

3D Arts

Standard Lighting

Month 2, Lecture 6

What You Will Learn Today:

- Switching renderers
- Standard Light Types
- Basic Light Creation/Modification
- Shadow Types/Modification
- Core Light Tools
- Choosing the right light

Where you are in the big picture

- Basic program operation
- Modeling tools
- Modeling strategies
- Texturing
- Lighting
- Animation
- Rendering



What is the role of lighting in 3D graphics?

Question:

The role of CG lighting

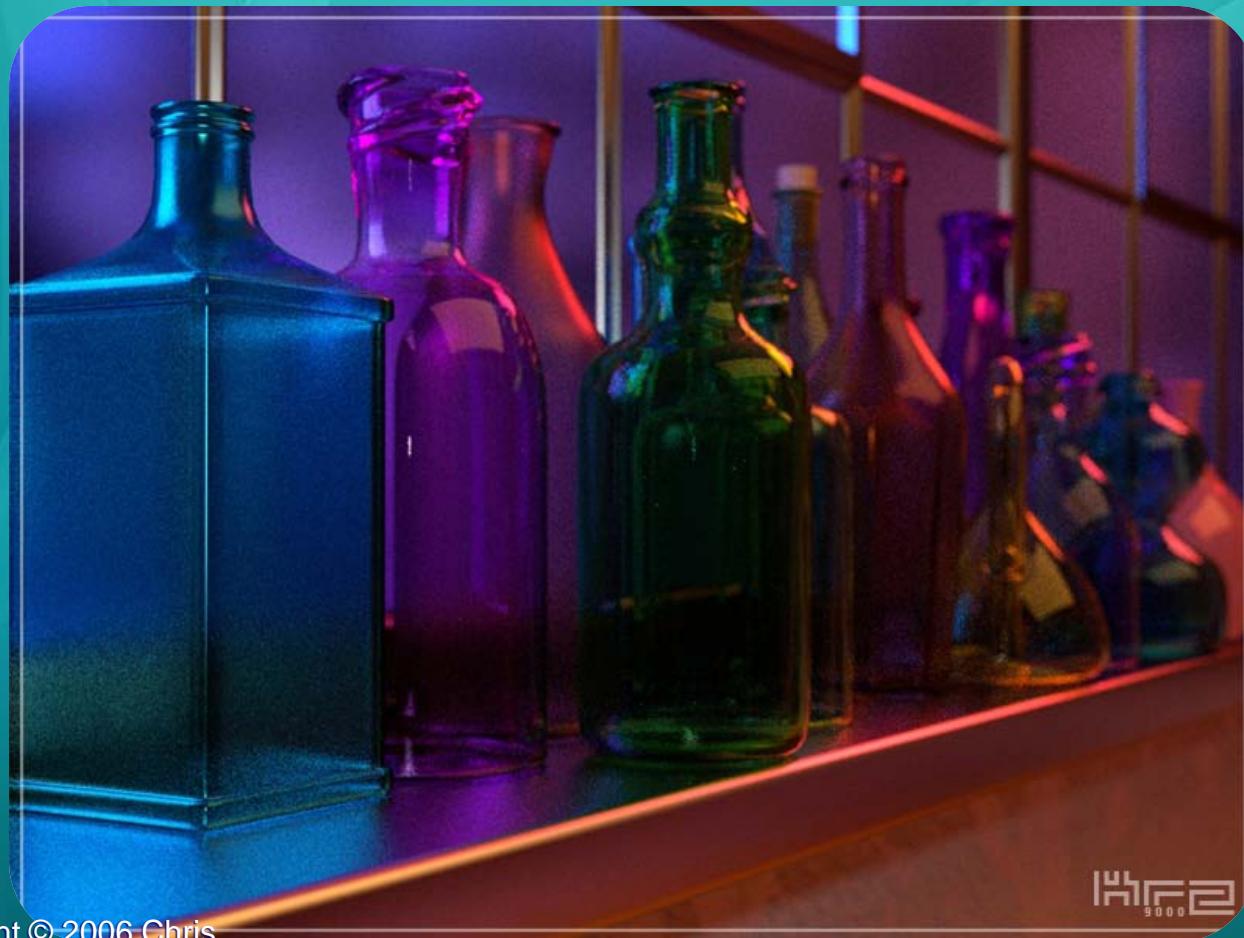
- The qualities of light in 3D
 - Intensity = Brightness
 - Color = Hue and temperature
 - Softness = As it relates to shadows and atmosphere
 - Throw = similar to shadows, gobos
 - Animation = Moving light sources
 - Motivation = Practical lights
 - Shadows = Accuracy and realism

Qualities of light: Intensity

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Qualities of light: Color - Hue and Temperature



