Lecture 1 Eye and Human Vision

COMP3204 & COMP6223 Computer Vision

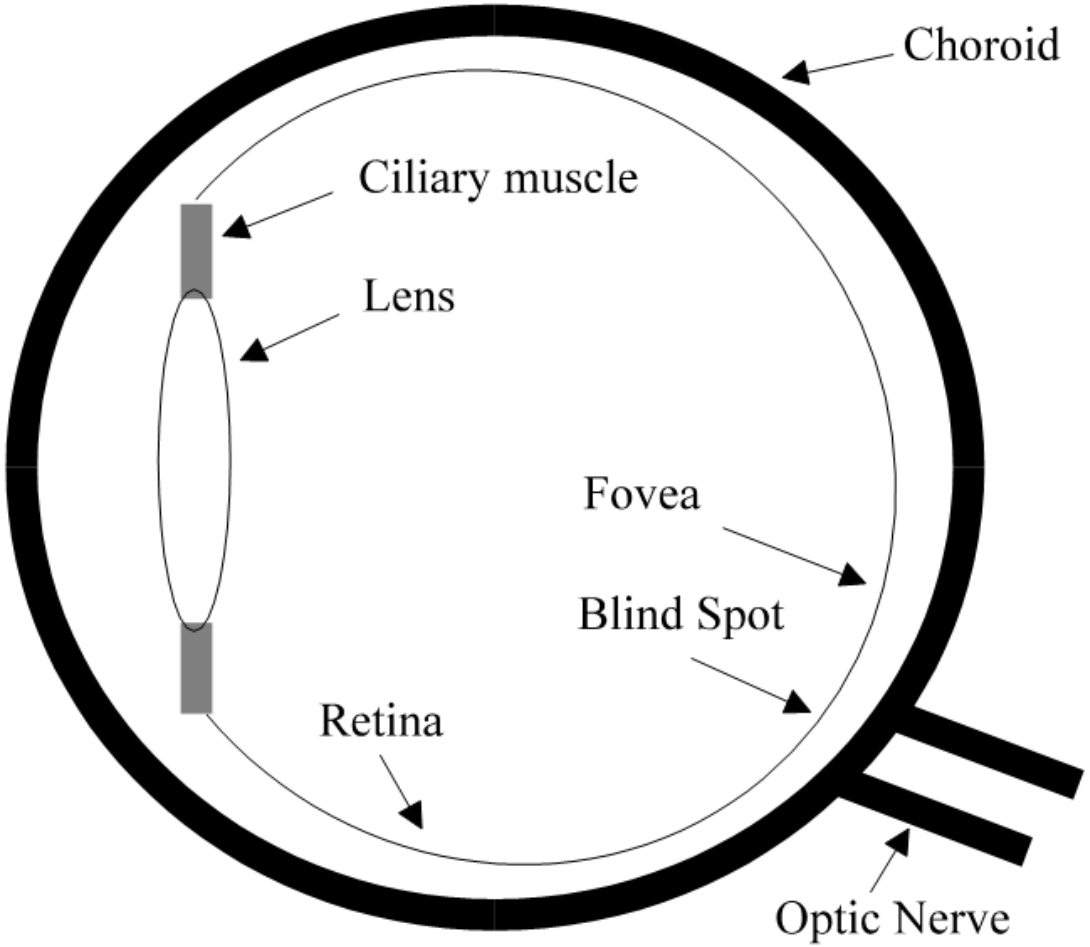
Is human vision a good model for computer vision?

