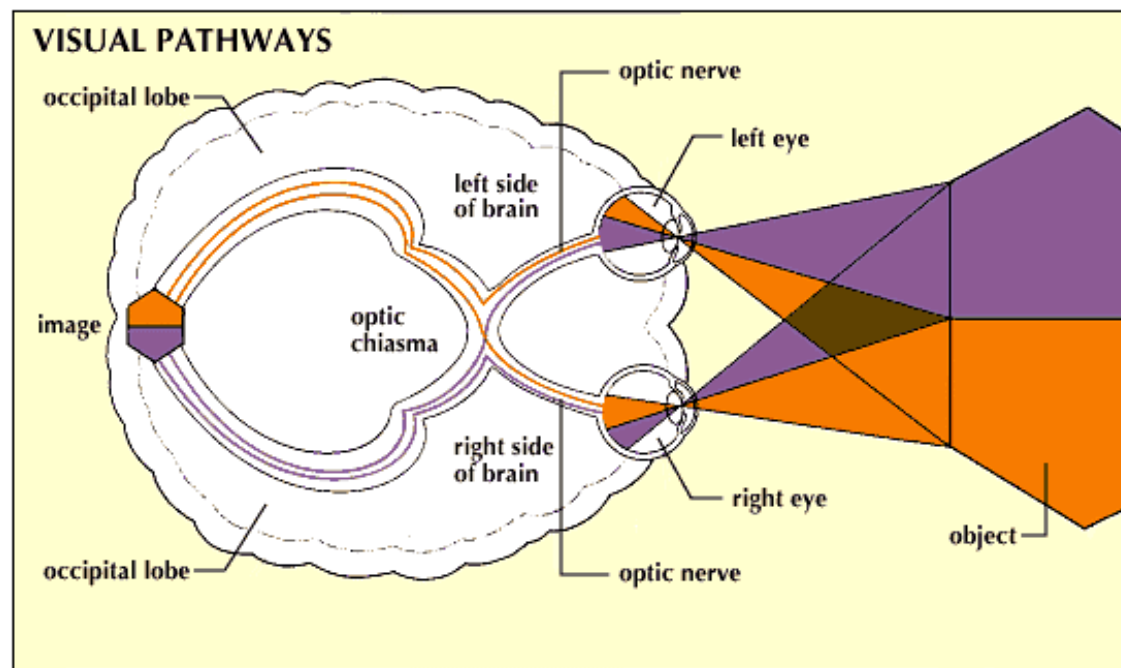


Sperry: Split-brain patients

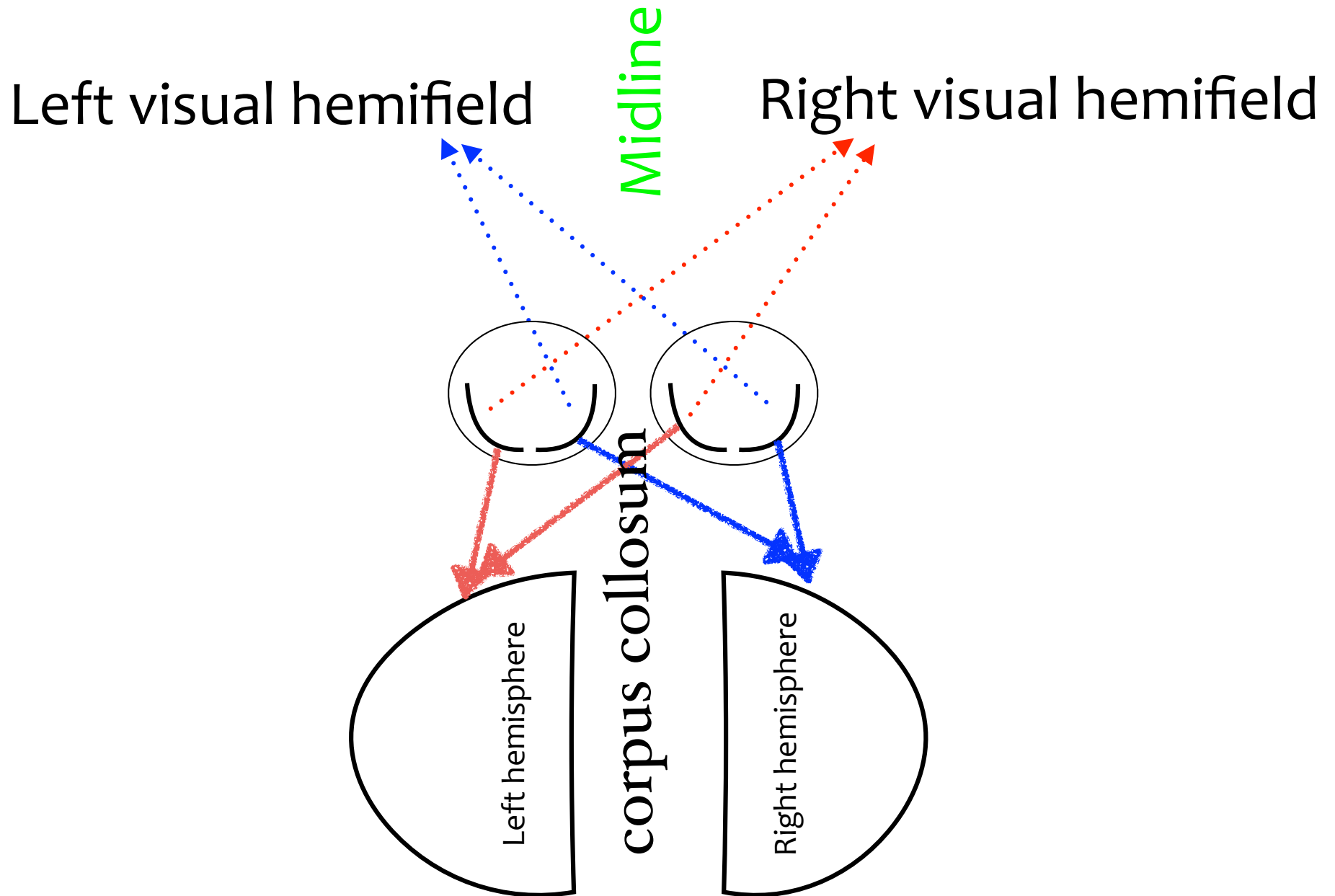
After the corpus callosum is cut, the two hemispheres are mostly independent, like two brains in one head