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IHF
9000

IHF

Qualities of light: Softness



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Rau



Qualities of light: Throw

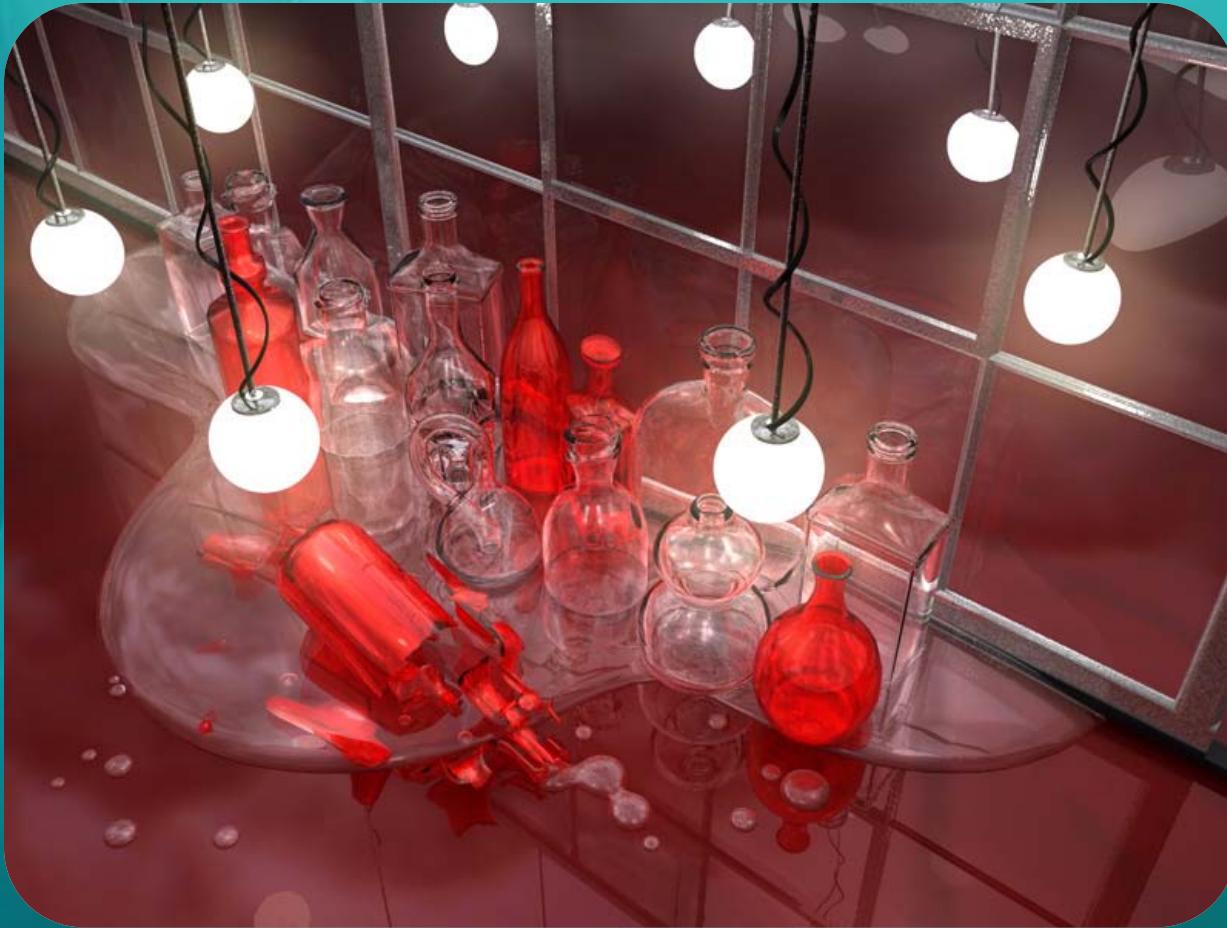


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Qualities of light: Motivation



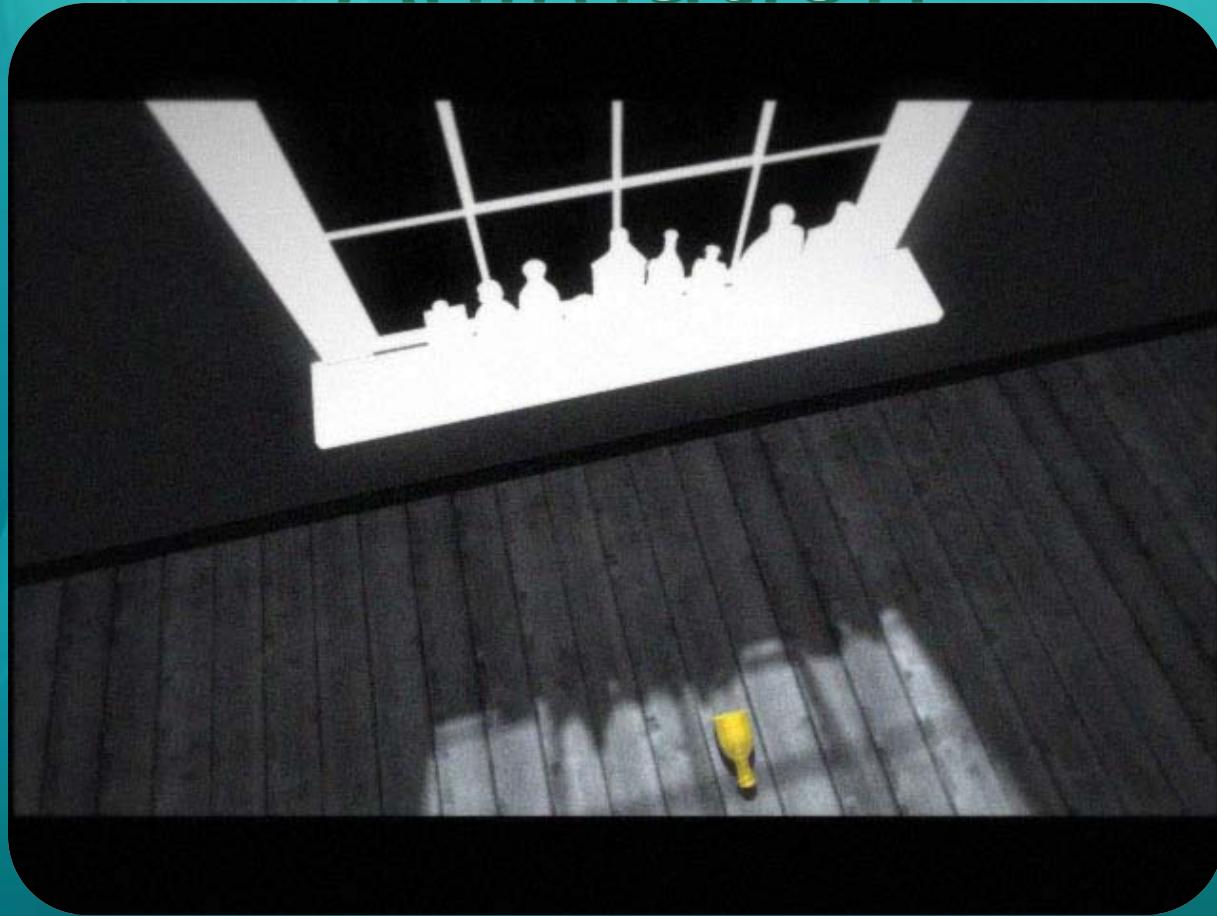
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Christophe Boujon

Qualities of light: Shadows



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Boekestein

Qualities of light: Animation



Aesthetics of CG Light



Aesthetics of CG Light

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Aesthetics of CG Light



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How do we use lighting in 3ds max?

Question:

Lighting workflow



What is a rendering engine?

