CSC 240
Computer Graphics

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Fall 2016
Smith College

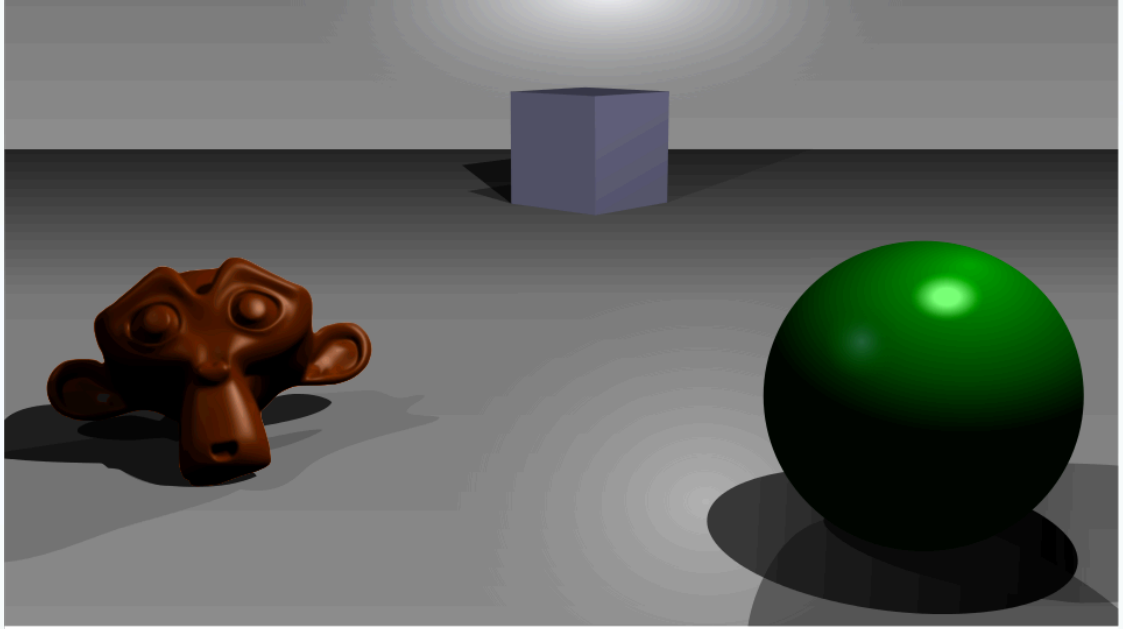
Outline: 11/21

- Hidden Surface Removal
- Rendering pipeline and introduction to ray tracing
- Blender Lab: chair and wine glass
- Blender Online Textbook on the website

- **HW 8**: due tomorrow (Tues)
- **Office Hours**: Mon/Tues 4-5pm
- **TA Hours:** I will be there 7:30-9:30pm tonight
- **Thanksgiving:** I am away Wed-Fri

