Note
The creation and use of lights varies greatly between the regular Blender renderer and the Cycles renderer. This section refers only to the regular renderer.

Lights
There are five types of lights in Blender: point, sun, spot, hemi, and area.

1. Point lights are the simplest. These cast shadows and have location, color, and energy. Shadow casting can be disabled, however, and their location, color, and energy can be animated using the round cornered data boxes (right click to set or remove a keyframe). If you use soft shadows then samples must be set to more than 1 - preferably 8 and above - and if you want to reduce the contrast of shadows adjust the shadow color from black to gray.

   To adjust the color and value of lights across a scene copy them with Duplicate Linked or use Alt-D. The new lights will be instances of the original. Point light shadows can be previewed only in Rendered mode.

2. Sun lights have direction, shadows, energy, and color, but location is irrelevant. They cast parallel rays across the scene, but only in front of the sun. Items behind the sun icon will have no shadows. So the sun’s position in a scene matters. The shadows from a sun light can be previewed in Texture mode and higher.

3. Spot lights have direction, shadows, energy, color, a cone angle, and a hotspot to falloff ratio (called Blend). This last can be adjusted in the Spot Shape panel. Spot lights can also include a Halo (often called volumetric) effect that simulates dusty or smoky air. Spot lights shadows can be created in Buffer Shadow mode, which is faster but less accurate than Raytrace.

   The shadows from a spot light can be previewed in Texture mode and higher.

4. Hemi lights are the simplest; they are the only type that does not cast a shadow. Hemis are often used to provide general directional illumination, often from underneath the scene to simulate bounced lighting. Illumination on faces is greater or less depending on how they face the hemi light – so this is not the same as ambient occlusion or environmental lighting. They are the only light type that doesn’t have a real life equivalent. Like Ambient Occlusion (see next section) hemi lights tend to flatten out a scene so use them sparingly.

5. Area lights are an array of point lights (Sampling size is the number of lights used). They are identical to a point light if the X and Y samples are both 1.
**Ambient occlusion**

Ambient is another word for all-surrounding and occlusion means hiding or blocking. So ambient occlusion (often referred to just as AO) just means what is being shadowed from the surroundings.

AO lights a scene without lights, and is a useful way to preview a scene as well as add a better 3D appearance to a model. It is based on how much of a surrounding hemisphere each point on a surface can “see”. The number of these points is defined by the pixel resolution of the image being rendered. A point on top of the default cube can see almost all of the surrounding hemisphere except the very base; a point on a side will see less, and a point close to the ground will see even less. If the cube is floating slightly above a ground plane a point underneath it will only see a thin strip of the hemisphere. A lighting value is assigned to each point based on the occlusion of the surroundings at its position and gives a surprisingly convincing result. AO can be used in combination with true lights to give the effect of light filling a space without the intensive calculations true ambient lighting needs.

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**Three Point Lighting**

This is a frame from the 1942 movie Casablanca. It shows the classic Hollywood three point lighting system in action on the actor Conrad Veidt.

There are three main sources of light in this image. A key light in front and to the left, which is lighting the main planes of the subject. You can see this as the large square highlight in Veidt’s eyes. There are also two fill lights to the front right, again visible as reflections in his eyes, which prevent the right side of his face (in the image) being too much in shadow. And finally, shown around his hair and on his collar, there is a back or rim light behind him which produces highlights that pop his profile out from the background. Here is a close up of the reflections in his eyes. Note the large square key light, the two small fills, and the highlight on his ear from the back light.

**Soft shadows**

These can be thought of as blurred shadows. Several shadows are calculated (the number and sepa-
ration of the light sources for the calculation are defined by the Samples and Soft Size parameters) and then combined. The more samples are taken the better the quality of the shadow.

**Transparent shadows**

By default Blender renders the shadows from a transparent object as if that object is opaque. All that you need to do to correct this is select the object(s) on which the shadow is being cast (not the light or the shadow casting object), go to the Shadows panel in the Material tab, and check Receive Transparent. There is a seven minute video on transparent shadows at [http://youtu.be/MwSrreKlzlg](http://youtu.be/MwSrreKlzlg).

**Rendering shadows only**

It’s often useful to be able to render just the shadows falling on an object without the object itself, for example when placing a rendered object in an image. This is done by going to the Shadows tab of the material for that object (again, not the light or the item casting the shadow), opening it, and checking the Shadows Only box. Make sure that Alpha is set to Transparent in the Shading panel under the Render tab in Properties otherwise the shadow will be rendered against the sky color.

Go to [http://users.soe.ucsc.edu/~yonge/blend-files/](http://users.soe.ucsc.edu/~yonge/blend-files/) and download the Blender file FigureWith-Background.
Bring in the right fly-in with N and go down to the Background Images panel. You’ll see there is an image called MalagaStreetScene included which is defined to be only visible in camera view.
Camera View and make the Opacity of the background image 1.000. There are accurate ways of matching the perspective of the rendering to the background, but for now we’re just to eyeball it. Enable Lock Camera to View in the right fly-in under View.

Then adjust the view so that it looks right. You will need to make the camera and target visible in the outliner and move each. Alternatively you will need to delete the camera’s target if you have one and use
Lock Camera to View in the View panel to move it interactively.

Now change the point light to be a Sun, reduce the ambient occlusion to around 0.200, change the point light to a Sun, and adjust the angle of the lighting to match that in the photo. Select the ground plane and under the material tab in Properties go down to the Shadow panel and open it by clicking on the small triangle by the name. Check the Shadows Only box and rerender. Now only the shadow appears. Save the image as an RGBA PNG file. In an image editor open the street scene and overlay the PNG file on it. The figure appears with its shadow.

**Rendering with no shadow**

In some cases you don’t want a shadow at all from an object. This is rare but happens occasionally, and it’s not obvious how to turn shadows off. With the object selected, go to its Material tab and down to the Options panel. Then uncheck Traceable. This works with all lights casting Raytraced shadows; however spotlights also have the option to cast (faster but less accurate) Buffered shadows. For this kind of spotlight the shadow will still appear if Traceable is unchecked.

**Adding sky color**

Alpha is generally best set to Transparent but sometimes it’s useful to have a sky color as the background. In this case go to the Render tab in Properties, down to the Shading panel, and set Alpha to Sky. Next go to the World tab and the World panel under that. You’ll see three check boxes for Paper, Blend, and Real sky, with three color pickers under them for Horizon, Zenith, and Ambient color. Check Paper sky and change the Horizon color to a light blue. The default cube will be rendered against a plain blue background. Next check Blend sky; the Horizon color will become active. Change that to a slightly deeper blue and rerender. The cube will be set against a sky fading from light blue at the bottom to deeper blue at the top.

Now add a plane for the cube to sit on and scale it up so it fills the camera view from side to side. The light blue is hidden by the plane. If you now turn on Real Sky, the horizon color starts from halfway up the screen and the render looks better.

**Links**


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