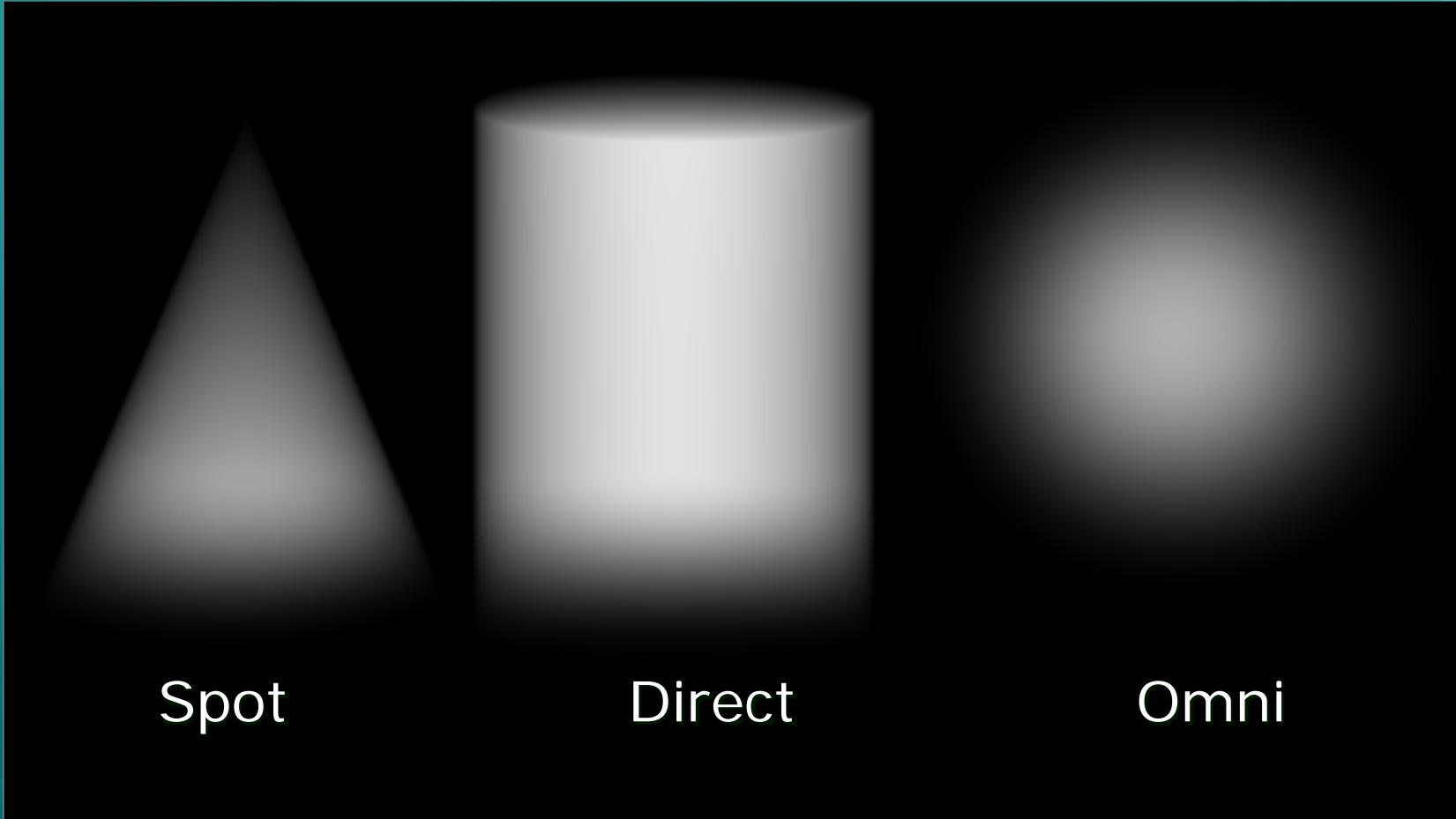
- Mathematical Algorithm
- Plugin (interchangeable)
- Different capabilities
- 3ds Max comes with 2
- Scanline and Mental Ray

What is a rendering engine?

- Scanline Renderer
 - No advanced lighting calculation
 - All lighting quality is determined by you and your ability to control the lights
 - Pros: Quick results, easy to use, all controls on the lights
 - Cons: realism harder to achieve, requires experience to master

- Mental Ray
 - Advanced lighting calculations and effects (HDR)
 - Quality is a balance of light control and rendering controls
 - MR is a DEEP "sub program"
 - Pros: Great looking lighting with some ease.
 - Cons: Time, complex, requires deeper understanding of physics of light

Standard Light Types



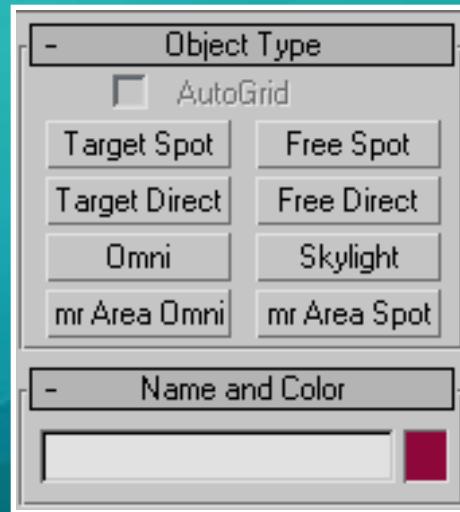
Spot

Direct

Omni

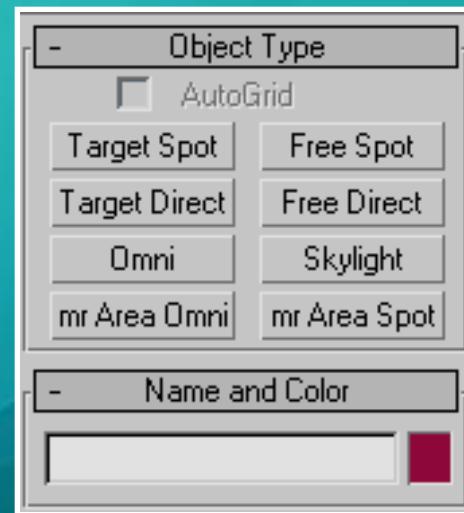
Spot Lights

- Cone Shaped
- Emitted from single point in space
- Task Lighting
 - Flashlights
 - Headlights
 - Track Lights
 - FX



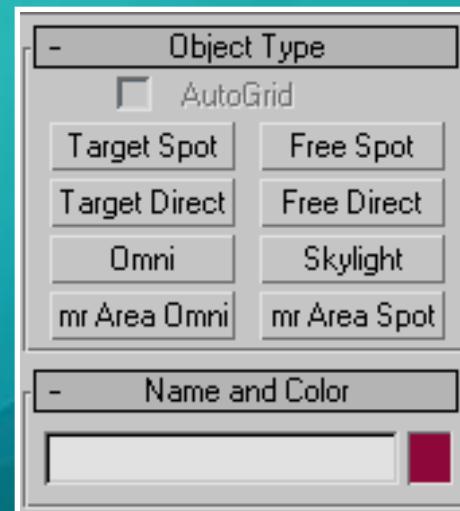
Direct Lights

- Cylindrical
- Emitted from flat surface
- Infinitely in single direction
 - Search Lights
 - The Sun
 - Most outside lighting
 - Light sabers
 - Other FX