White background slides from Eitan Mendelowitz

Hidden Surface Removal



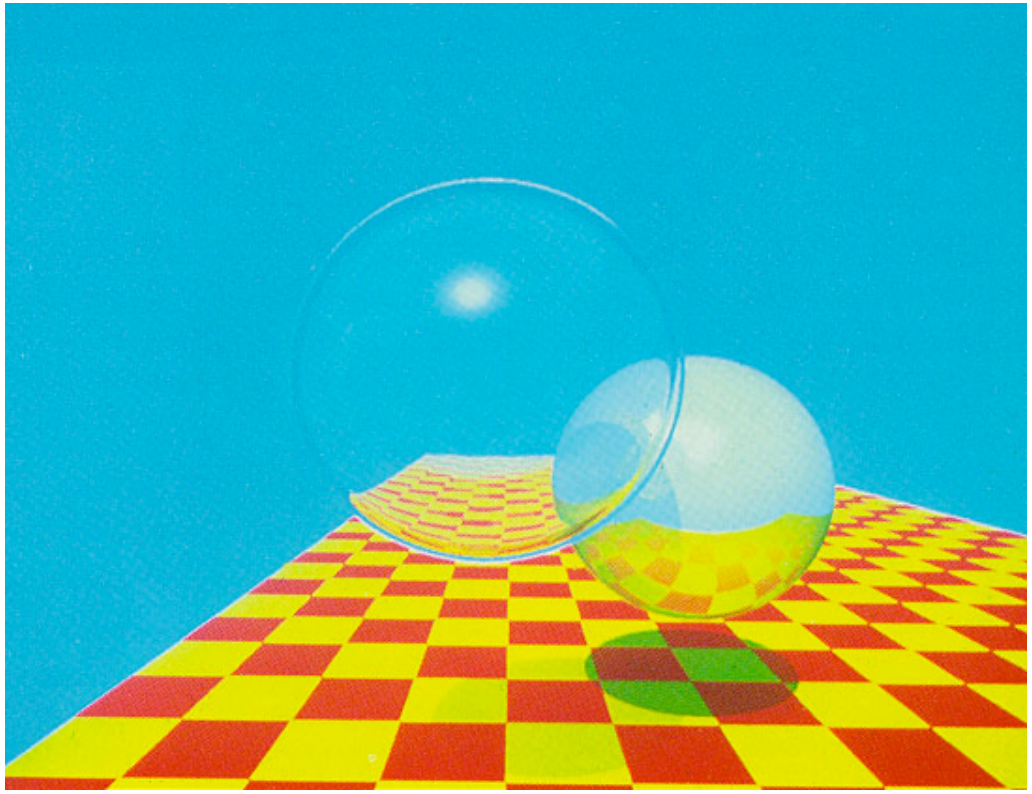
A simple three-dimensional scene

Z-buffer representation

"Z buffer" https://commons.wikimedia.org/wiki/

Introduction to Ray Tracing

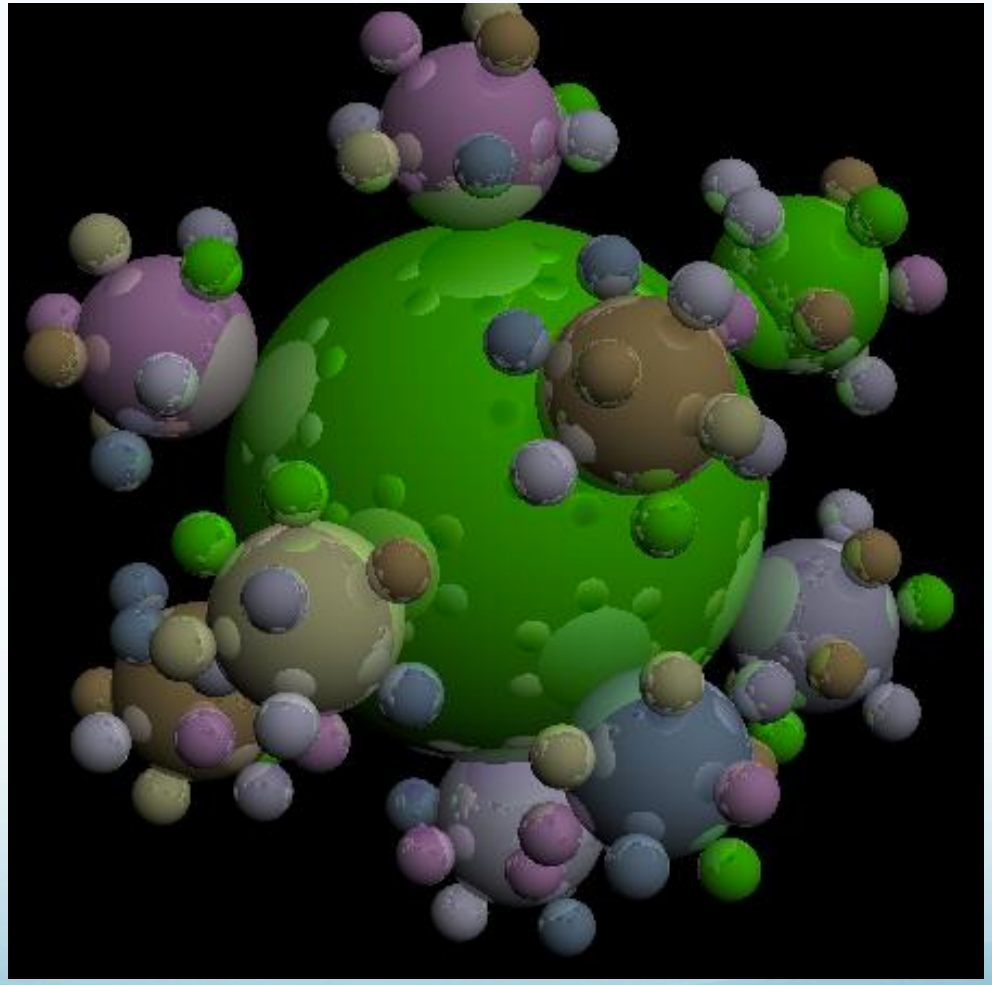
Turner Whitted, 1980



An improved illumination model for shaded display,
Communications of the ACM, v.23 n.6, p.343-349, June 1980

