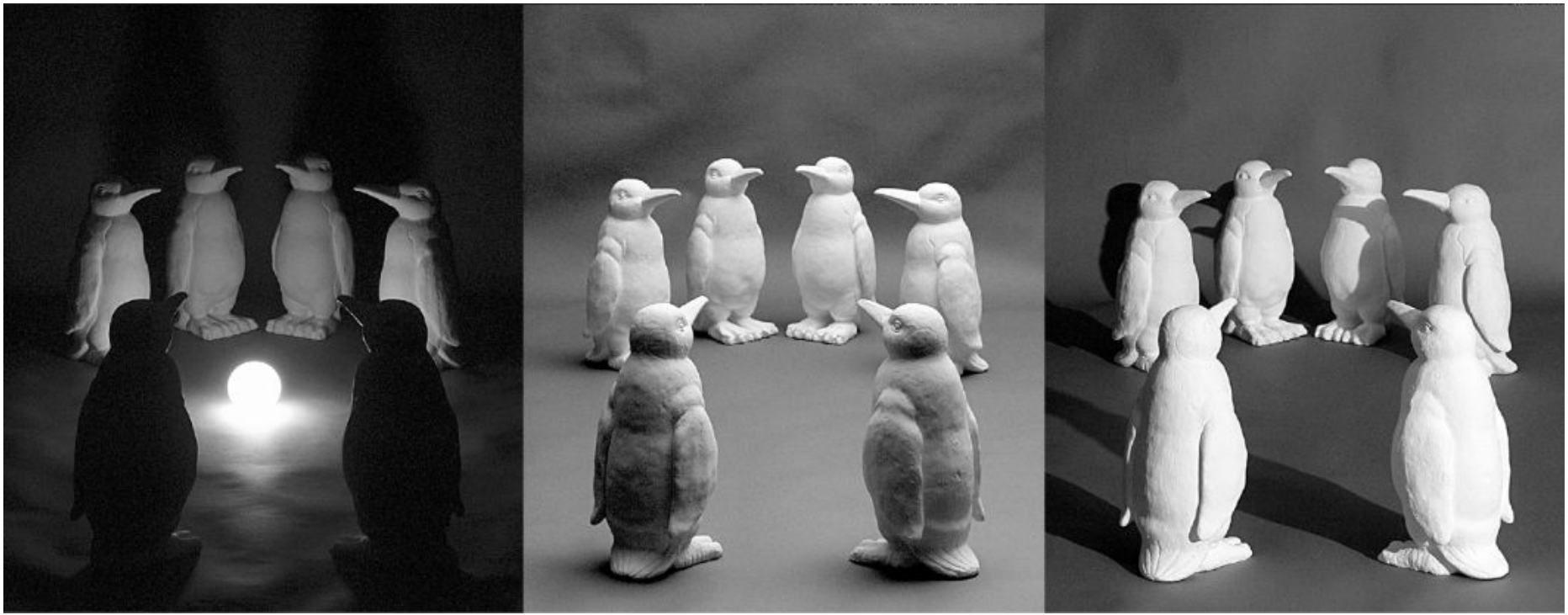
Challenges in Computer Vision

Princeton AI4ALL

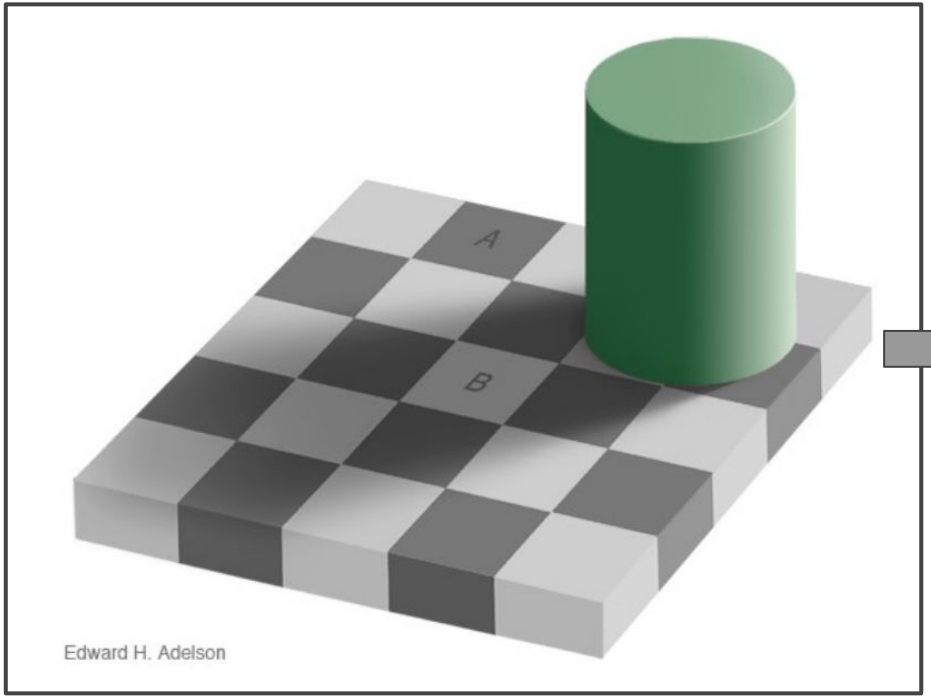
Many slides courtesy of Professors Olga Russakovsky and Andras Ferencz, COS429