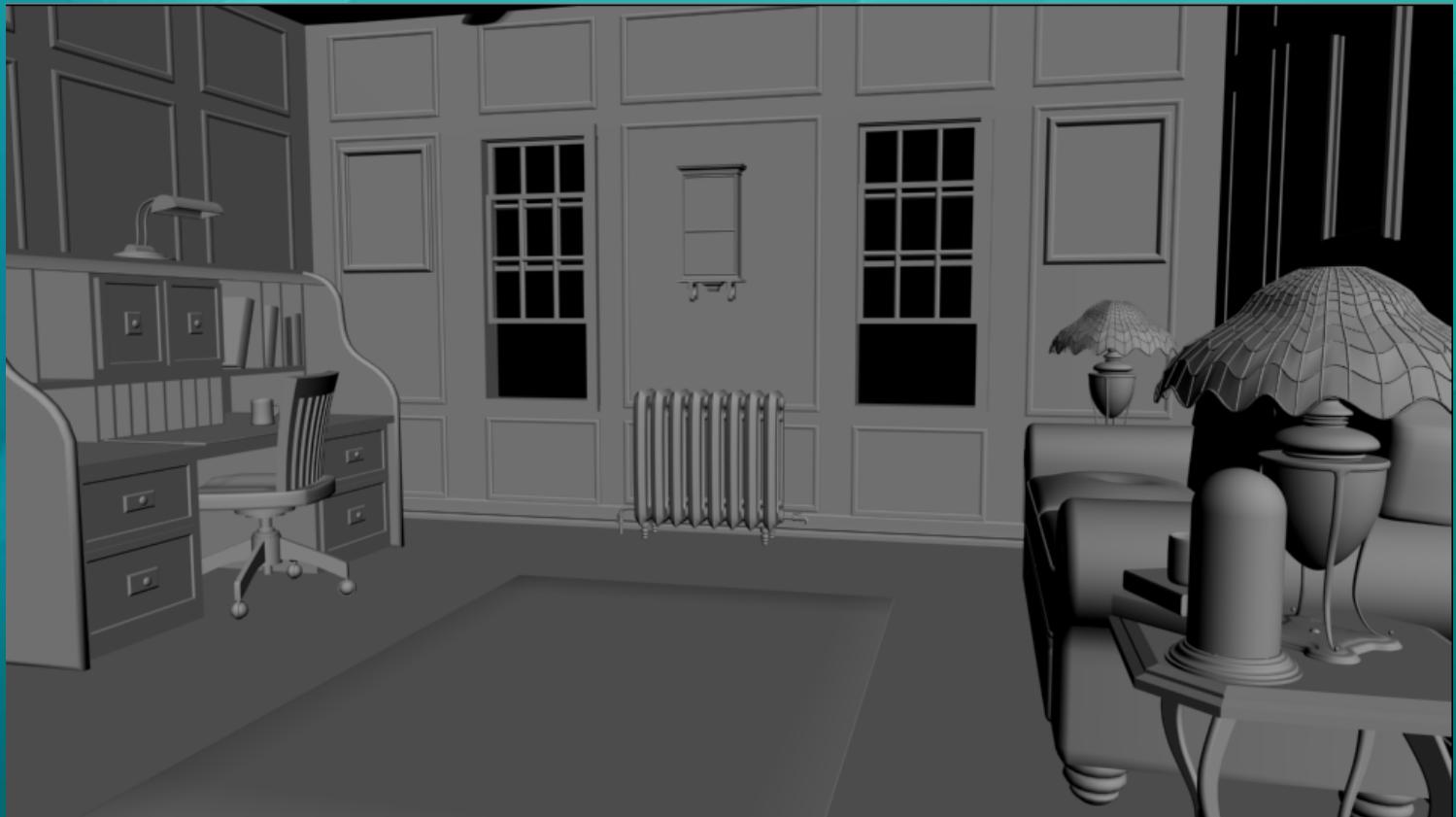
Omni Lights

- Single point in space
- Illuminates in all directions
 - Fill lights
 - Room lighting
 - General purpose



Environment Lighting

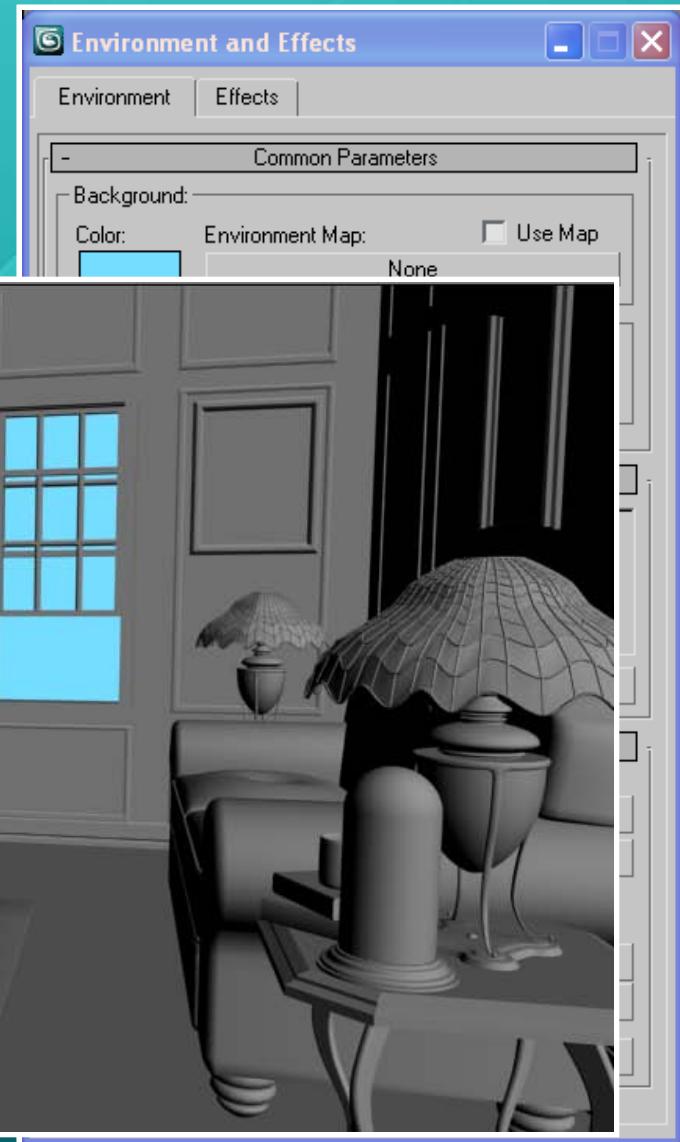
- 1 or 2 default lights
- Right-Click Viewport > Configure