Book pp 2-12

Department of Electronics and Computer Science

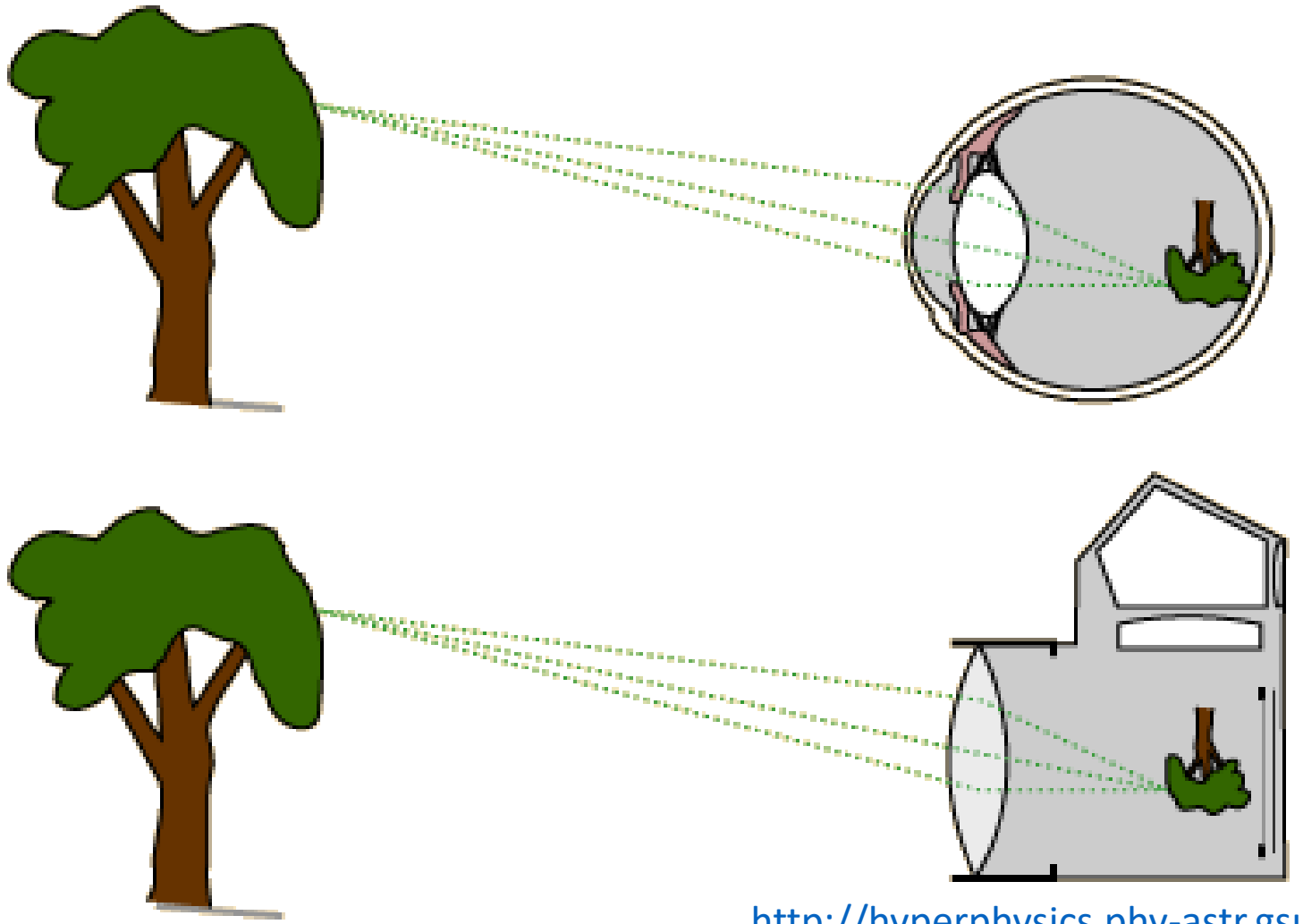
UNIVERSITY OF Southampton
School of Electronics and Computer Science

