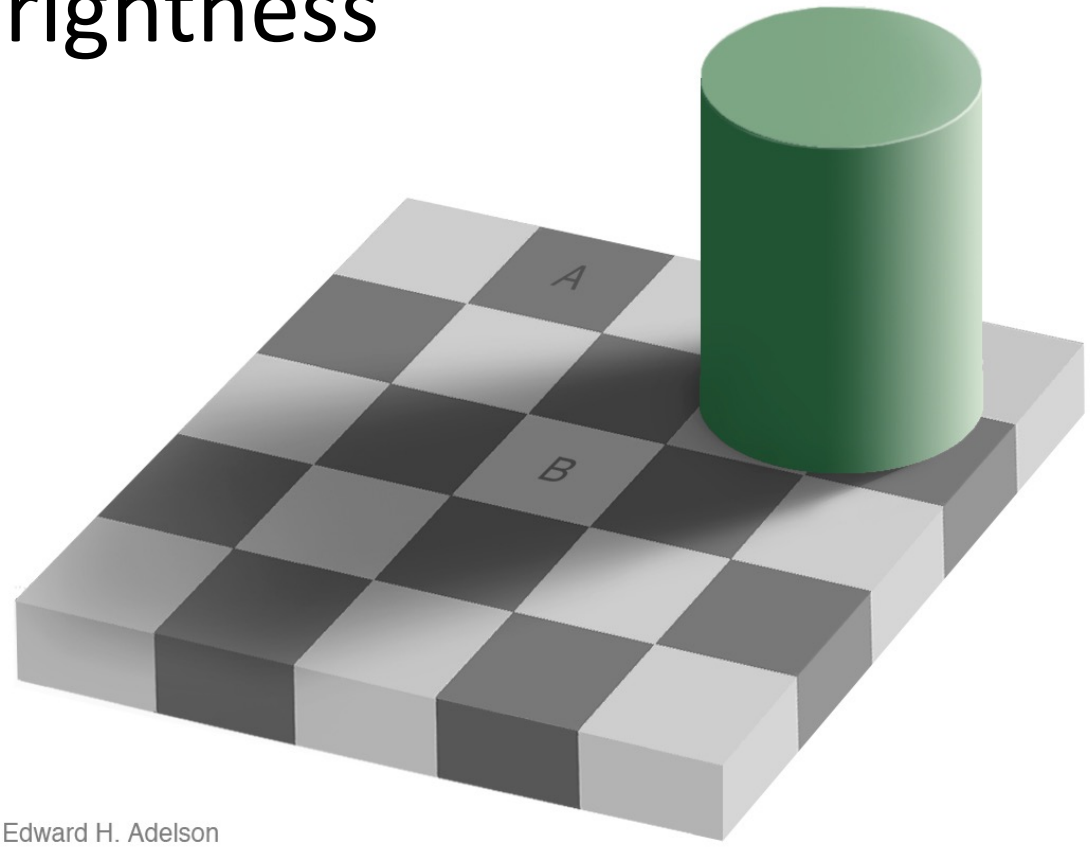
Measurement

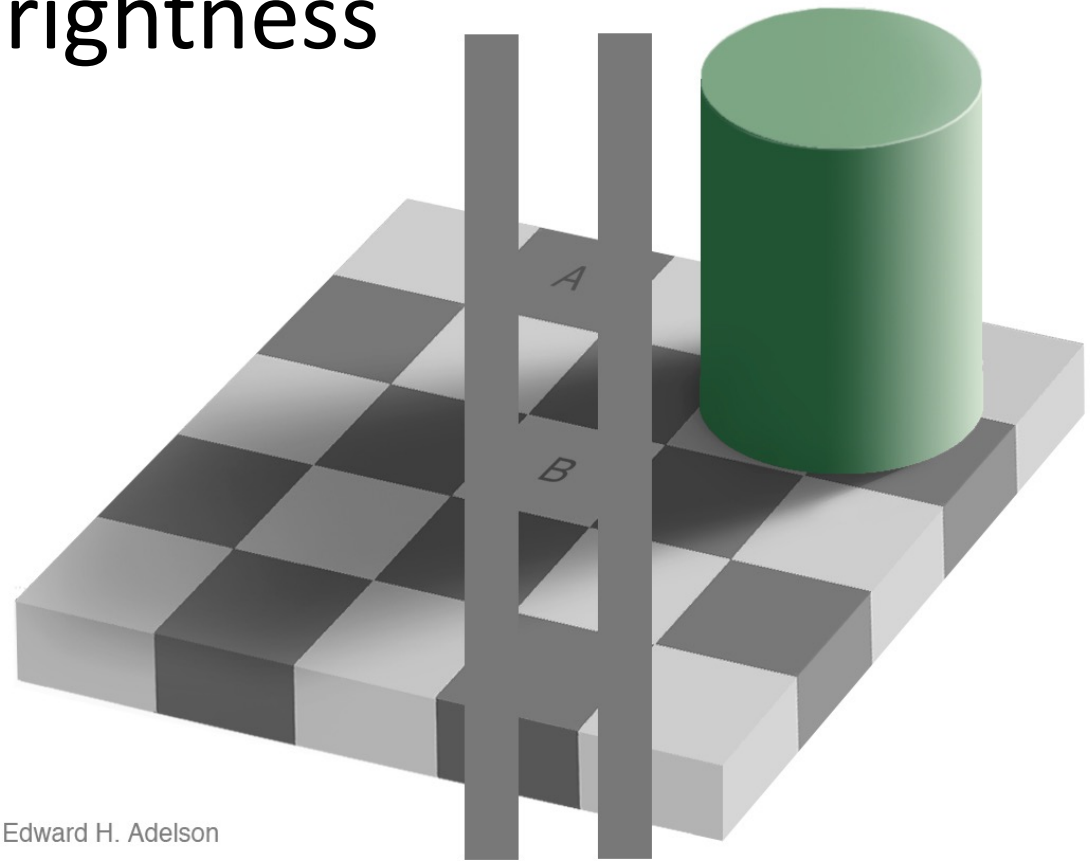
Brightness



Edward H. Adelson

Measurement

Brightness

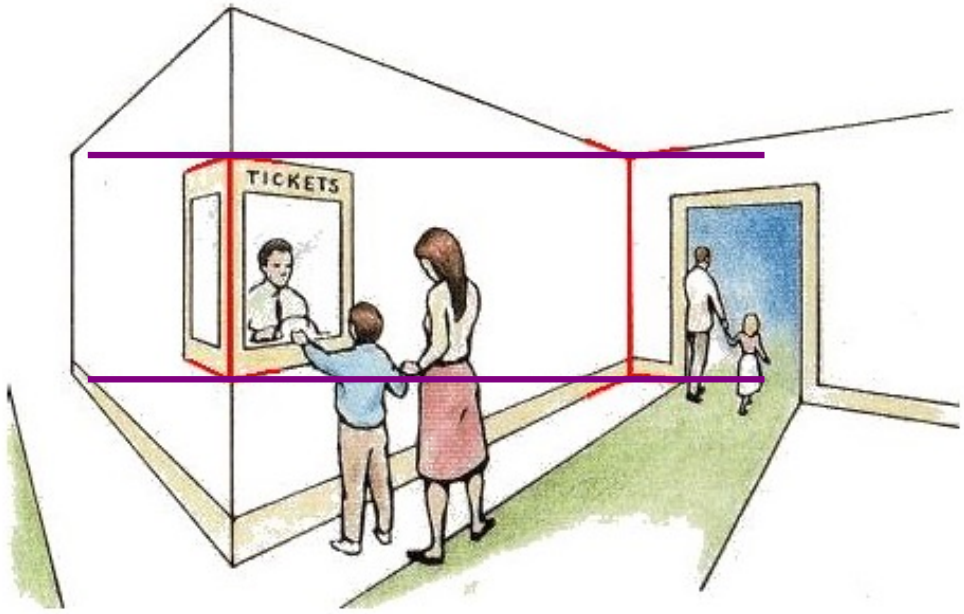