Contralateral: opposite side

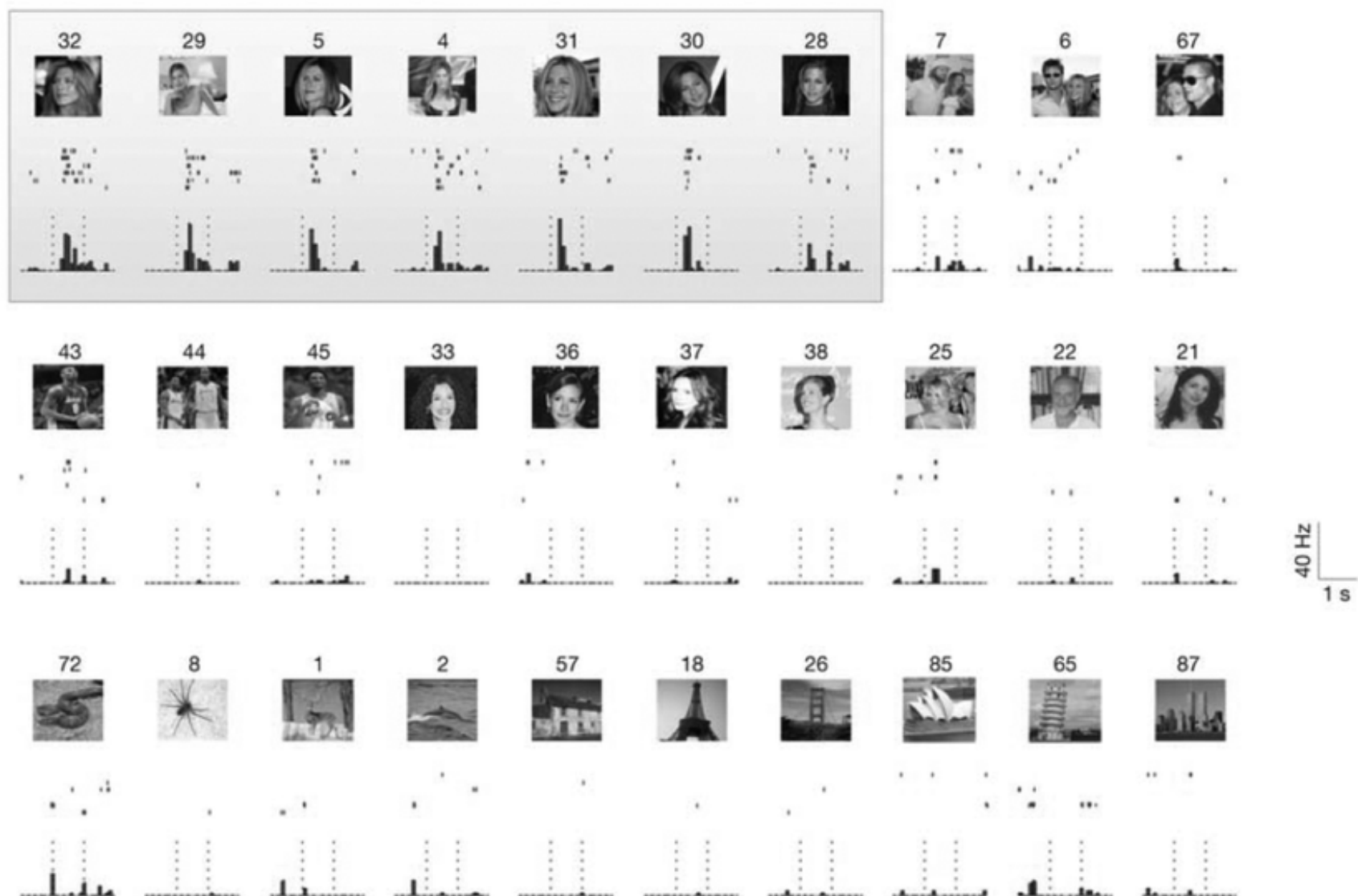
Ipsilateral: same side

Contralateral organization of visual hemifields



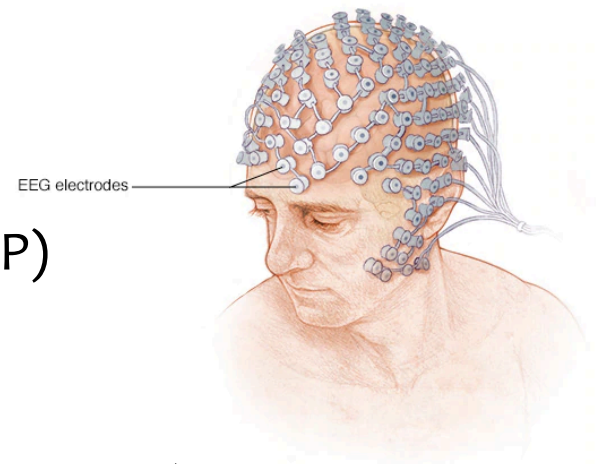
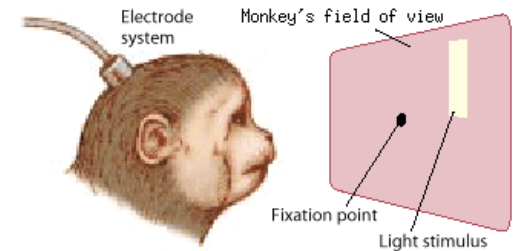
The limits of localization of function

- How specific does localization of function get? Do individual neurons have specific functions?
- “Grandmother cells”
- The case of the Jennifer Aniston cell



Neuroscientific methods

- Individual cellular recording
 - Electronic probes of individual neurons
 - Very sensitive, but also very invasive
 - Historically mostly in animals... now in humans too
- Electroencephalography (EEG)
 - An array of electrical probes on the scalp
 - Characteristic results: Event-related potentials (ERP)
 - High temporal precision but low spatial precision
- Lesion studies (strokes, surgeries, bullets, CO poisoning, etc.)
 - Study what cognitive deficits are associated with what injuries
- Neuroimaging (PET, fMRI, etc.)