Human eye


Choroid
Ciliary muscle
Lens
Fovea
Blind Spot
Retina
Optic Nerve

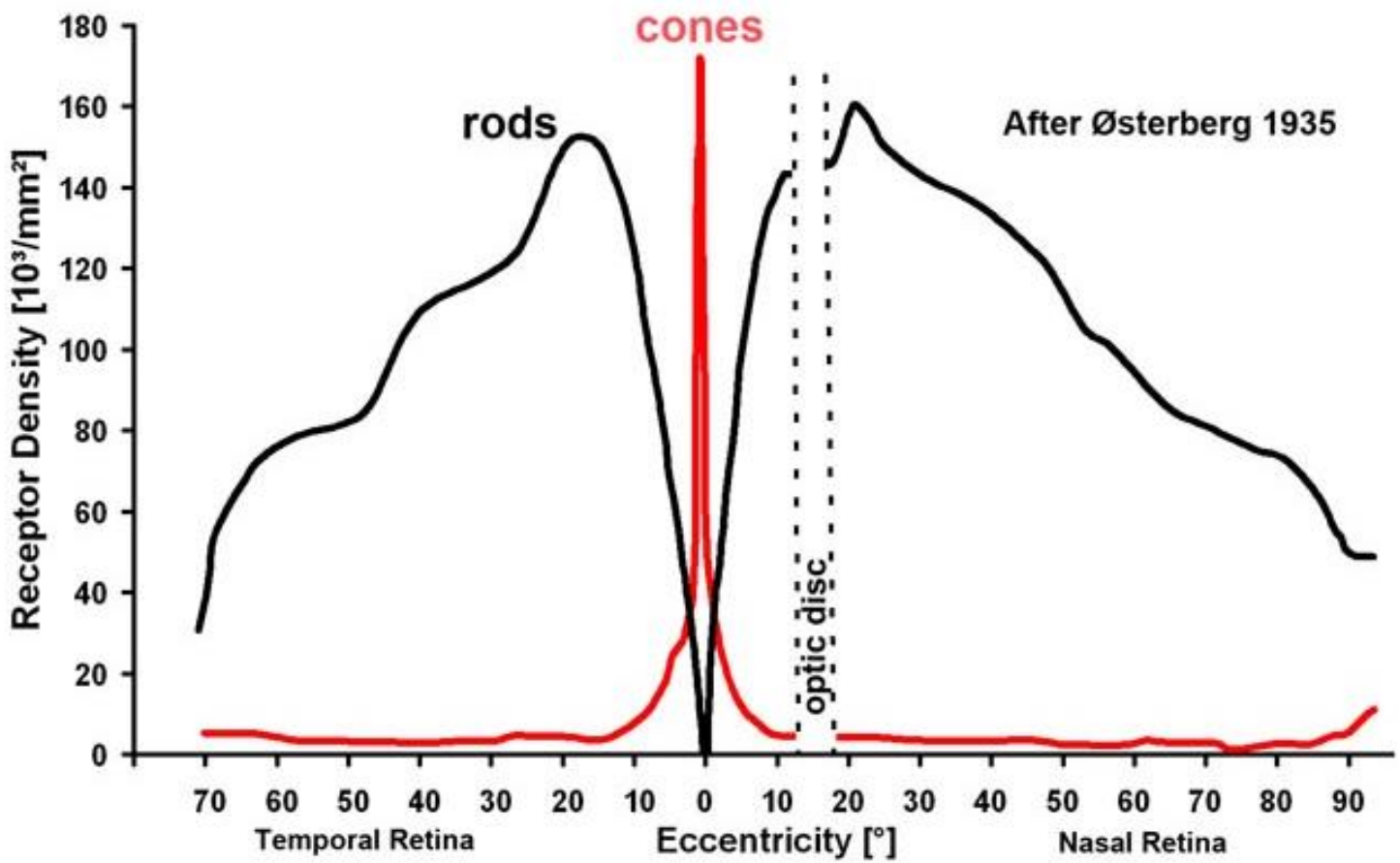

FEATURE EXTRACTION
AND IMAGE PROCESSING
FOR COMPUTER VISION

Optics

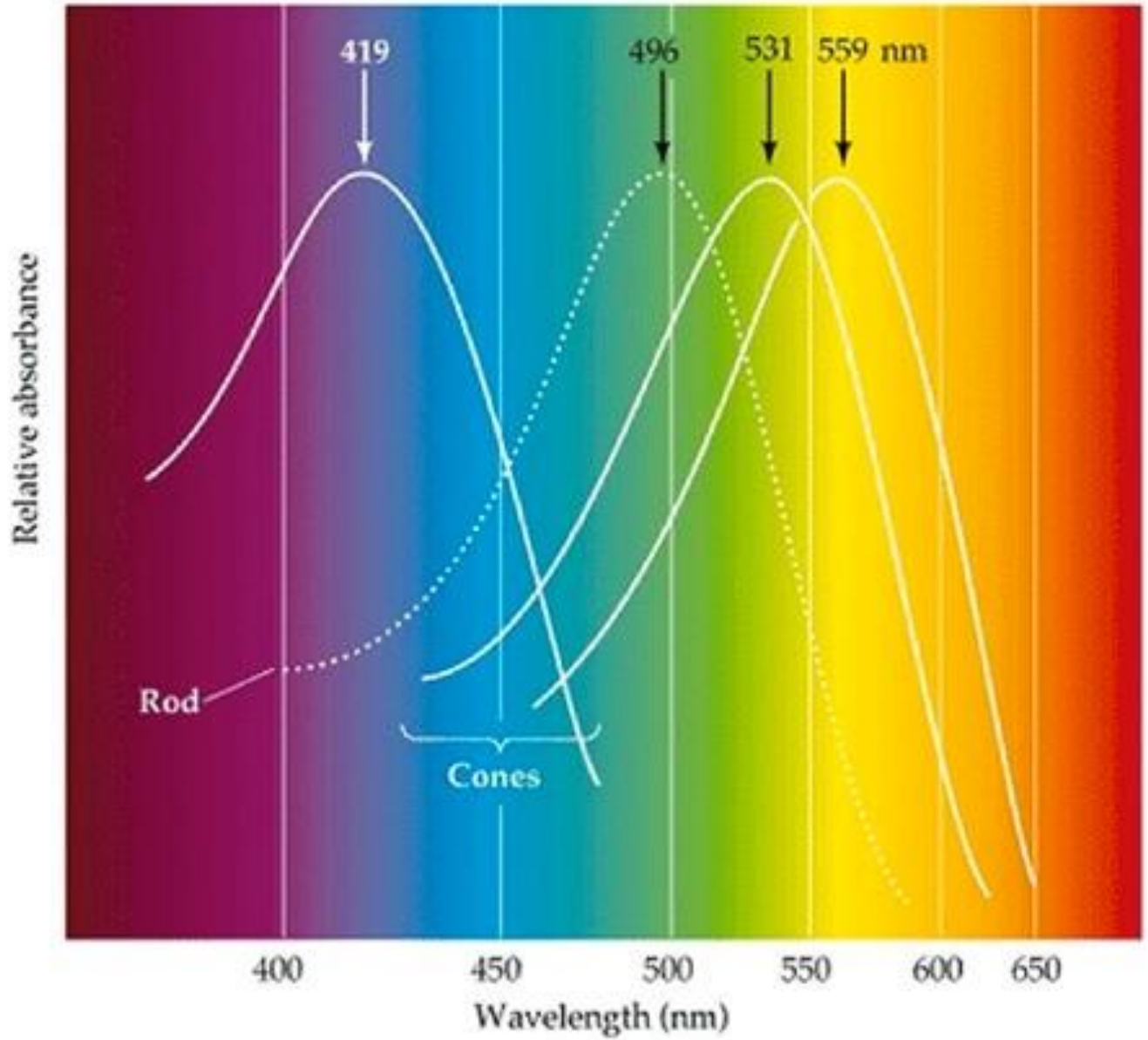


