

# Depth and size

## Binocular Vision Is NOT Essential

### Cues with 1 and/or 2 eyes:

- accommodation & convergence
- texture gradient
- atmospheric perspective
- linear perspective
- familiar size
- height in the field of view
- shadows
- interposition (occlusion)
- motion
- motion parallax

### Cues with 2 eyes only:

- binocular disparity**
  - crossed
  - uncrossed

## Horopter & Panum's Fusion Area

### Depth (size) constancy

- binocular disparity
- Wallach & Zuckerman (1963)
- motion parallax

### Physiology: binocular disparity

- Barlow et al.
- Poggio et al.

Atmospheric perspective    Height in the field of view

Perspective

Interposition

Shadows



*Un tipico paesaggio toscano lungo la Via Francigena*

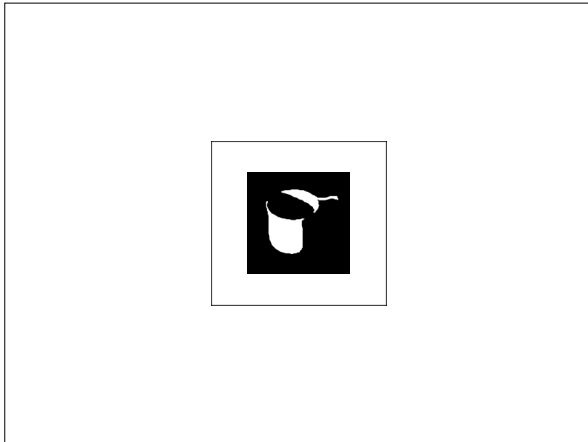
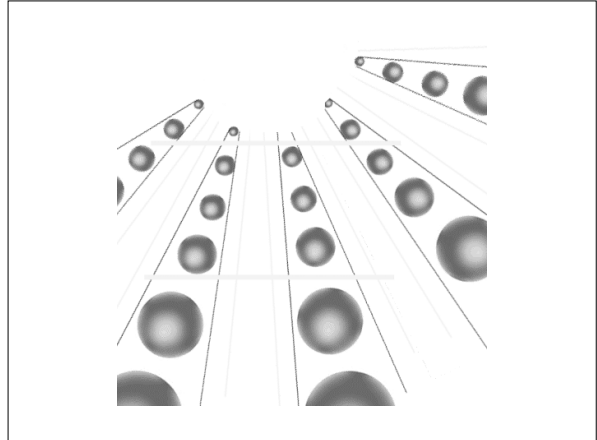


*Luni (Liguria). Particolare del decumano massimo, tratto cittadino dell'Aurelia*

Atmospheric perspective  
Linear perspective  
Texture gradient  
Height in the field of view  
Interposition