http://www.newworldencyclopedia.org/entry/Same_color_illusion

Slide Credit: Alyosha Efros

Measurement

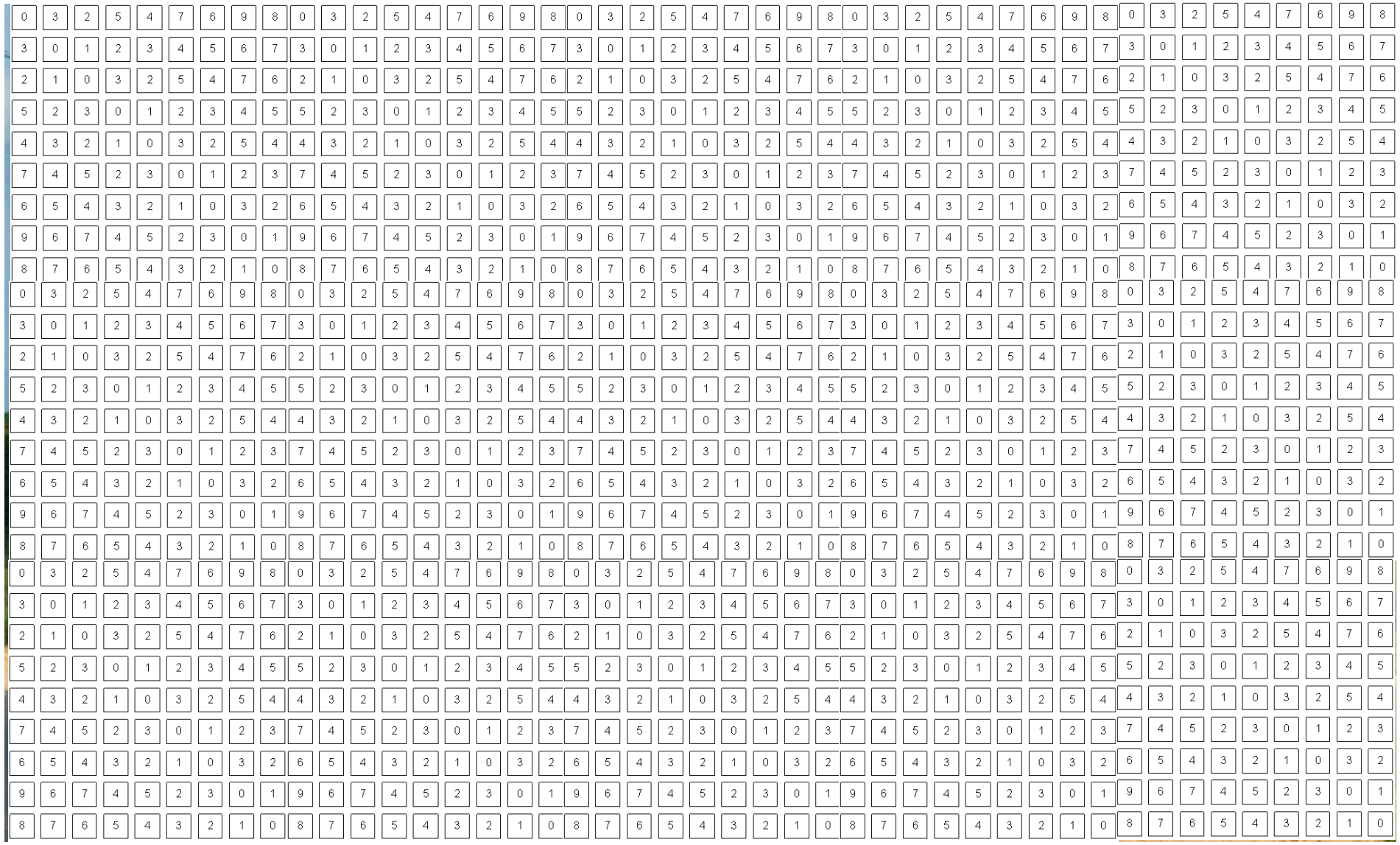
Length



Müller-Lyer Illusion

http://www.michaelbach.de/ot/sze_muelue/index.html

