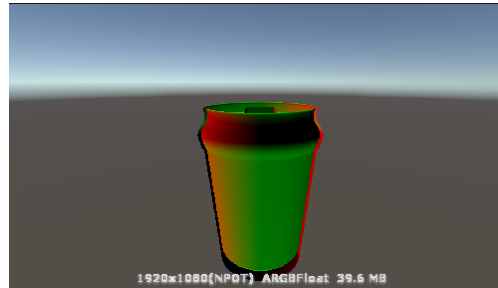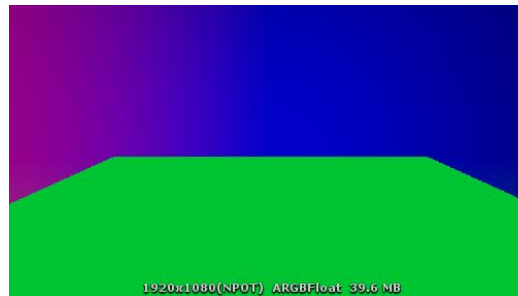### 8.2.1 Complex Front
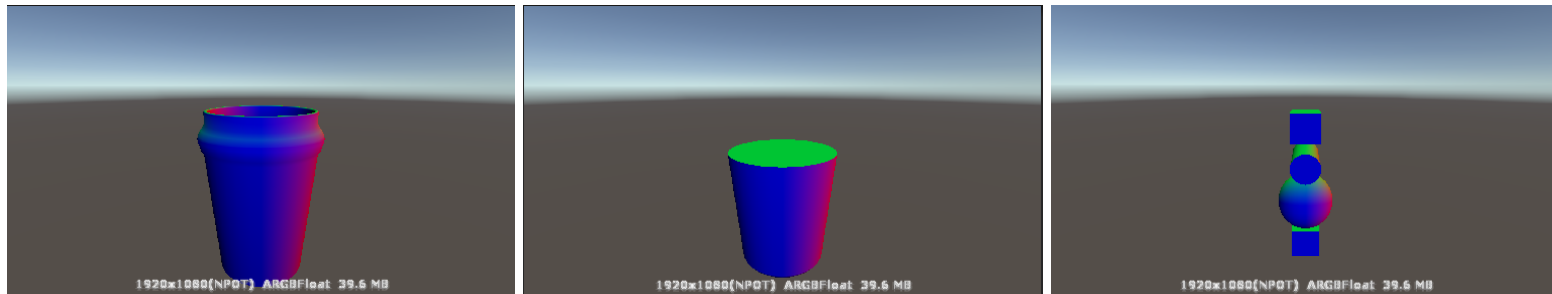
For complex front depth, the depth texture is created from the front-most depth of the front-facing pixels of the Glass object.
If you wish to have all Glass objects achieve this, it is recommended to set the front depth technique to use the Front Shader option, as this will give the right depth for all Glass pixels in the scene by calculating them in the shader - it is also therefore a faster technique.
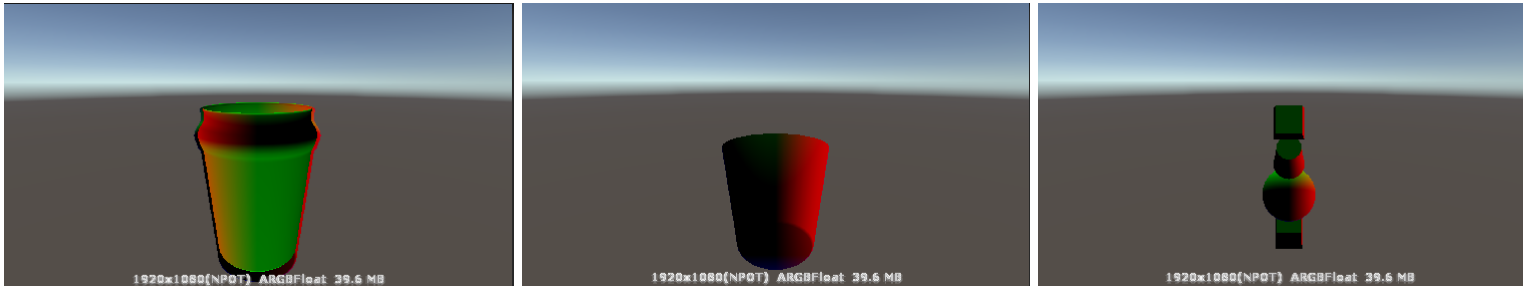
8.2.2 Complex Back

For complex back depth, the depth texture is created from the front-most depth of the back-facing pixels of the Glass object.