Environment Dialog

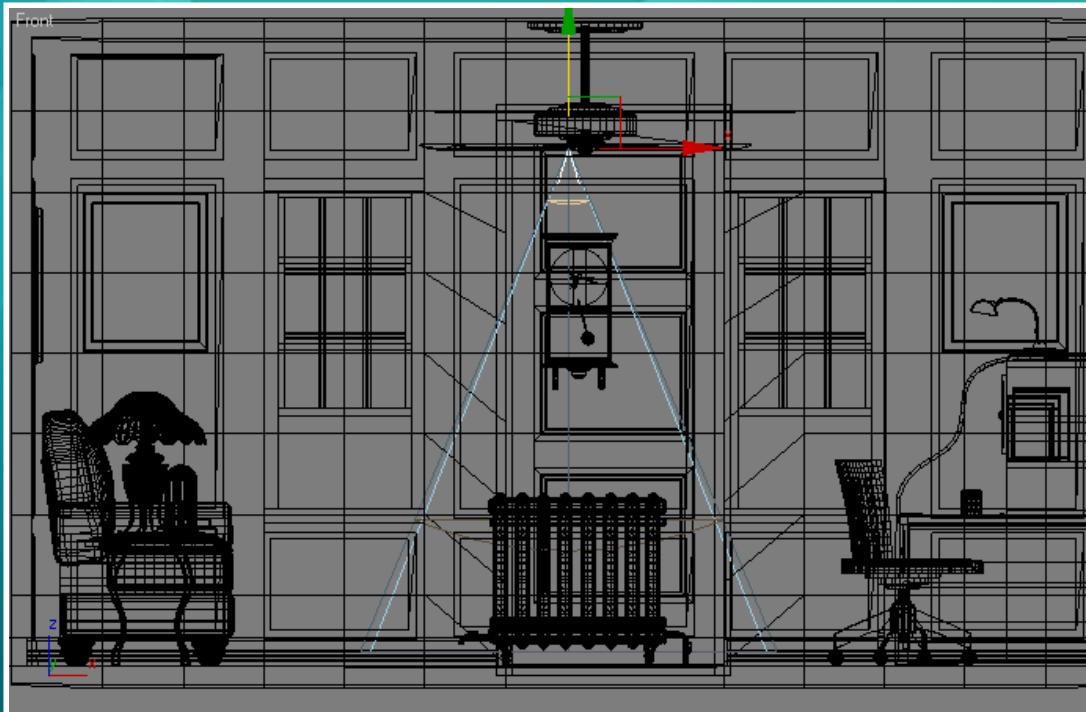
- Background Color
- Global Lighting

- Tint
- Level
- Ambient
- Don't Touch 'Em
- Exposure Control
- Atmosphere



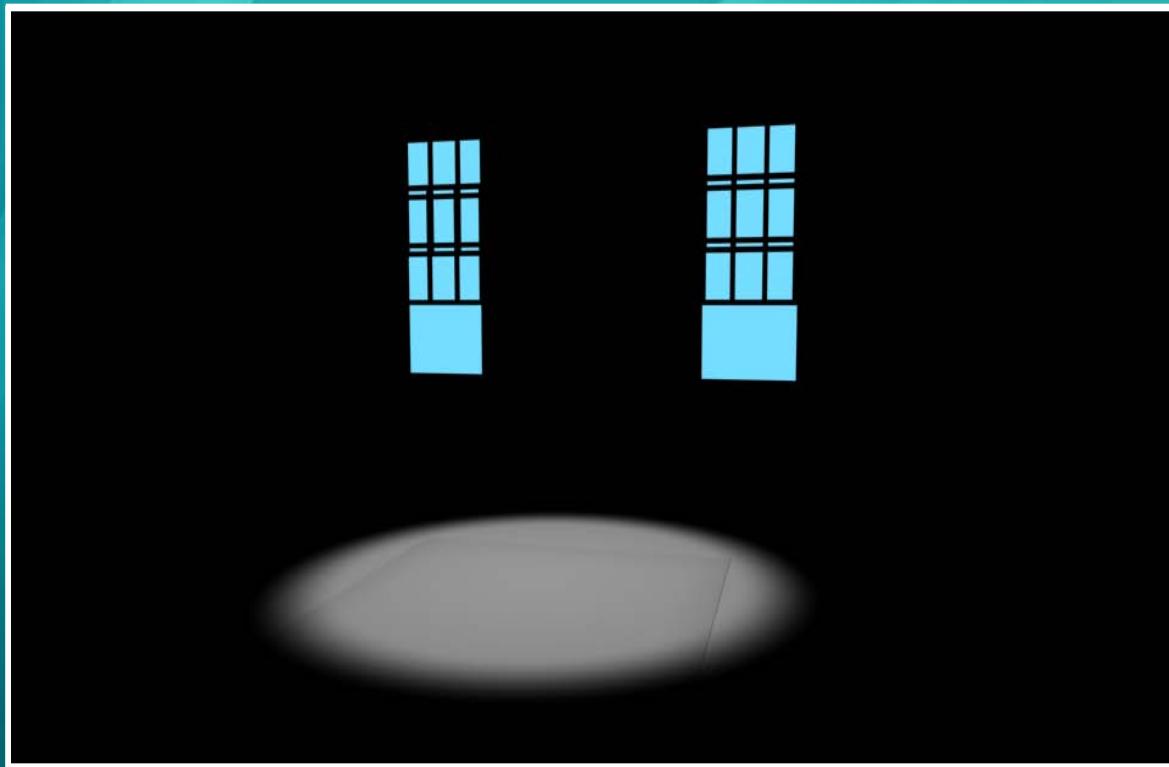
Adding Lights

- Create from Top Viewport
- Click in Viewport, Drag and Release
- Adjust height in side Viewport



Spotlight Modification

- First “Real” light turns off Defaults
- Ctrl+L to toggle on/off
- Always off during rendering

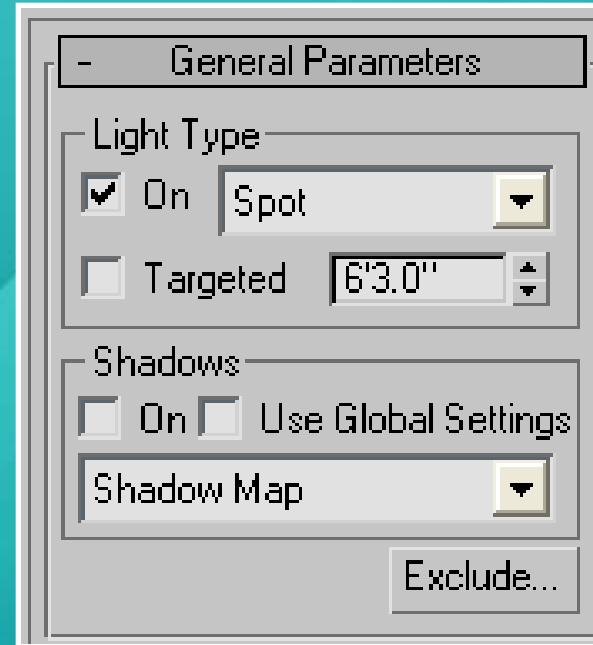


Modification Categories

- General
- Intensity/Color/Attenuation
- Type-specific parameters
- Shadow parameters
- Advanced Effects