Slide Credit: Alyosha Efros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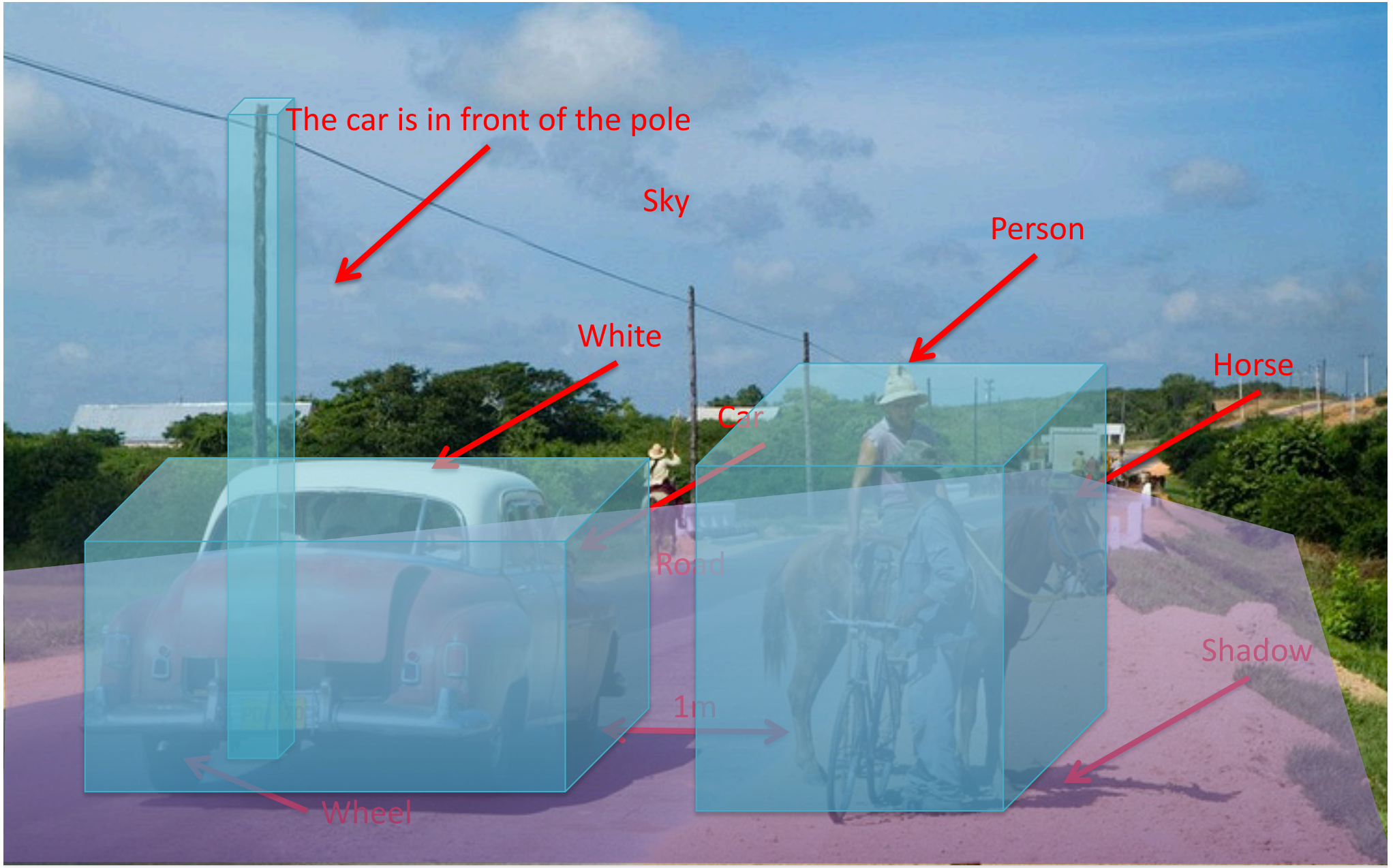
The car is in front of the pole
Sky
Person
White
Horse
Car
Road
Shadow
1m
Wheel