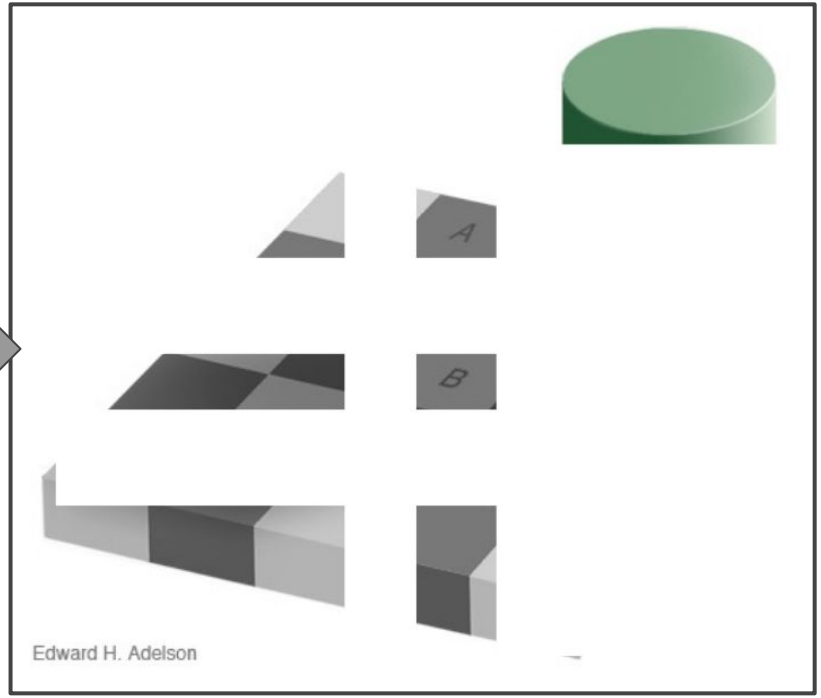
Seeing is challenging. Why?