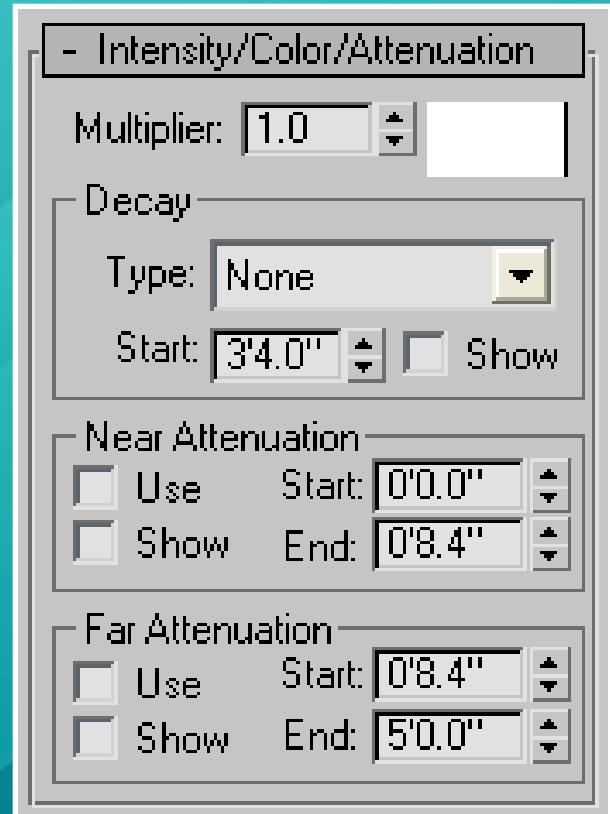
General

- Light Type
- On?
- Targeted or not
- Shadows on?
- Shadow type
- Exclude



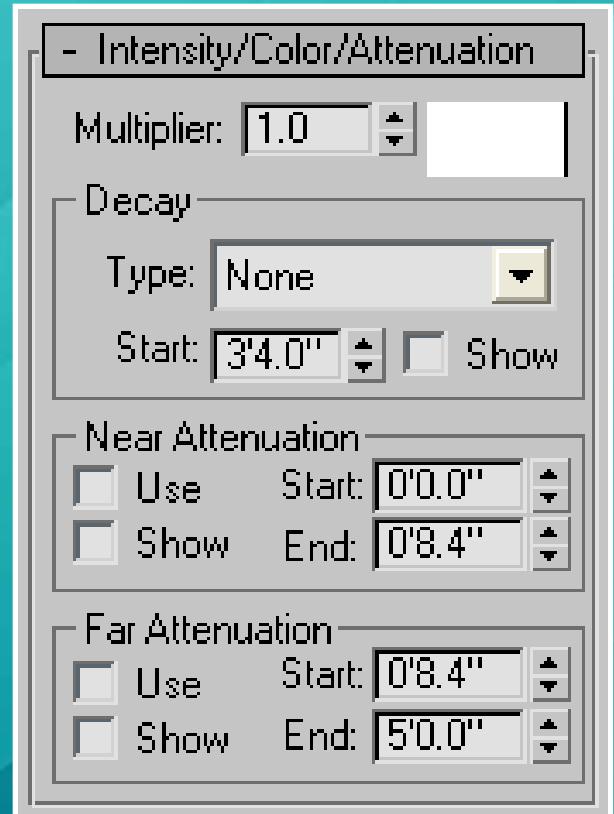
Intensity/Color/Attenuation

- Intensity
 - Multiplier
 - Brightness of light
 - Multiplied against Global Light Level in Environment Dialog



Intensity/Color/Attenuation

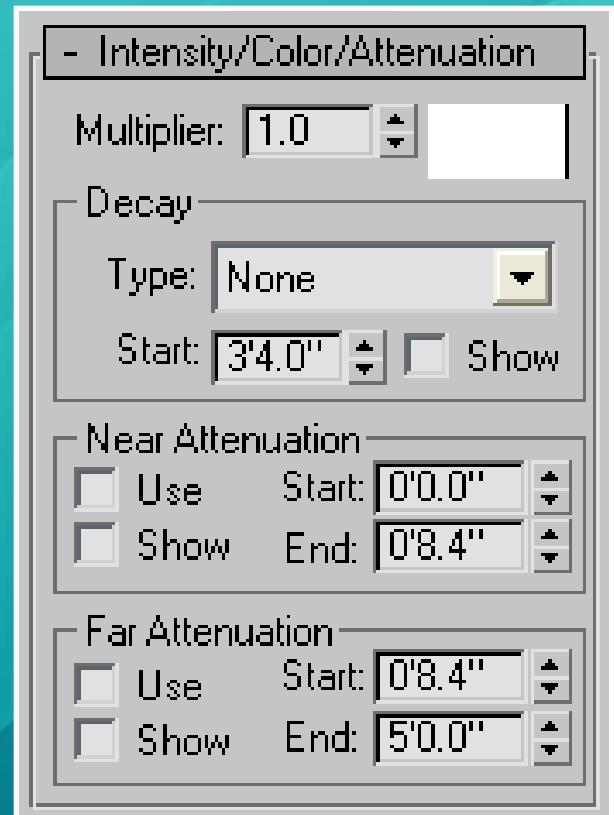
- Color
 - Duh...
 - Only selected light
 - Instead of Global Lighting Tint in Environment Dialog



Intensity/Color/Attenuation

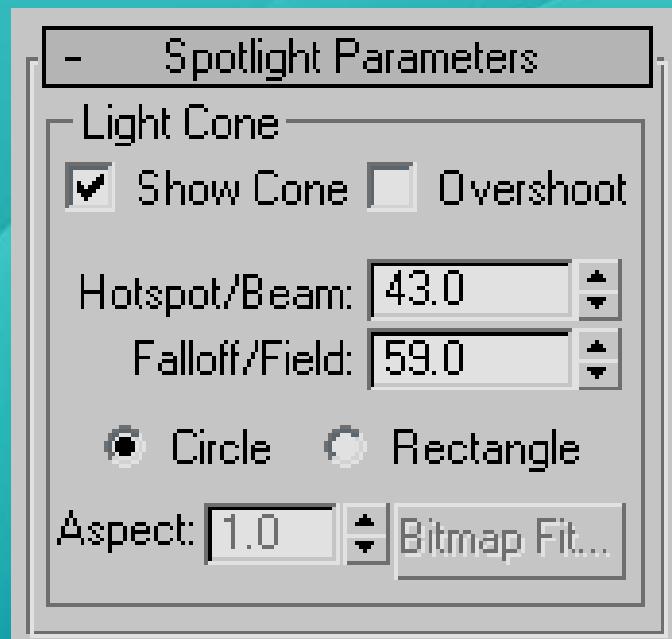
• Attenuation

- Effect of light diminishing over distance
- Only selected light
- See it with Omni light



Spotlight Parameters

- Show Cone
- Overshoot
- Hotspot/Beam
- Falloff/Field
- Circle or Rectangle
- Aspect Ratio

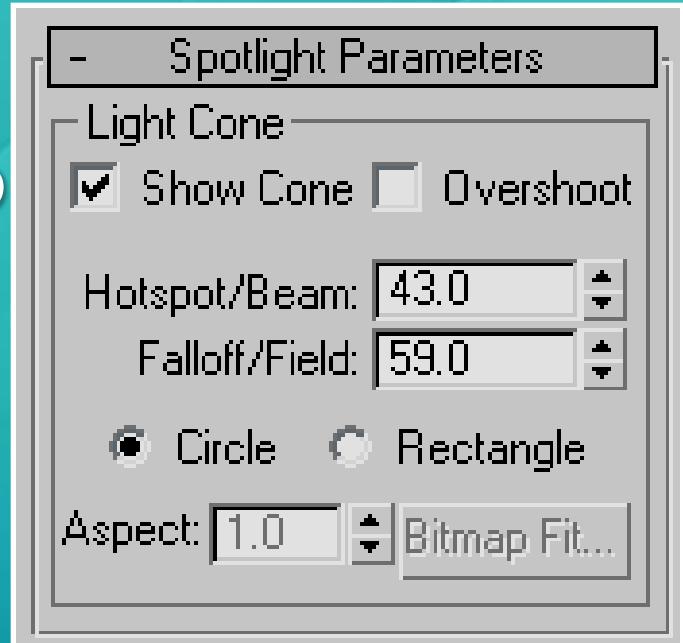


Controlling Shadows

- Quality
 - Edge Quality
 - Density
 - Color
 - Position
- Shadow Types
 - Shadow Maps
 - Raytrace

Shadows

- Check the Box
- Select Shadow type
 - Mental Ray Shadow Map
 - Adv. Ray Traced
 - Area Shadows
 - Shadow Mapped
 - Ray Traced Shadows