Computer Vision

- Low Level Vision
  - Measurements
  - Enhancements
  - Region segmentation
  - Features
- Mid Level Vision
  - Reconstruction
  - Depth
  - Motion Estimation
- High Level Vision
  - Category detection
  - Activity recognition
  - Deep understandings

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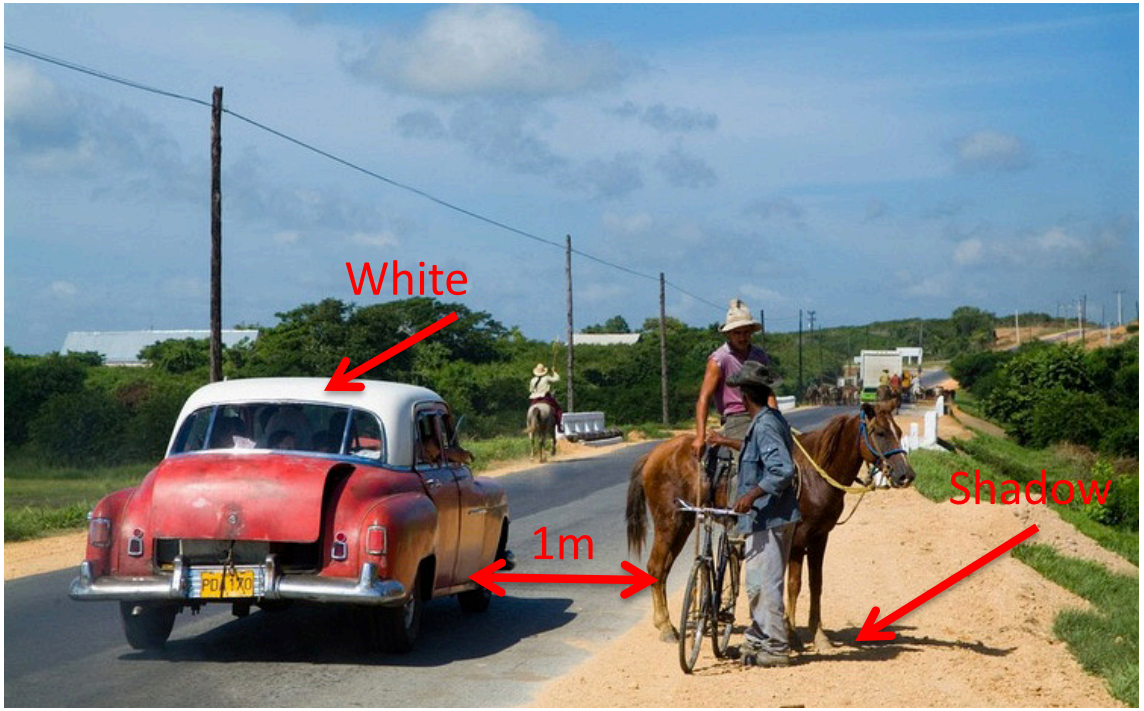