Neuroimaging

- **PET** (Positron Emission Tomography), **fMRI** (functional Magnetic Resonance Imaging), etc.
- Methods for visualizing **blood flow** in the brain
 - = **BOLD** (Blood Oxygen Level Dependent) signal
 - which is assume to correlate to neural activity, over a slow time-scale (>~10seconds)
- Requires some sort of **comparison**, e.g. **Method of Subtraction**
- Controversial
 - Advocates argue it is a non-invasive way of directly observing neural activity
 - Detractors argue it is a very expensive way to localize function without providing real understanding

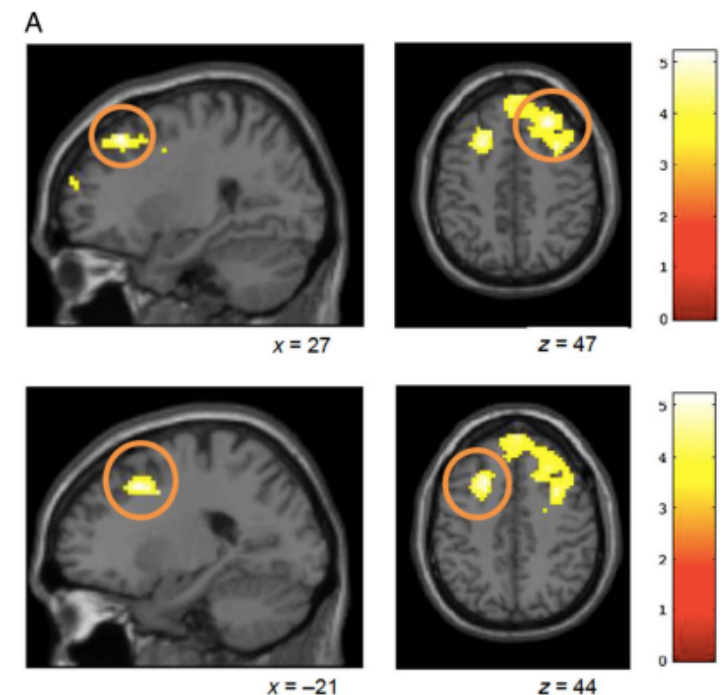
Example: statistical pattern learning

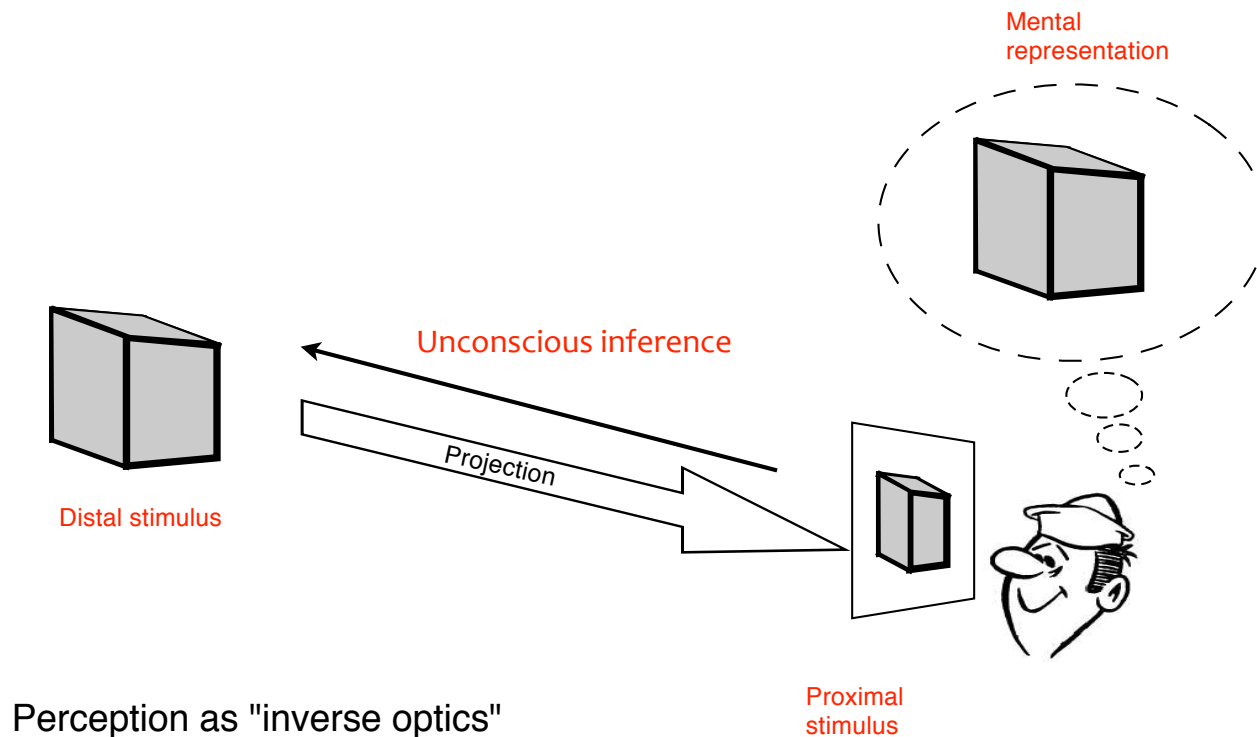
- Researchers taught subjects **statistical patterns** among visual items (letters in an unfamiliar alphabet)
- In the test phase, subjects were shown either (a) visual examples that **obeyed** the pattern or (b) **random** examples