Shadow Maps

- Check the Box



5 Features

- In Shadow Parameters and Shadow Map Parameters
 - Color
 - Dens.
 - Bias
 - Size
 - Sample Range

Color



Density



Bias



Size

- Smaller is chunkier
- Larger is finer



Sample Range



Break

Directional Lights



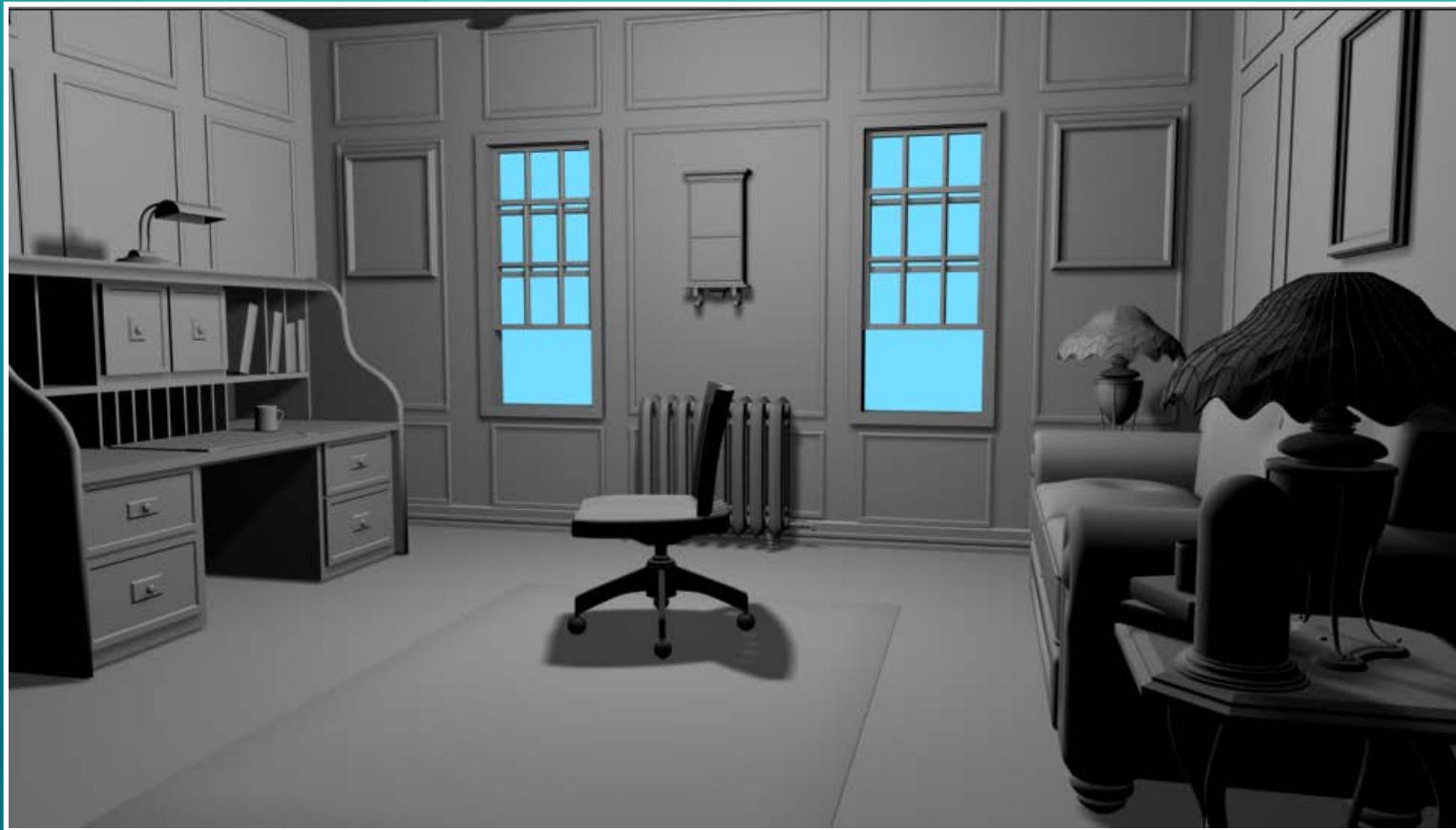
Overshoot



Observations?

- Everything lit from above
- Walls black
 - Angle of Incidence
- No shadows under all objects
 - Overshoot shadows only within Falloff

Omni Lights



Attenuation

- Attenuation
 - Effect of light diminishing over distance
 - Real World lighting effect
 - Adds depth and dimension

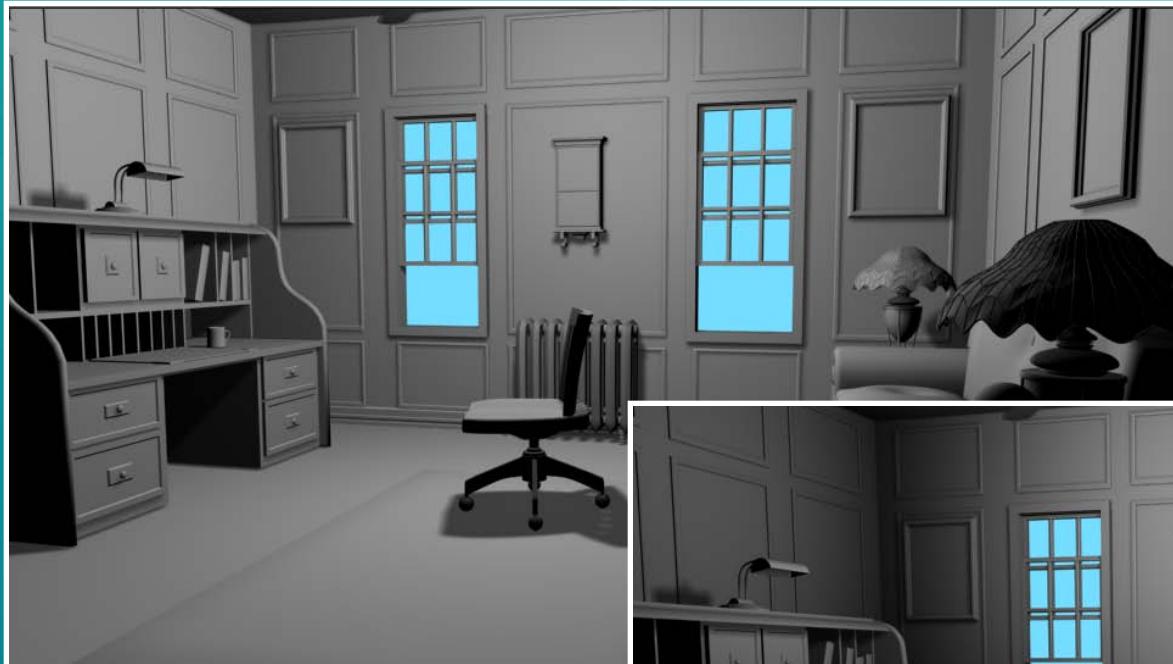
Near / Far Attenuation

- Near
- sets the distance at which the light begins (fades in)
- Far
- sets the distance at which the light drops off to zero (fade out)