Computer Vision

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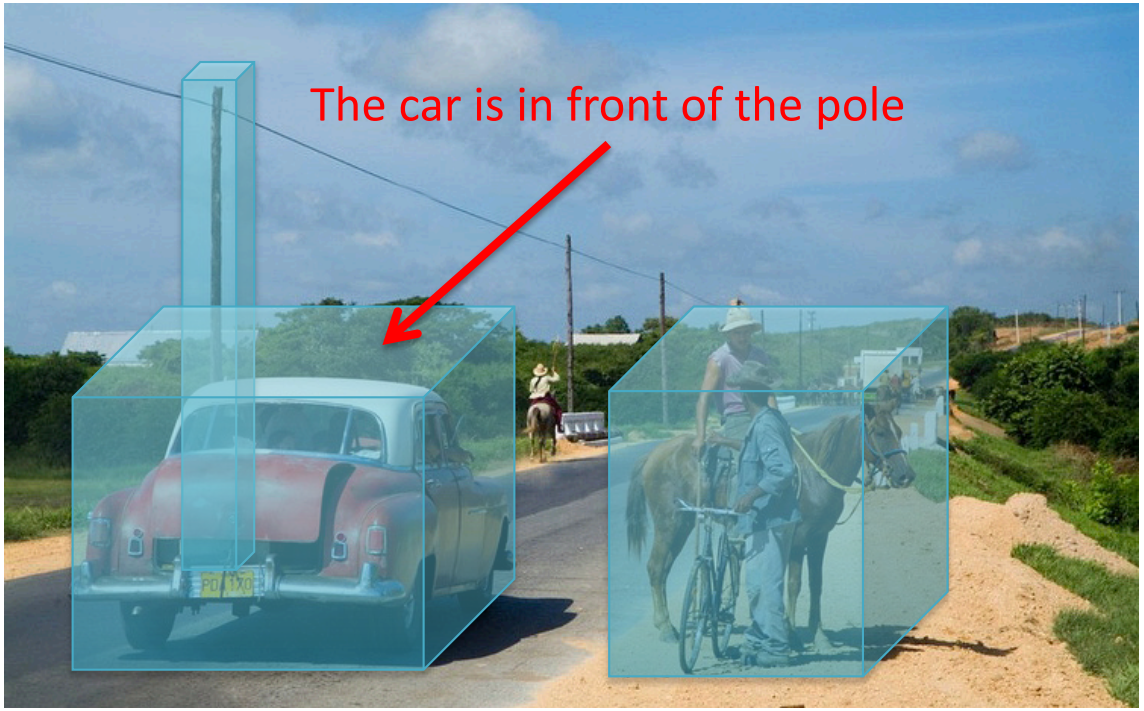

Computer Vision

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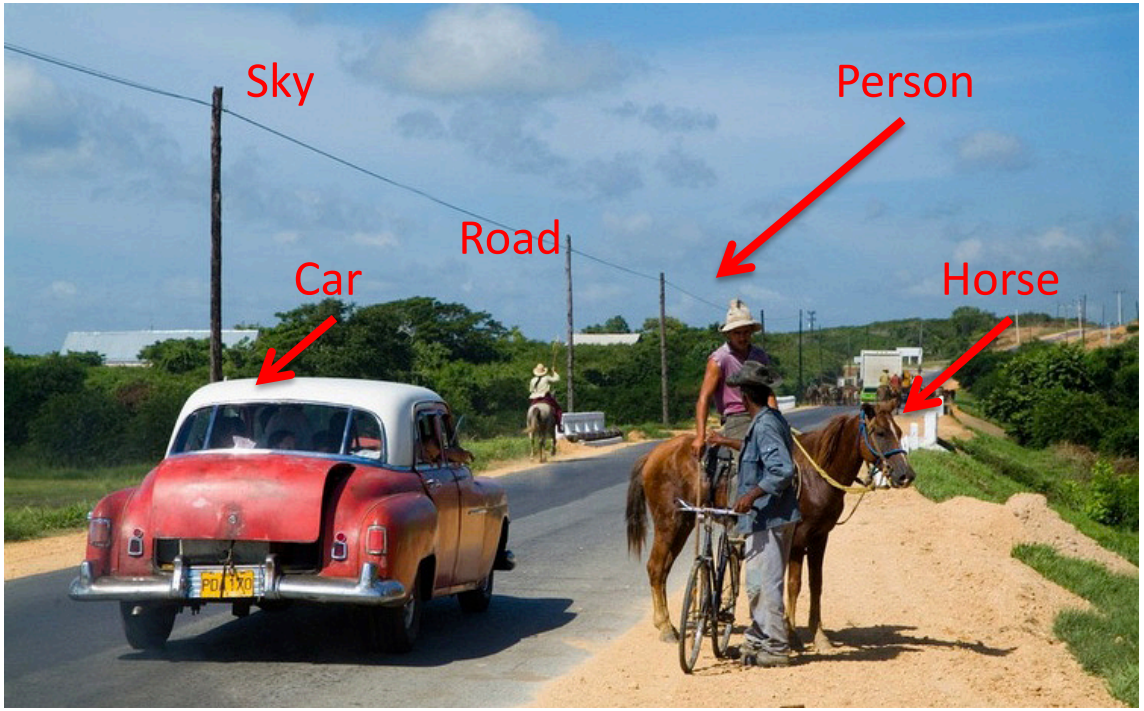
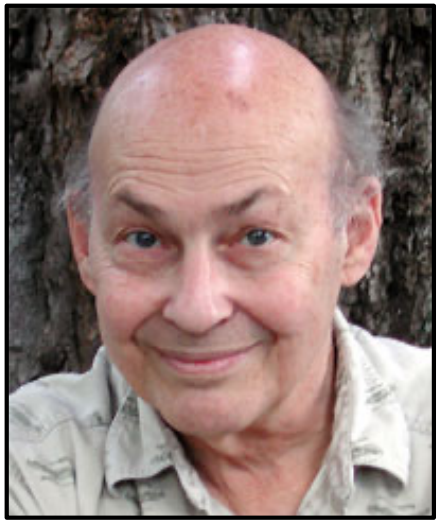
  - Reconstruction
  - Depth
  - Motion Estimation
- High Level Vision
  - Category detection
  - Activity recognition
  - Deep understandings
  - Pose estimation



How hard is computer vision?