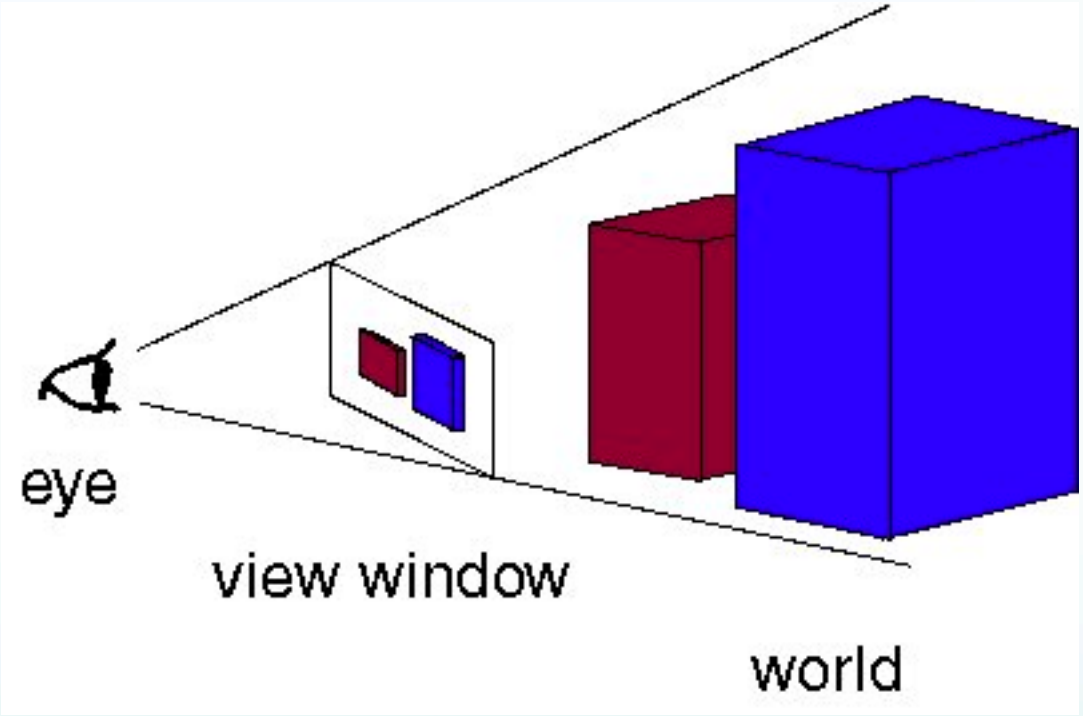
Cornell Box

Ray-tracing: useful for complicated light models



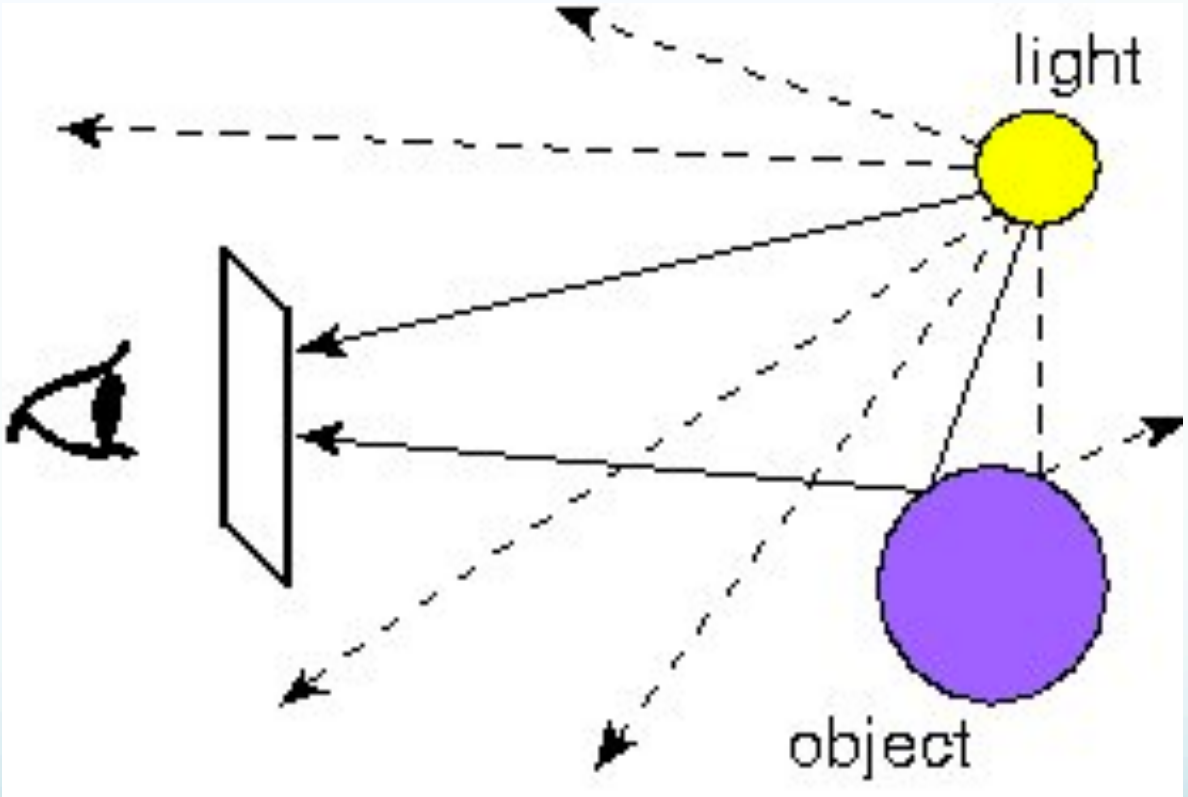
Credit: Paul Rademacher