Attenuation

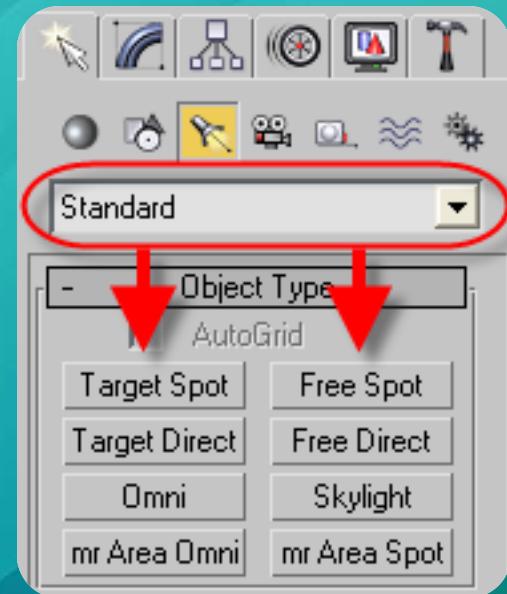


Side By Side

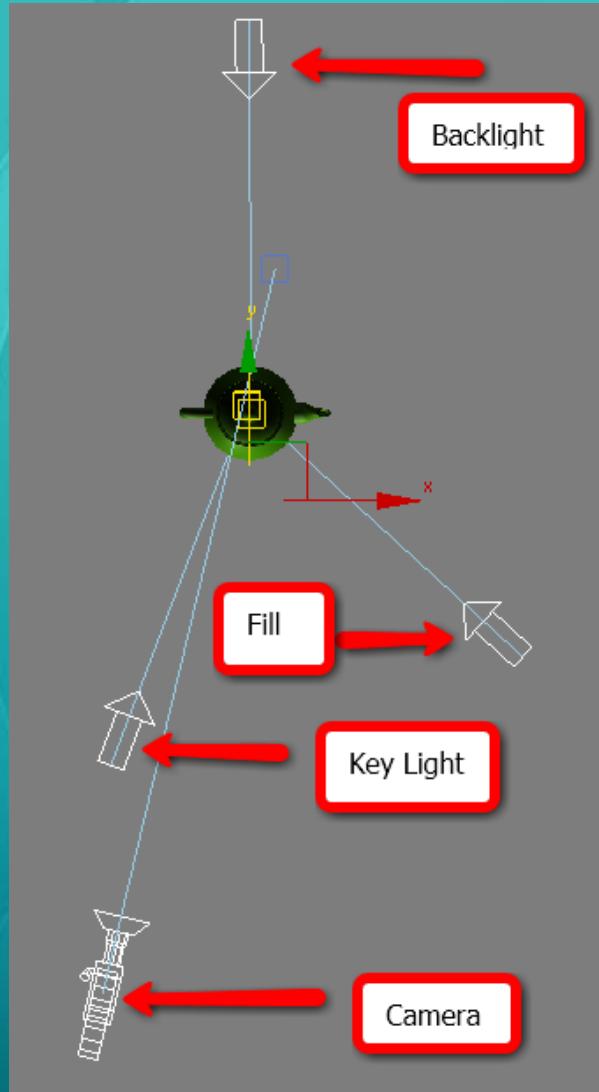


Creating Simulated Lights

- Simulated lights = Standard Lights
 - General lighting
 - Quick tests
 - Use complex Simulated light set ups to cheat a “real” light scene (advantage is speed)
 - No real world correlation to lumens



3-Point Lighting



Key Light

- Dominant source of light in the scene
- Highlights the important areas of the scene
- Can be colored or passed through gobos to add detail and interest to the scene

Fill Light

- Mimic bounced light
- Decreases contrast
- Less intense than the Key Light

Backlight

- Provides separation between subject and background
- Emphasize depth

End Result



Lecture Assignment:

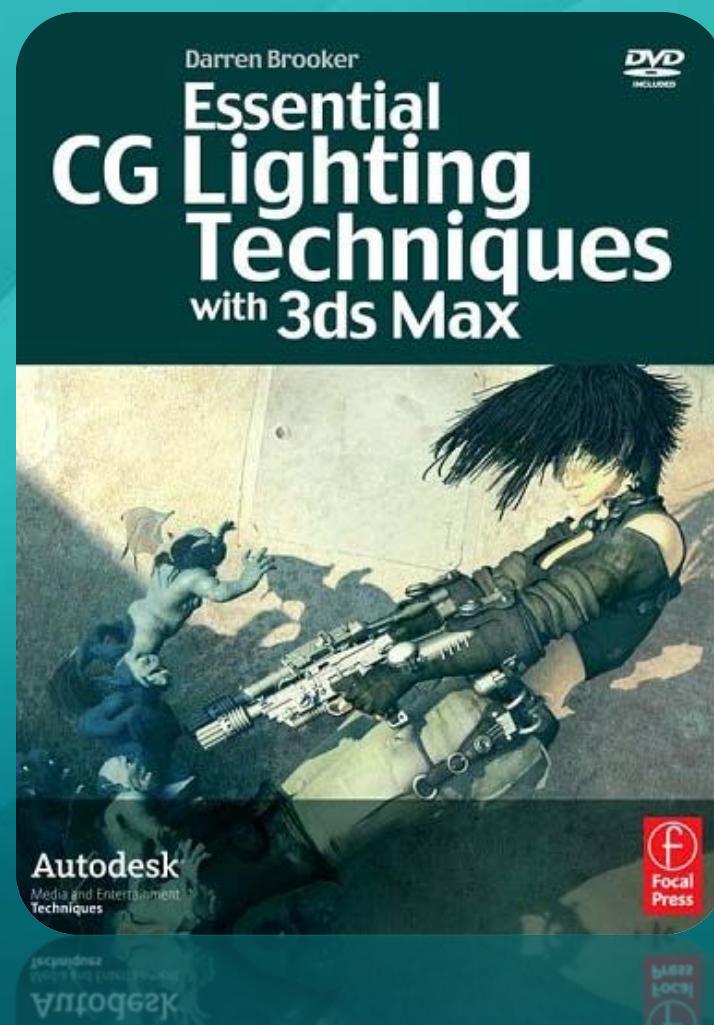
- Use the Office scene
- Unhide Painting Lamps
- Add Painting lights
- Add light for Desk Lamp
- Add Lights for End Table Lamps
- Add Fill Light
- Add Outdoor light
- Daytime lighting

What We Learned:

- Standard Light Types
- Basic Light Creation/Modification
- Shadow Types/Modification
 - Color, Dens., Bias, Size, Sample Range
- Core Light Tools
 - Multiplier, Attenuation, Hotspot/Falloff
- Standard 3-point lighting

Suggested Reading

- **Essential CG Lighting Techniques with 3ds Max**
- by Darren Brooker
- Publisher: Focal Press
- ISBN-10: 024052022X
- ISBN-13: 978-0240520223



Suggested Reading

- **[digital]
Lighting and
Rendering**
- **Author:** Jeremy Birn
- **Paperback:** 432 pages
- **Publisher:** New Riders Press
- **ISBN-10:** 0321316312
- **ISBN-13:** 978-0321316318