http://hyperphysics.phy-astr.gsu.edu/hbase/vision/rfreye.html

Rod and cone densities

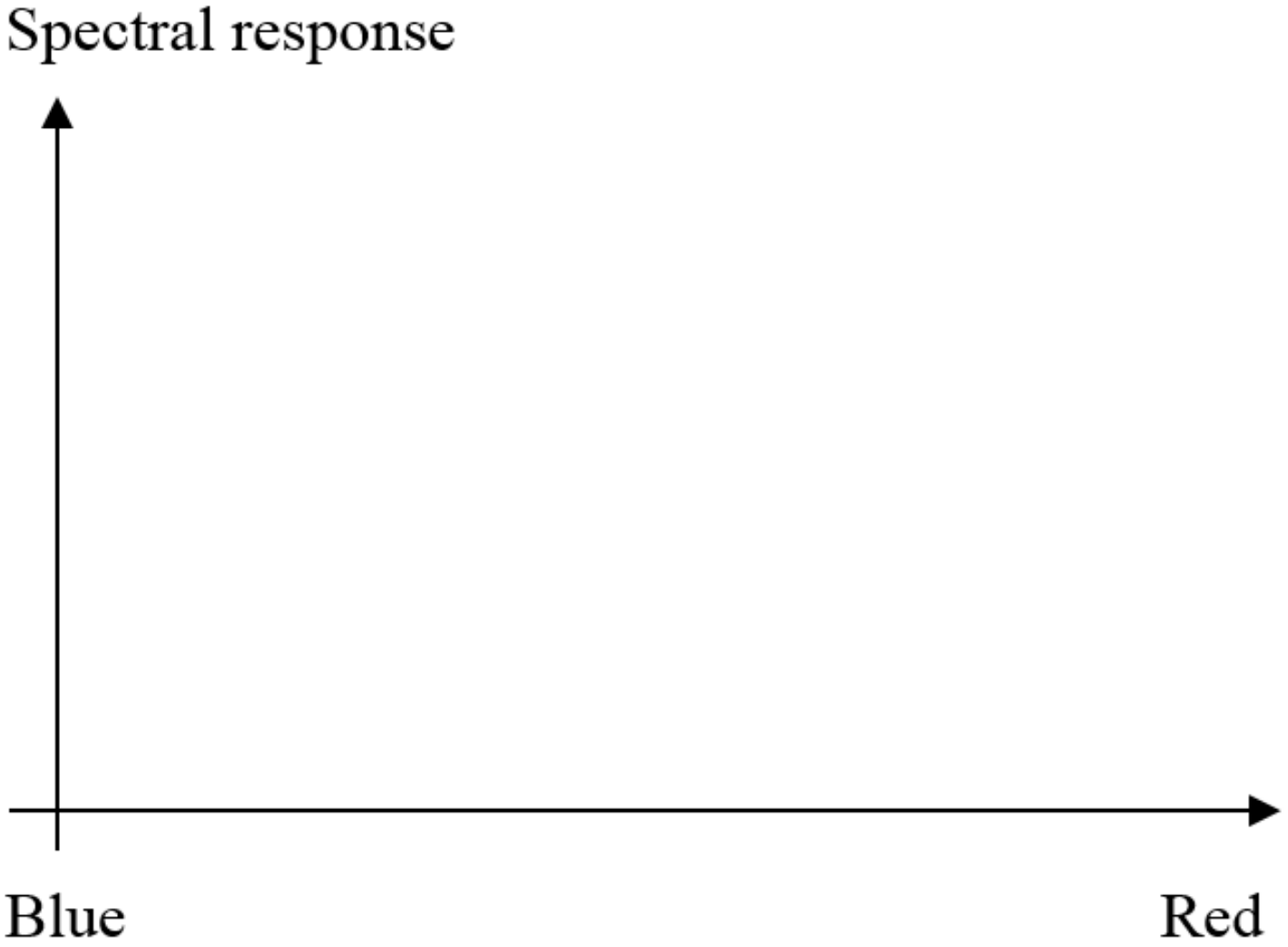


http://webvision.med.utah.edu/imageswv/Ostergr.jpeg

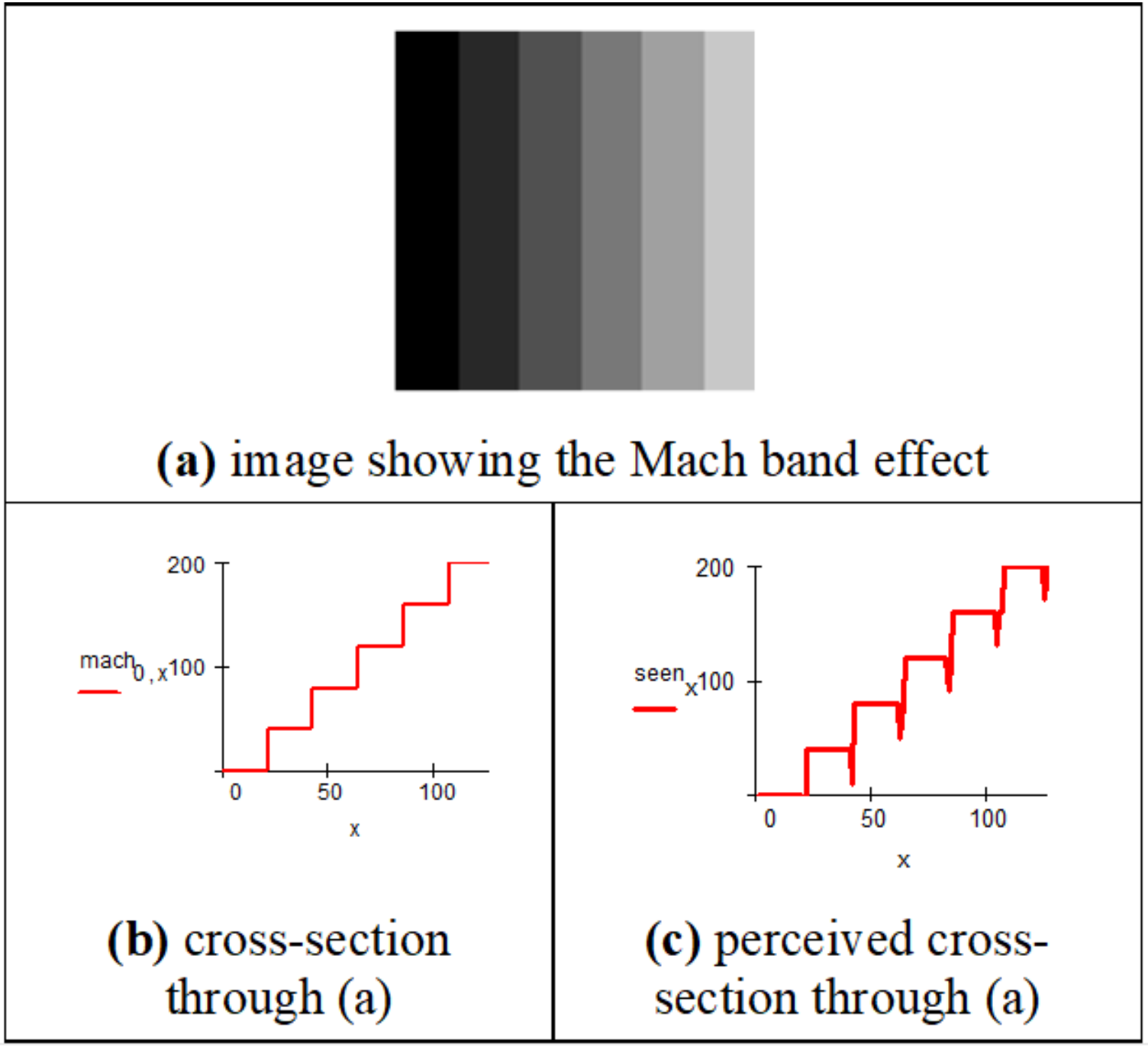


http://webvision.med.utah.edu/wp-content/uploads/2011/03/Spectrum.jpeg

Spectral responses



Mach bands


(a) image showing the Mach band effect
200
mach 0 , x 100
0
50
100
x
(b) cross-section through (a)
200
seen x 100
0
50
100
x
(c) perceived cross-section through (a)