8.2.2 Complex Other
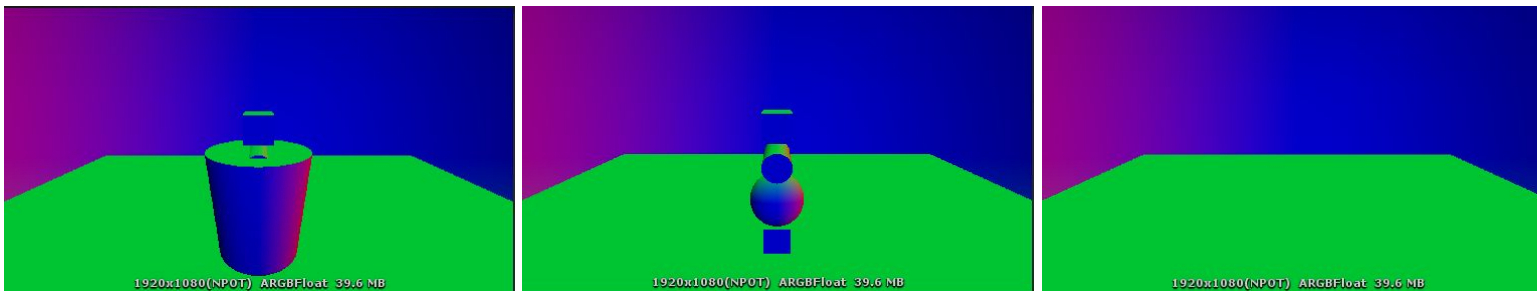
For complex other depth, the depth texture is created using all non-Glass objects as well as all other Glass objects in the scene. There is also the option to add Glass objects to an Ignored Depth list (appears under the Complex option when chosen).

A demonstration of the use of the Ignored Depth list is visible in the example scene showing a liquid-filled pint glass containing frosted ice shapes. In this scene, the liquid ignores the pint glass's depth and deals only with that of the ice shapes it contains.

9. Mesh Animator [Fantastic Glass 1.2.3]

Due to regular requests, I am including the Mesh Animator tool I made to render baked liquid simulations in real time with Fantastic Glass.

All required assets and an example scene are included in a separate **Mesh Animator** folder. This will eventually form a different asset but will remain a part of Fantastic Glass as both are updated.

Although this is an early version of what I would like the Mesh Animator to do, it is essentially fully functional. However, there are methods I have planned to make it easier to use. For now, this is a rough recommended guide to creating a scene similar to the one included:

1. Create your Blender fluid simulation
2. Bake it
3. Export as Waveform (.obj)
   1. Tick 'Animation'
   2. Un-tick 'Write Materials' as it will export another material for every frame
   3. Make sure you export each animation into its own folder (you'll see why in stage 6)
4. Attach a MeshRenderer and the MeshAnimator script to a GameObject
5. In the MeshAnimator inspector, select 'Load Folder' and choose any one of the exported models
6. MeshAnimator will then load all of the models in that folder and sort them into a meaningful order

Additionally, due to the potential size of a project made in this way, I would recommend reducing the complexity of your mesh, once baked, with Blender's Decimate modifier.

I also plan to create an accompanying video tutorial which will be uploaded to our YouTube channel in the near future.

10. Help and Support

10.1 In-Editor

If you come across an issue or error while using Fantastic Glass, a solution may be available from within the Unity Editor. Such references can be found in the Help section of Glass Maker as well as under About and Info sections within the Glass and Glass Maker inspector windows.

10.2 Online

7.2.1   Guides , References, Links

User Guides and references are available online for each version of a Unity Asset developed by Fantastic Development. You can find them here: http://www.fantasticdevelopment.co.uk/AssetStoreHelp

10.2.2   Support

We maintain a support website at http://www.fantasticdevelopment.co.uk/support where you can submit bugs, questions, and suggestions.

10.2.3   Tutorials, Demos

As well as the User Guide provided for each version, you can watch Tutorials for this and other Assets on the Fantastic Development YouTube page. Each product's set of videos will have their own playlist. You will also get a chance to see demos of current Assets as well as those still under development.