Eye (camera), viewport, world



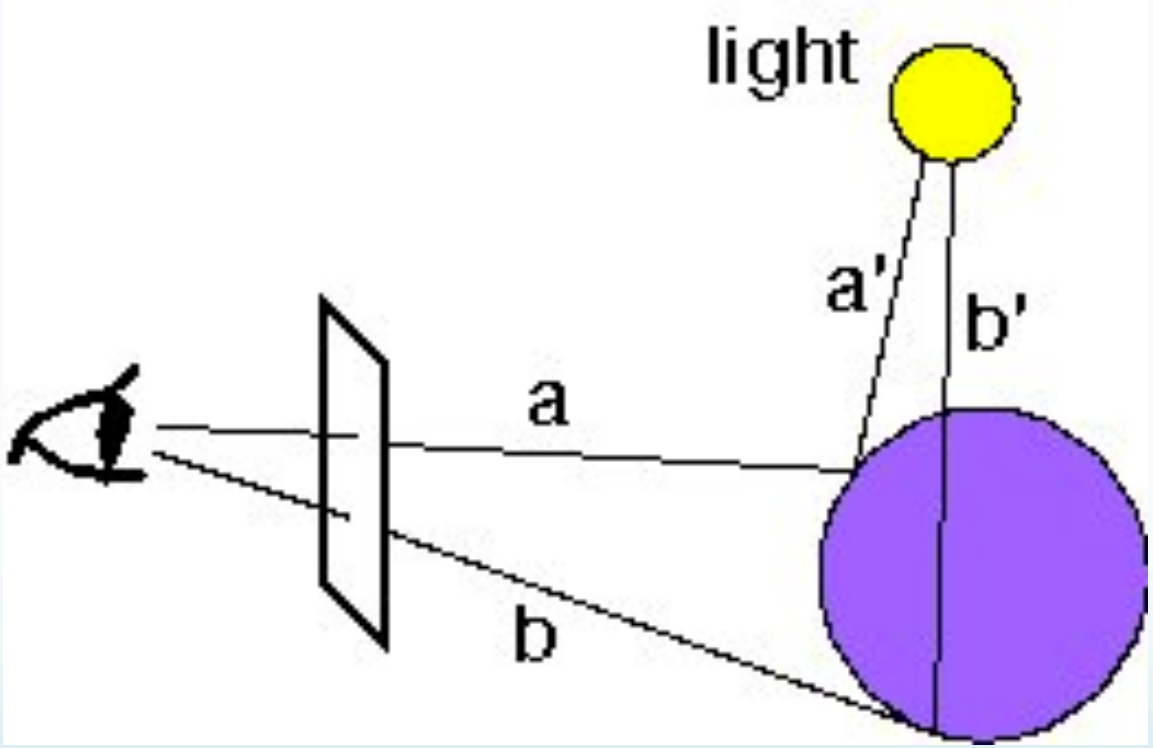
Credit: Paul Rademacher

“Wasted” rays don’t hit the eye



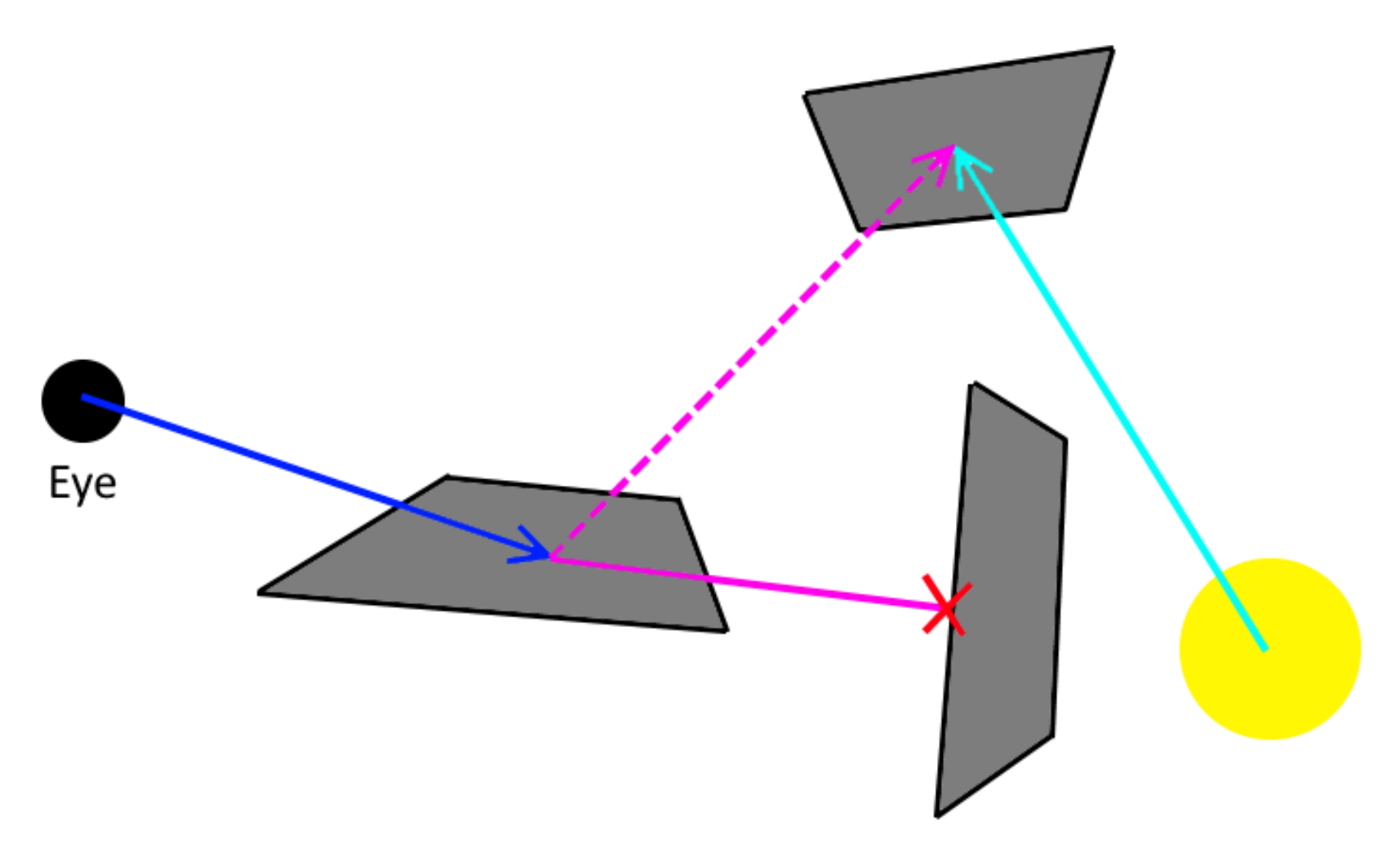