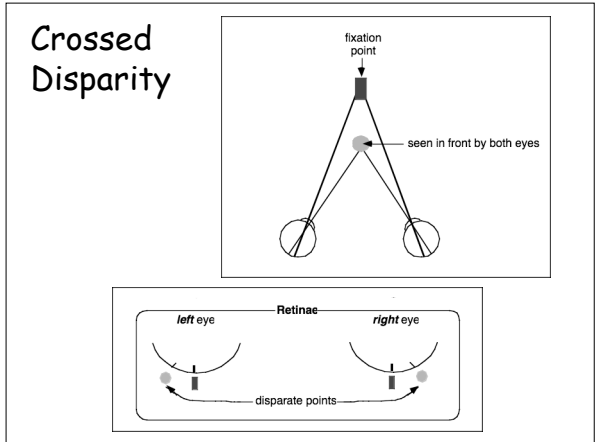
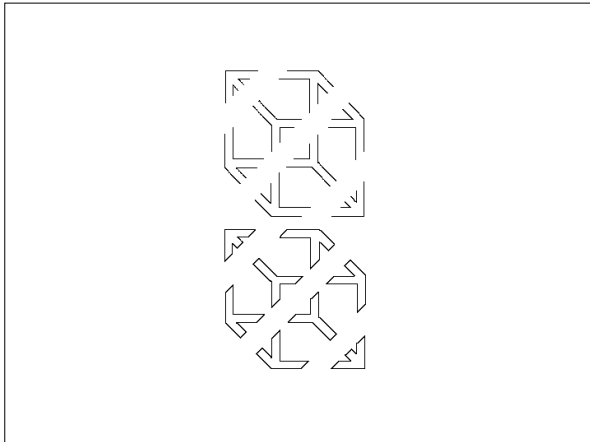
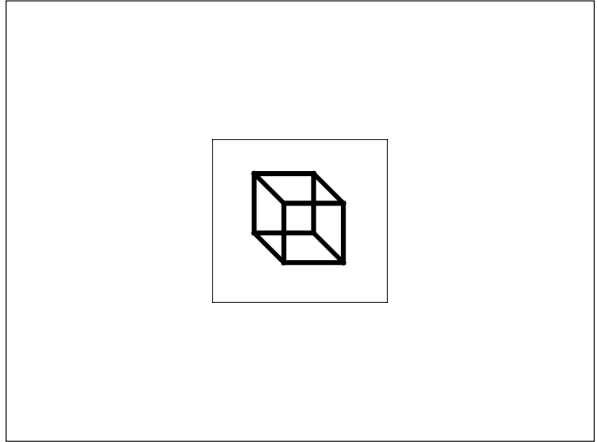
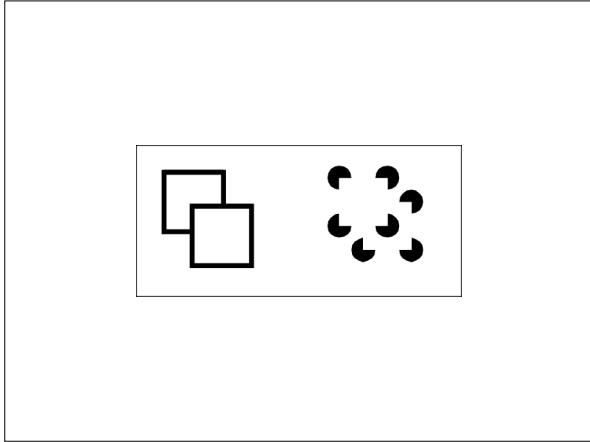
*Abbazia-ospizio di San Michele della Chiusa (Piemonte).*



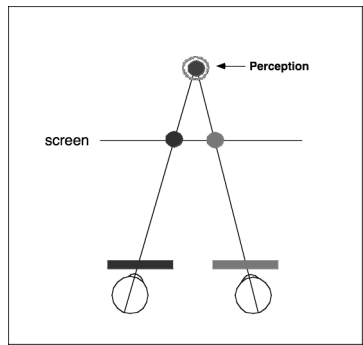
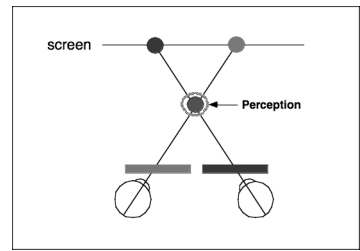
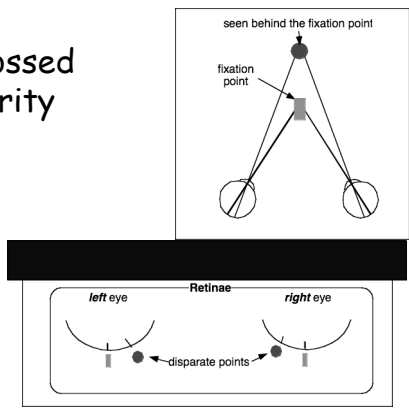
## Familiar size

Mobility 1  
Made exclusively  
for Apple by  
Stromhaven  
for your  
new  
12" iBook.

Student, faculty  
or staff?  
Find out if you  
qualify for  
education  
discounts.