FEATURE EXTRACTION
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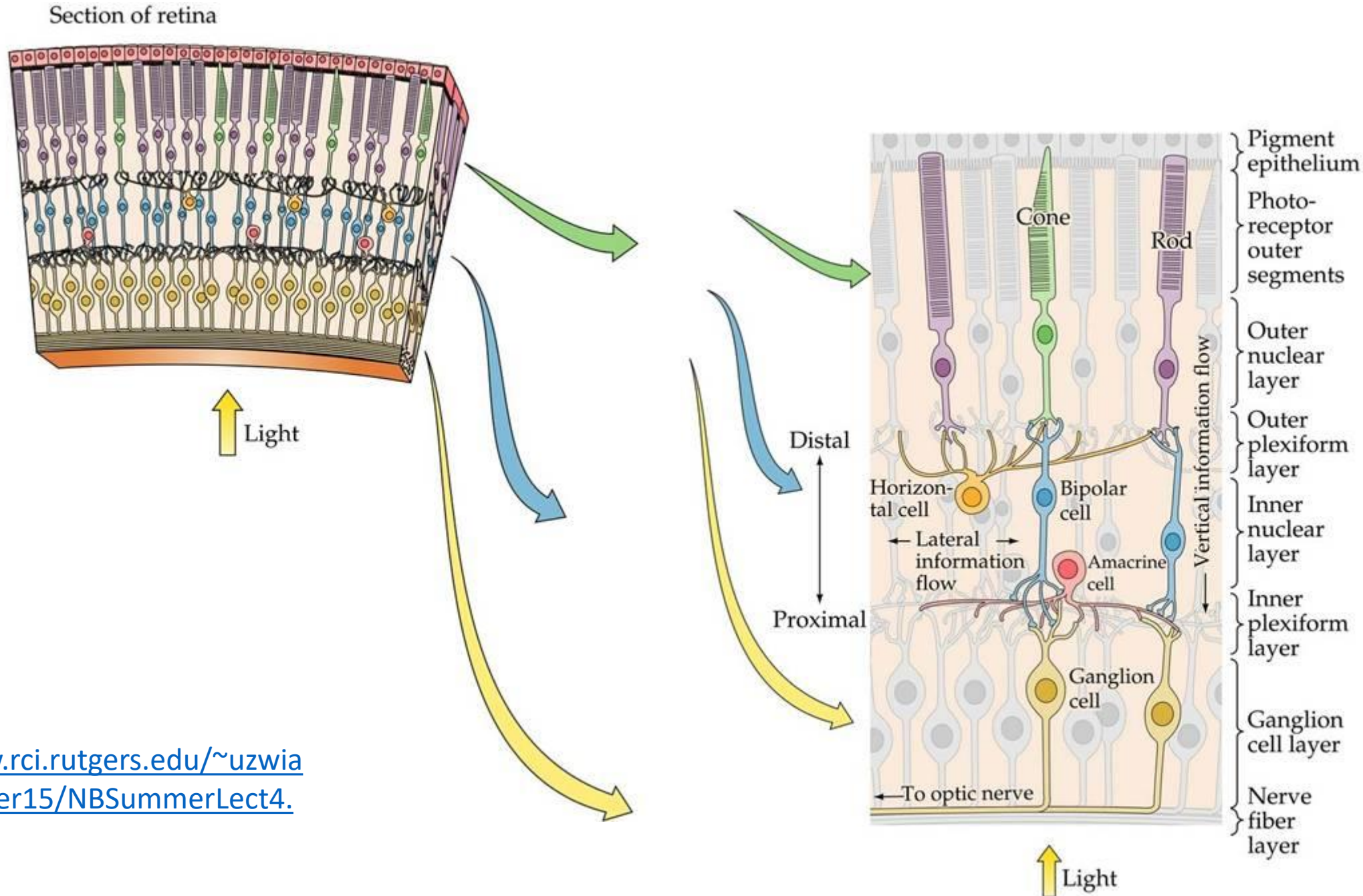
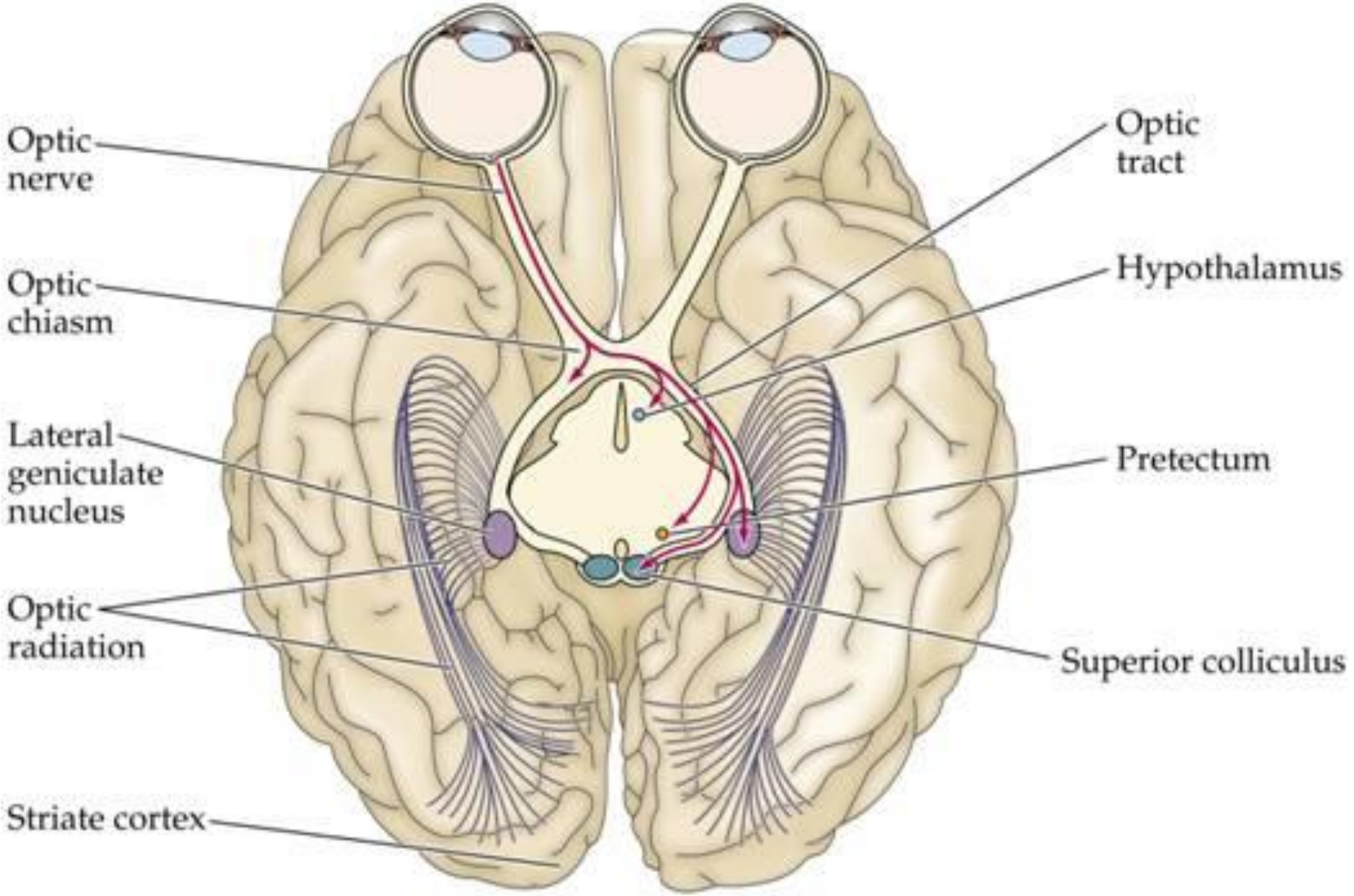