Credit: Paul Rademacher

Instead: start from the eye, not the light



Credit: Paul Rademacher

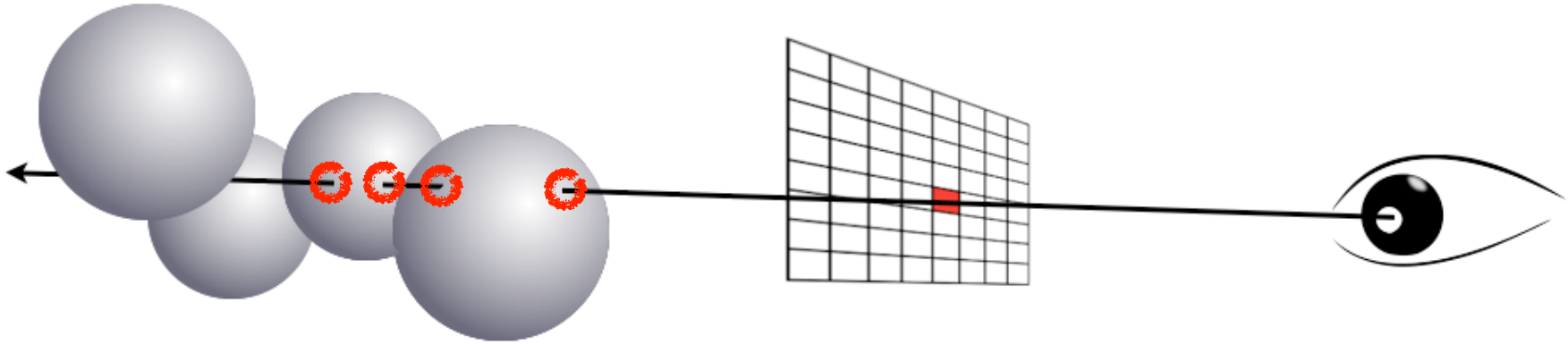
Bidirectional path tracing



Credit: Kai Burjack