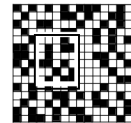
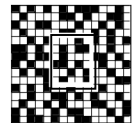
# Uncrossed Disparity



## Julesz random dot stereogram

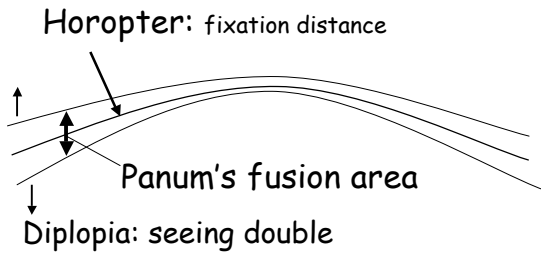
Left eye

Right eye

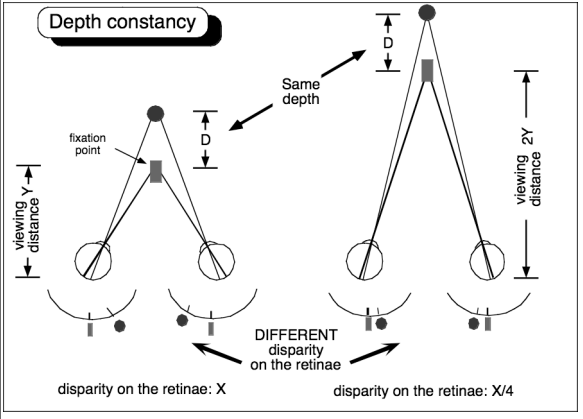


Disparity only

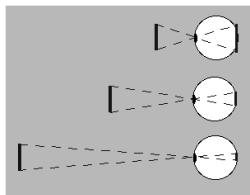
## Horopter & Panum's Fusion Area



## Depth constancy

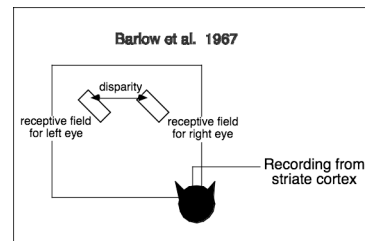


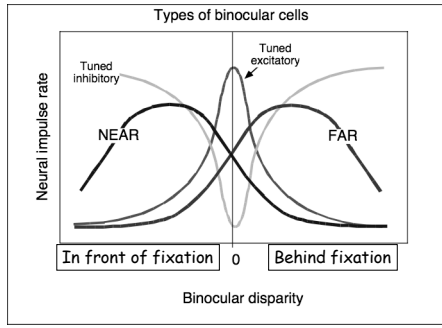
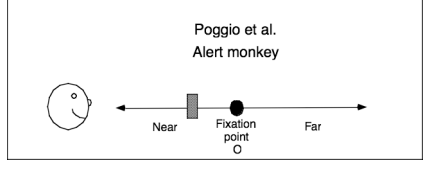
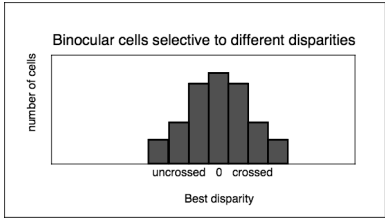
## Size constancy



The size of the proximal image is inversely proportional to the square of the viewing distance. In other words, when we increase the viewing distance by a factor of 2, we decrease the size of the image on the retina by a factor of 4.

## Physiology: Binocular cells

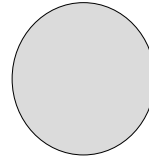




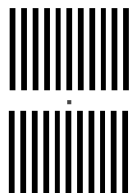
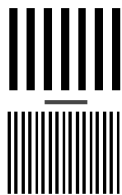
**The moon illusion**



[http://www.yorku.ca/hono/parallax\\_demo/](http://www.yorku.ca/hono/parallax_demo/)



### Size aftereffect



Adapted from Blakemore & Sutton, 1969