Lighting and Shading

Textbook Chapter 14

1

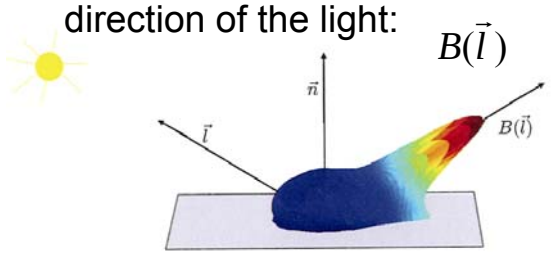
Today

- Announcements
  - Assignment 2 grading this week, sign up asap
  - Assignment 3 out this week (before Wednesday)
  - Quiz 2 will be on March 4 (note: a Wednesday)
- Phong reflection model

2

Light blob from PVC plastic

- PVC blob
  - Note that this figure just describes the result of light that comes in from the specific shown direction $\vec{l}$. For other incoming directions we would need a different blob to visualize the resulting scattering.
- The plastic will appear brightest when observed in the directions clustered about the 'bounce' direction of the light:



3

Lighting & Shading

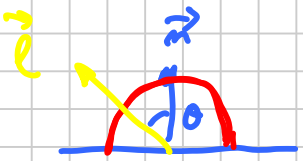
Note Title 2015-02-23

Capture qualitative features of the BRDF

Phong reflection model:

★ Diffuse

independent of $\vec{v}$
but depends on $\vec{l}$
"rough surface"



Intensity $I = \vec{l} \cdot \vec{n}$

$= |\vec{l}|\,|\vec{n}| \cos\theta$

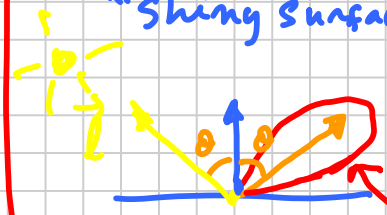
$= \cos\theta$ if $\vec{l}$ & $\vec{n}$ are unit vectors

In practice, to avoid -ve light!

$I = \max(0, \cos\theta)$

★ Specular | Ambient | Emissive

depends on both $\vec{l}$ and $\vec{v}$
"shiny surface"



$B(\vec{l})$ "Bounce Vector" path of light for a perfect mirror

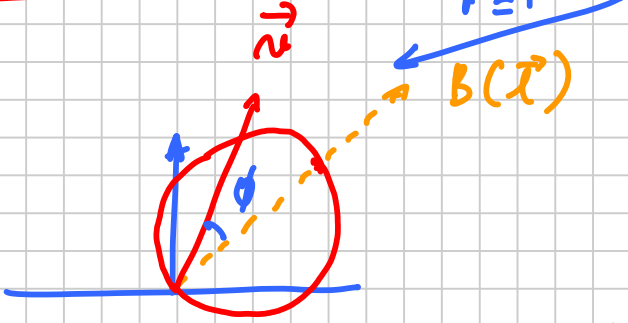
specular reflection lobe

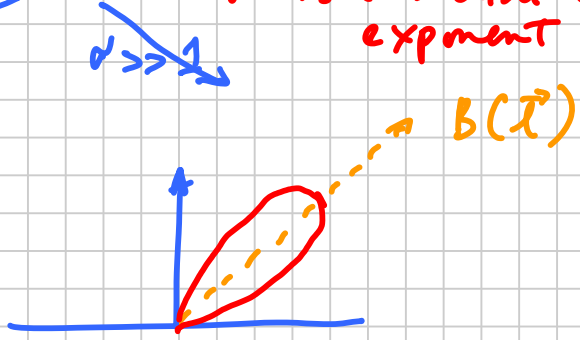
Note: this is the intensity of reflected light as a function of $\vec{v}$

A simple mathematical model:

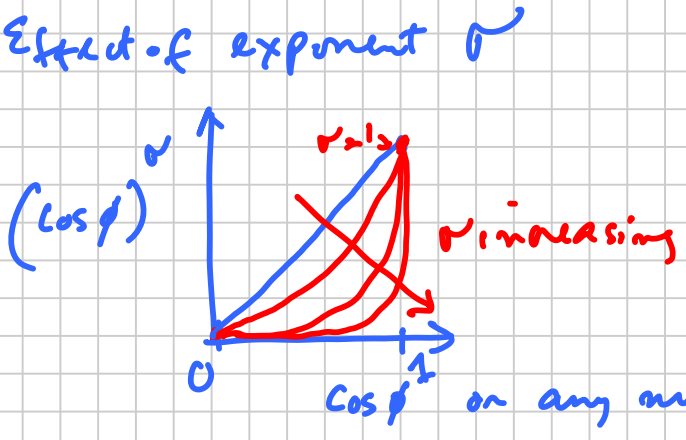
$I = (B(\vec{l}) \cdot \vec{v})^{\alpha}$

α is a "shininess" exponent



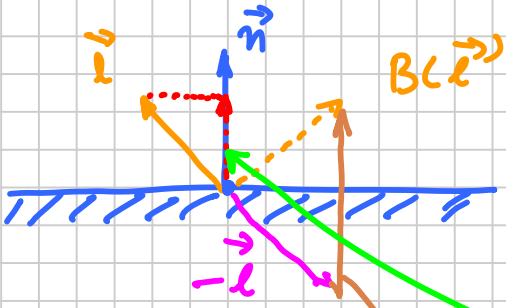


Effect of exponent α



on any number between 0 & 1

How to compute bounce vector?



$\vec{l} \cdot \vec{n} = |\vec{l}| \cos\theta$

when $|\vec{n}| = 1$

$(\vec{l} \cdot \vec{n})\,\vec{n}$

$2\,(\vec{l} \cdot \vec{n})\,\vec{n}$

$$B(\vec{l}) = -\vec{l} + 2\,(\vec{l} \cdot \vec{n})\,\vec{n}$$

In GLSL there is a useful function called "reflect"

$$B(\vec{l}) = \text{reflect}(-\vec{l}, \vec{n})$$

Next class: read chapter 3.6