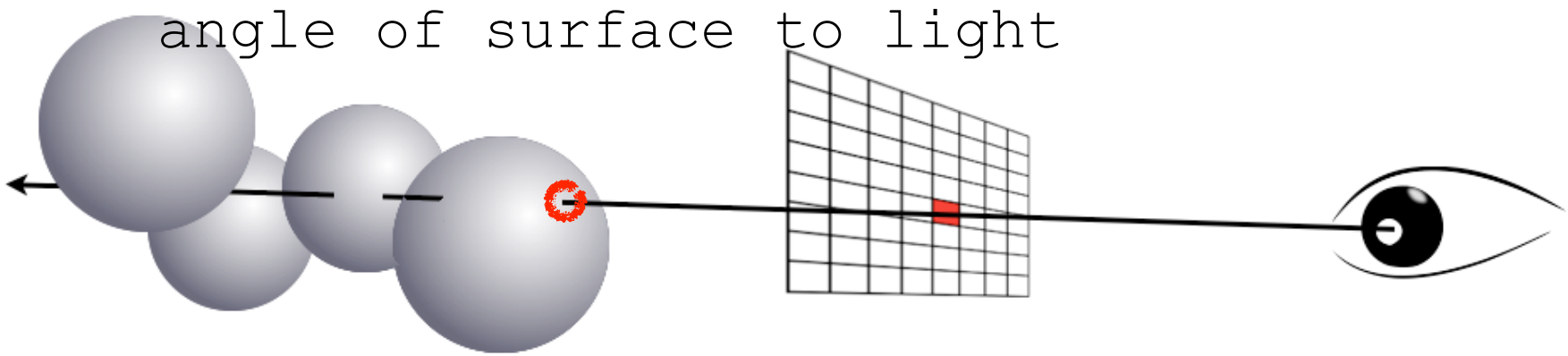
Ray Casting

```
∀ pixel
  create a ray from eye
  ∀ object in world
    calculate intersection with ray
    keep if closest
```