Marvin Minsky, MIT
Turing award,1969

“In 1966, Minsky hired a first-year undergraduate student and assigned him a problem to solve over the summer: connect a television camera to a computer and get the machine to describe what it sees.”

Crevier 1993, pg. 88

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

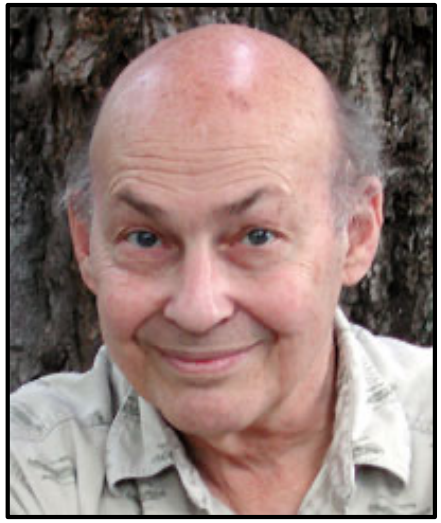
PROJECT MAC

Artificial Intelligence Group July 7, 1966
Vision Memo. No. 100.

THE SUMMER VISION PROJECT

Seymour Papert

The summer vision project is an attempt to use our summer workers effectively in the construction of a significant part of a visual system. The particular task was chosen partly because it can be segmented into sub-problems which will allow individuals to work independently and yet participate in the construction of a system complex enough to be a real landmark in the development of "pattern recognition".



Marvin Minsky, MIT
Turing award,1969

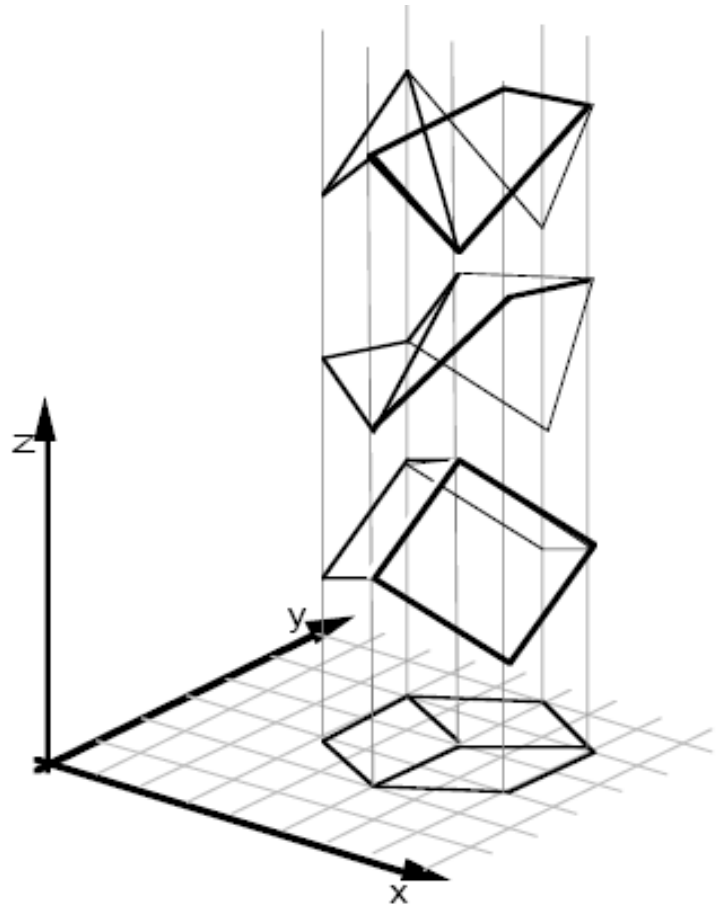
Gerald Sussman, MIT
(the undergraduate)

“You’ll notice that Sussman never worked in vision again!” – Berthold Horn

Why vision is so hard?

Why is vision so hard?

- Ill-posed problem



[Sinha and Adelson 1993]