- They then plotted those brain areas in which activity during (a) **was greater than** activity in (b)

i.e. a “map” of BOLD(a) - BOLD(b)

- Areas of greater activity in (a) include the Superior Frontal Gyrus (SFG)



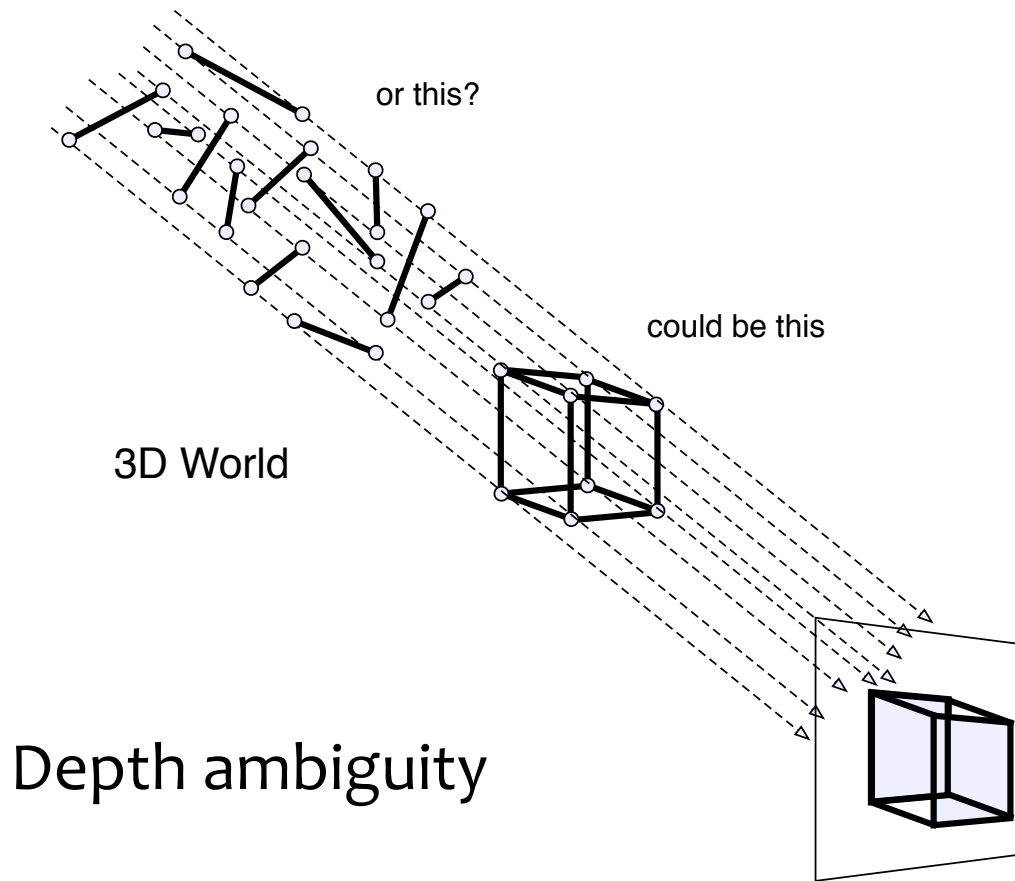


The **proximal stimulus** is the **sense-data**

- It is inherently **ambiguous**—consistent with many interpretations
- This is “**unconscious inference**” (Helmholtz 1867)

The goal of perception is to infer the properties of the world (the **distal stimulus**) based on the evidence in the proximal stimulus, plus other knowledge

-> Hopefully, this yields a **veridical** (true) representation



Each 2D stimulus is consistent with an infinite number of 3D objects (distal stimuli)

Generally, every stimulus is consistent with an infinite number of interpretations (scene models)



<http://www.youtube.com/watch?v=U9PZizBDBZw>

See also: <https://youtu.be/tBNHPk-Lnkk>