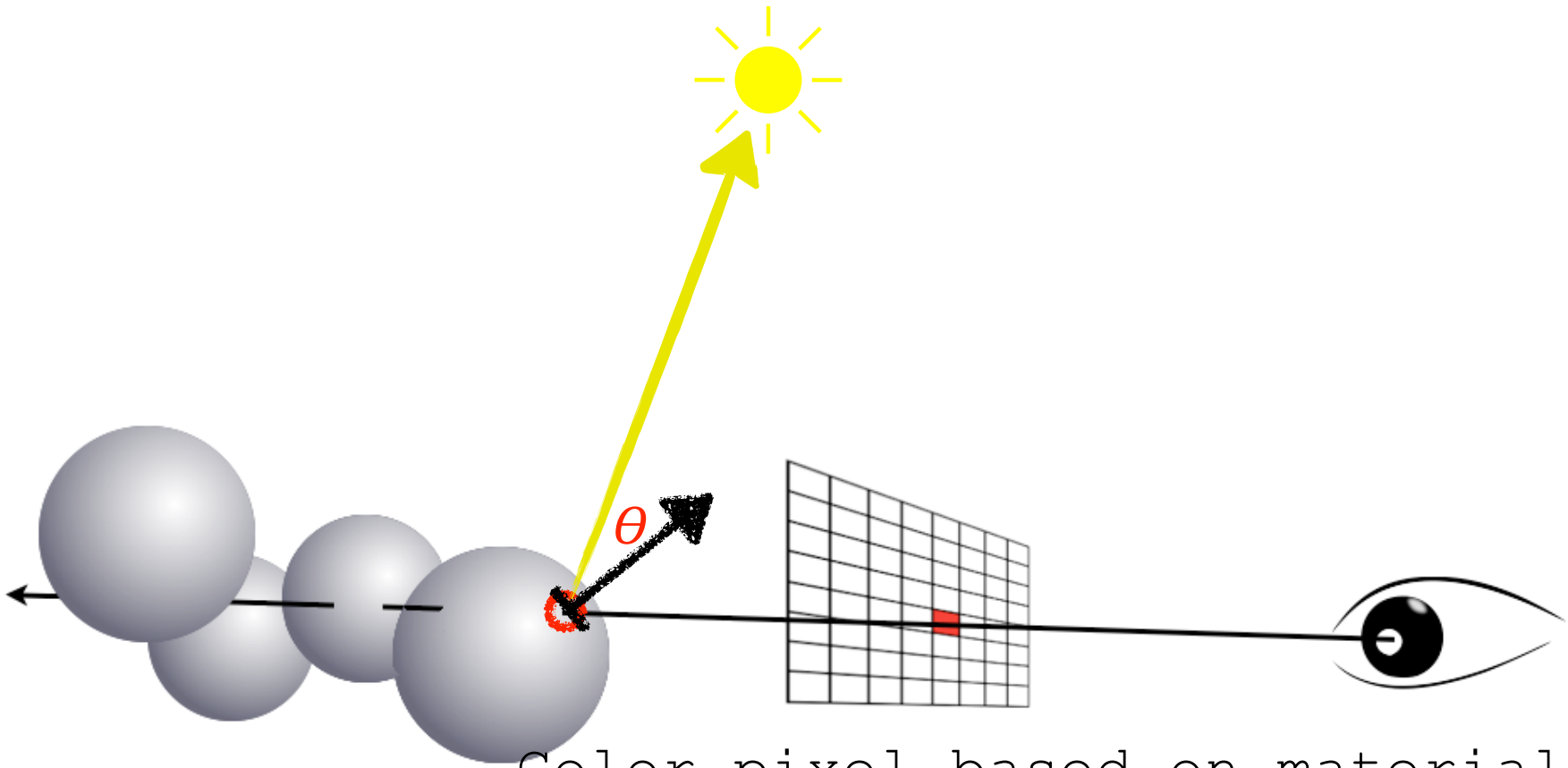


Shading/Coloring

```
∀ pixel
  create a ray from eye
  ∀ object in world
    calculate intersection with ray
    keep if closest
  Color pixel based on material &
angle of surface to light
```