Challenges 1: view point variation

Michelangelo 1475-1564

slide by Fei Fei, Fergus & Torralba

Challenges 2: illumination

slide credit: S. Ullman

Challenges 3: occlusion

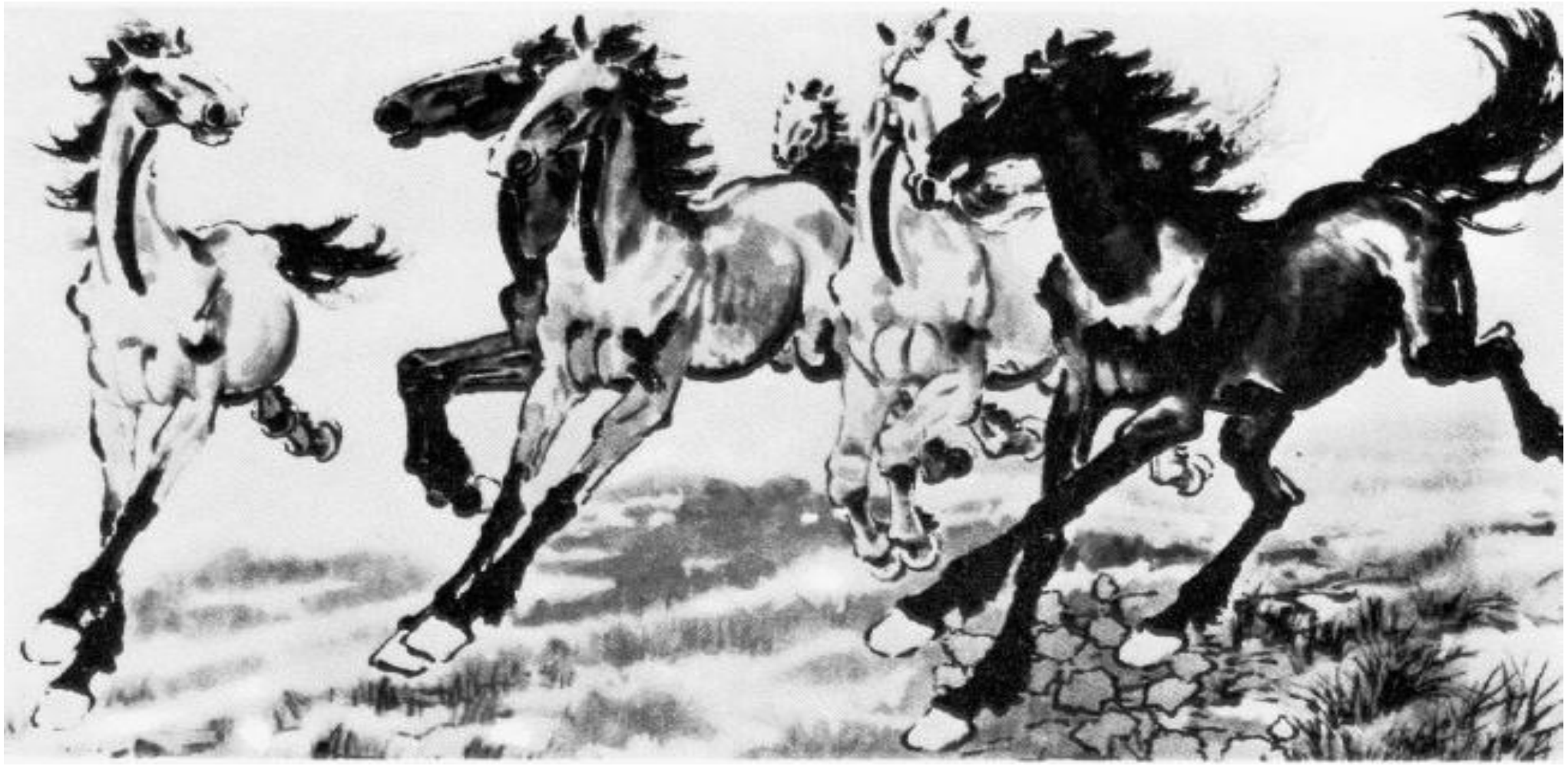
Magritte, 1957

slide by Fei Fei, Fergus & Torralba

Challenges 4: scale

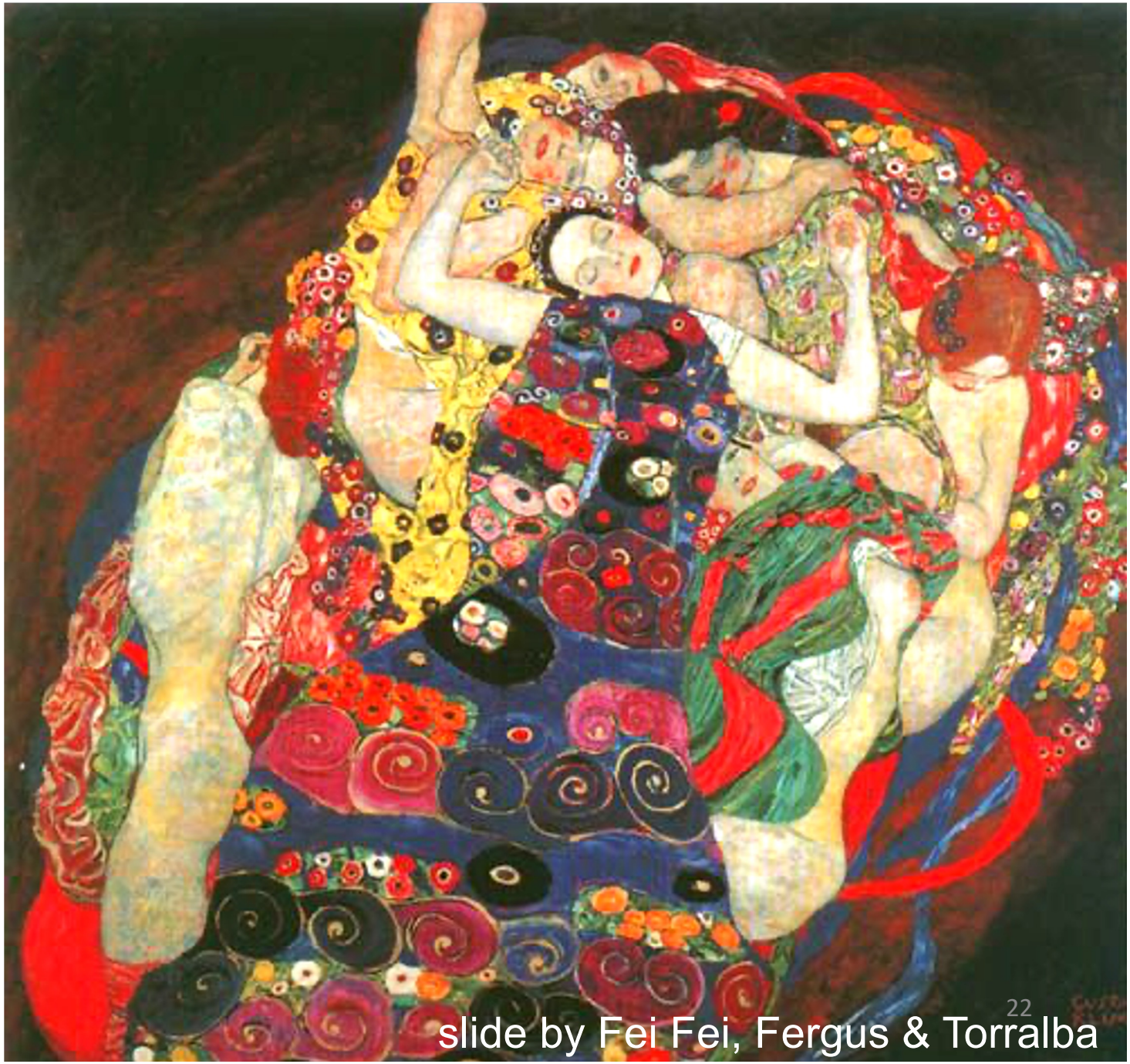
slide by Fei Fei, Fergus & Torralba

Challenges 5: deformation



Xu, Beihong 1943