Challenge: Illumination

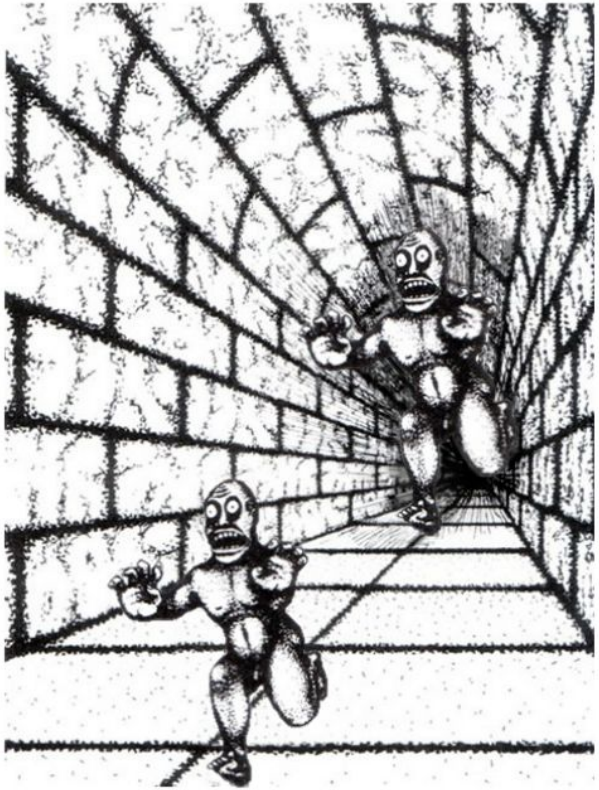


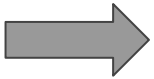
Challenge: Light and Shadow

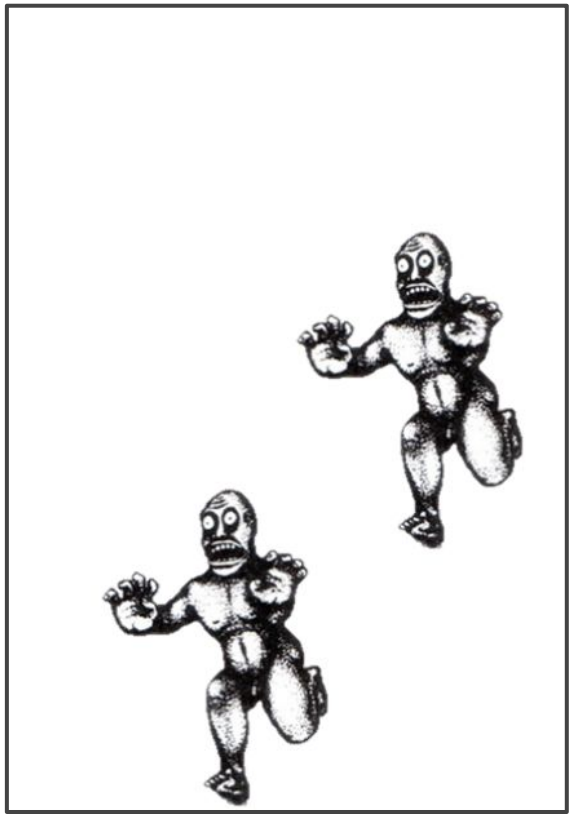




Challenge: Scale



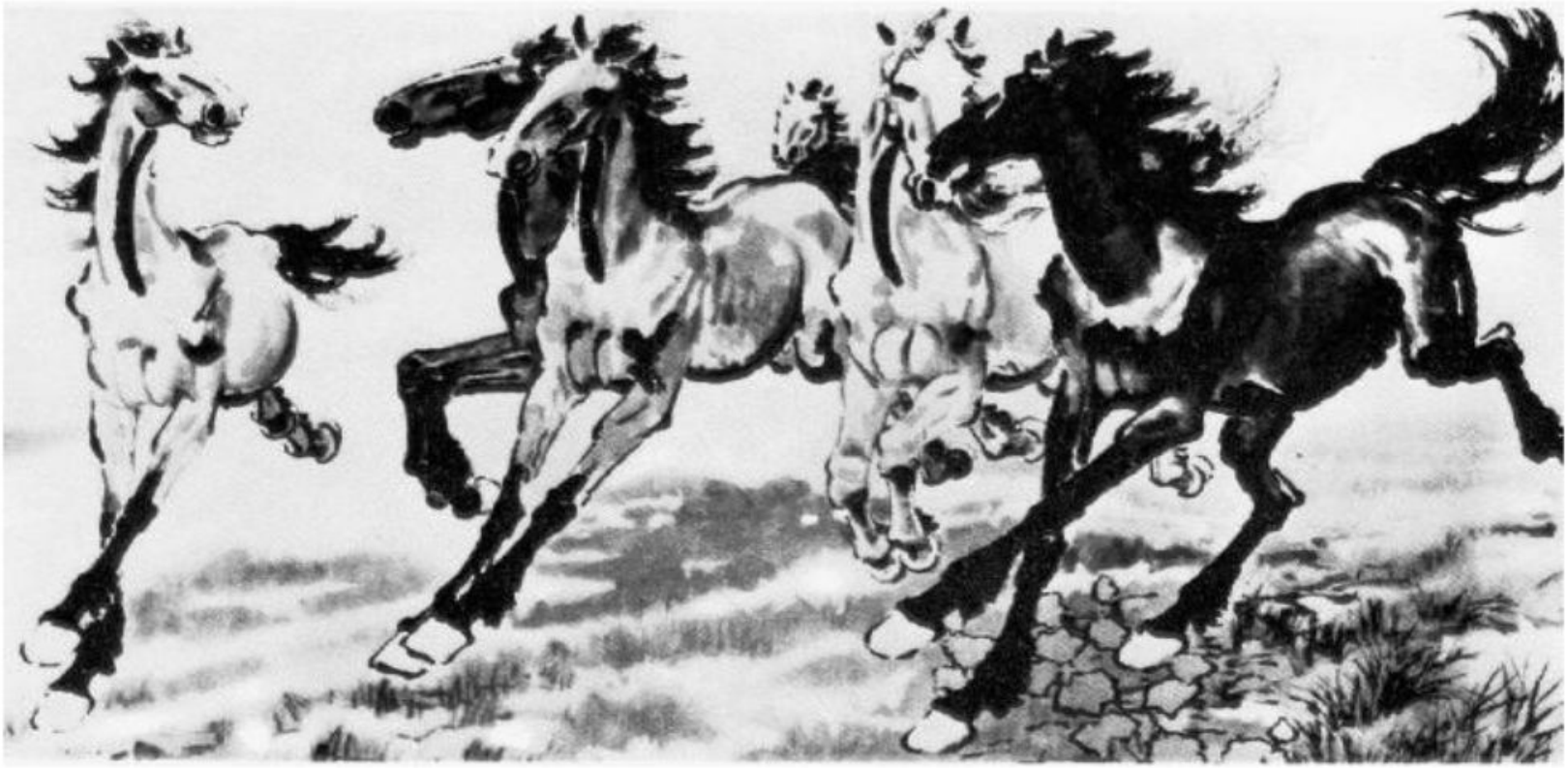




Challenge: Occlusion and clutter

Challenge: intra-class variation

Challenge: Deformation



Challenge: Motion

Challenge: Perspective

How much information can we get from each part of an image?

One pixel

- Amount of light recorded by a photoreceptor

"Is this the object's color?
Illumination? Noise?
I can't tell!"

Low-level view (a few pixels)

- Local image/shape properties

"There's an edge!"

Mid-level view

- Grouping and segmentation

"There's an object and a background!"

High-level view

"It's a chair! It's in a room!"

- Recognition
- Classification

How would you design algorithms to take these challenges into account?