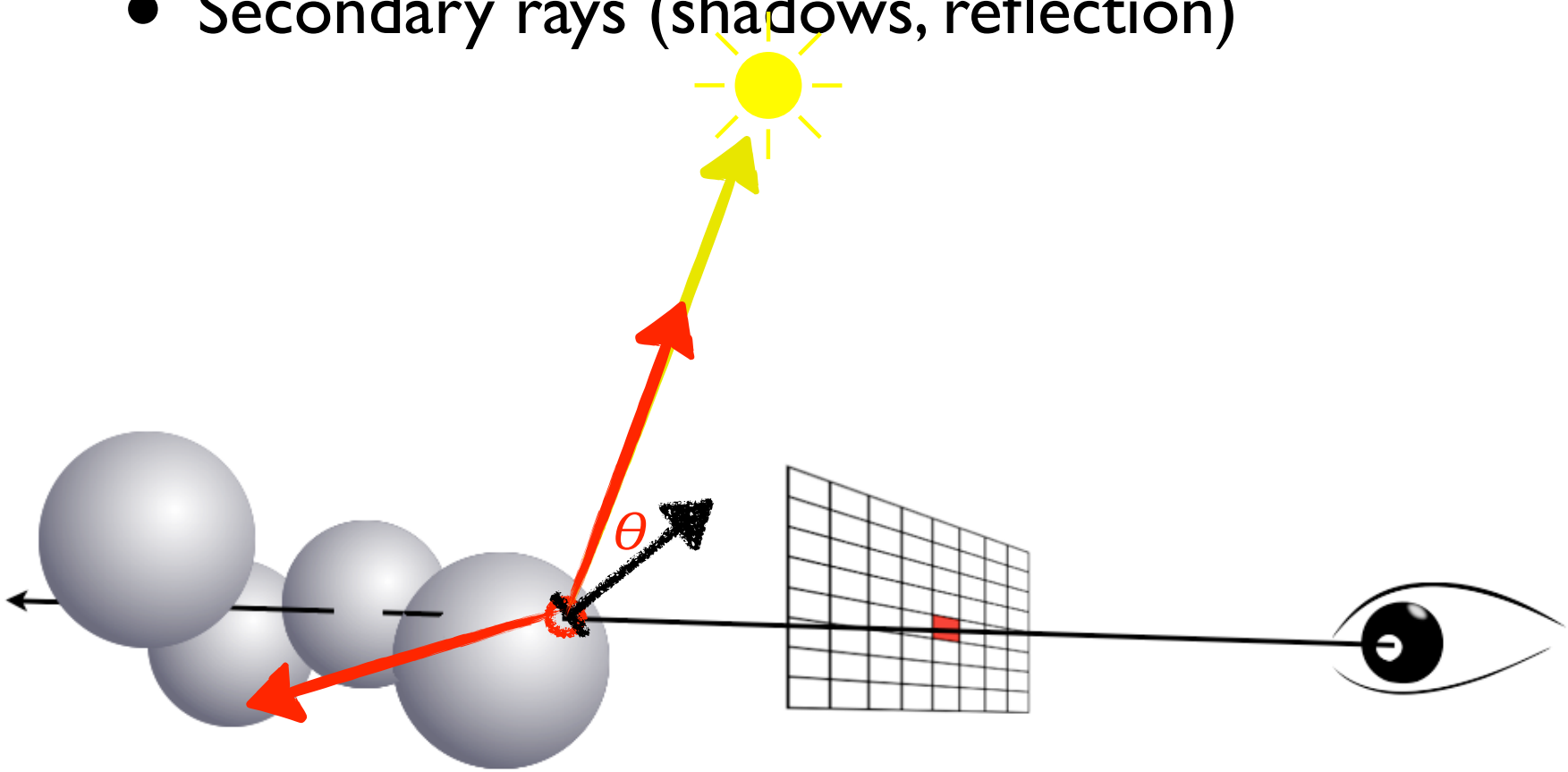
Shading/Coloring



Color pixel based on material & angle of surface to light

Ray Tracing

- Secondary rays (shadows, reflection)



Ray Representation

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