Challenges 6: background clutter



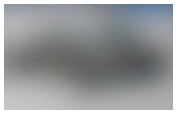
Klimt, 1913

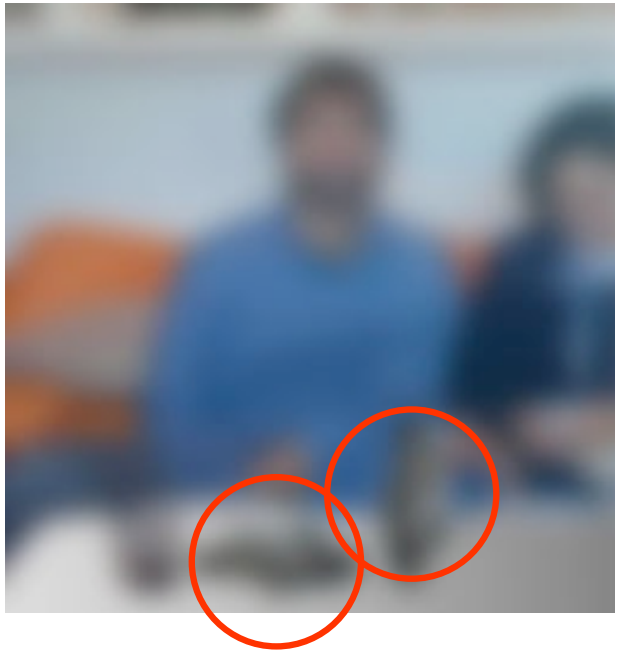
slide by Fei Fei, Fergus & Torralba

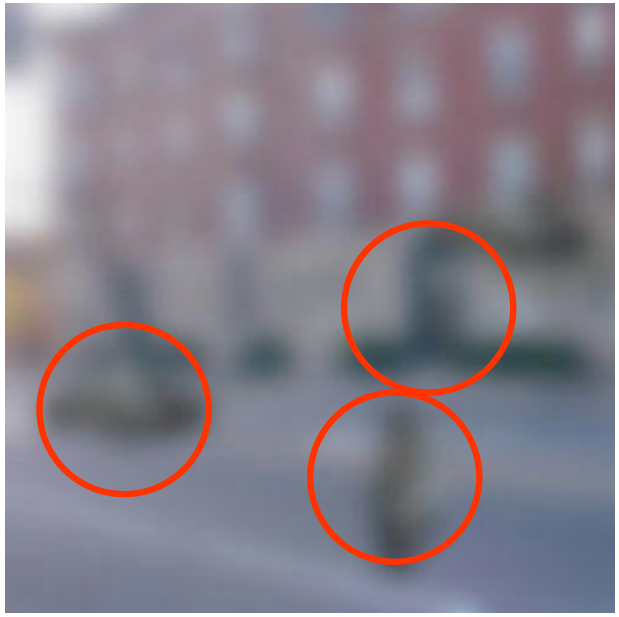
Challenges 7: object intra-class variation

slide by Fei-Fei, Fergus & Torralba

Challenges 8: local ambiguity







slide by Fei-Fei, Fergus & Torralba

Challenges 9: the world behind the image