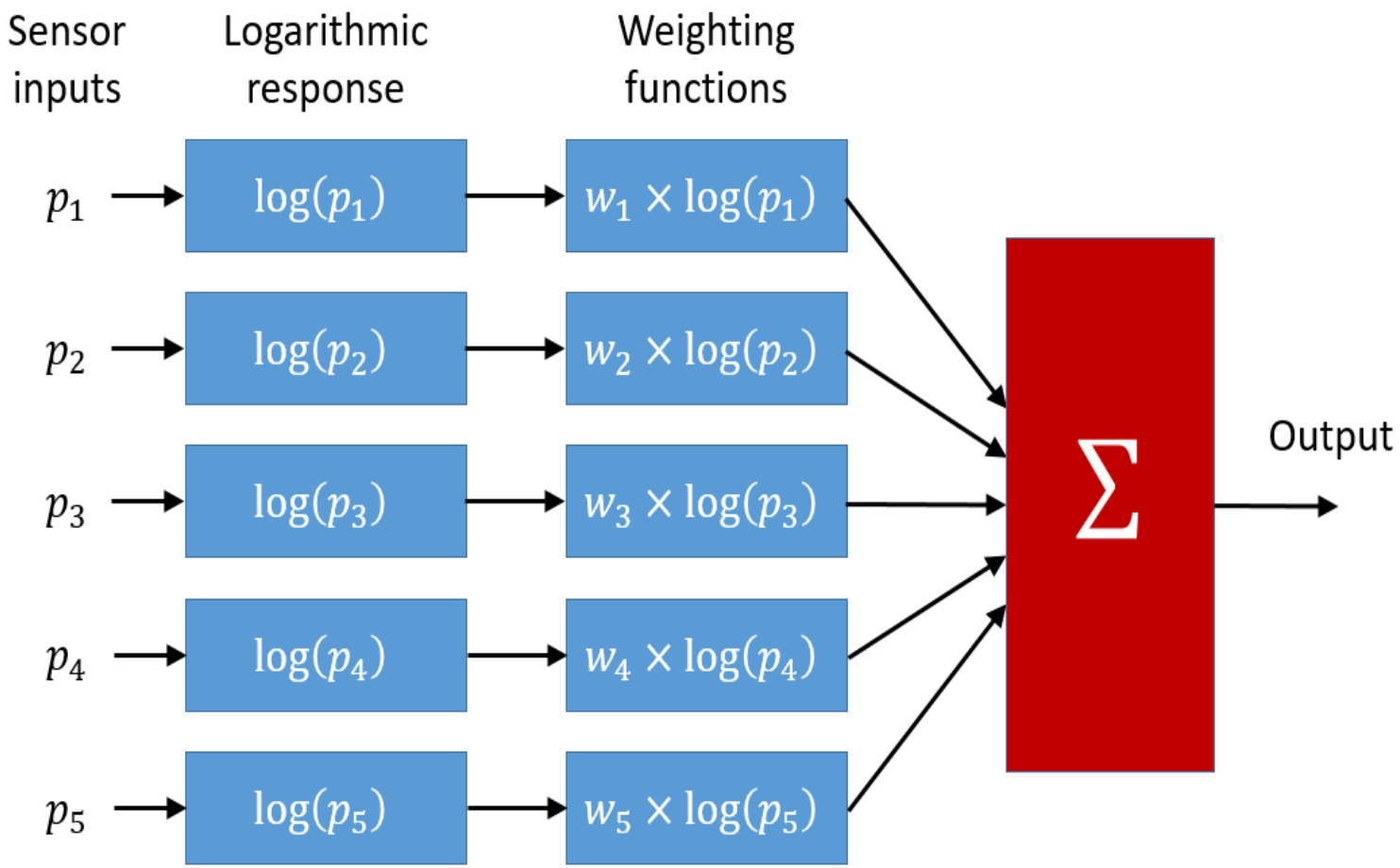
http://www.rci.rutgers.edu/~uzwiak/NBSummer15/NBSummerLect4.html

Cortices



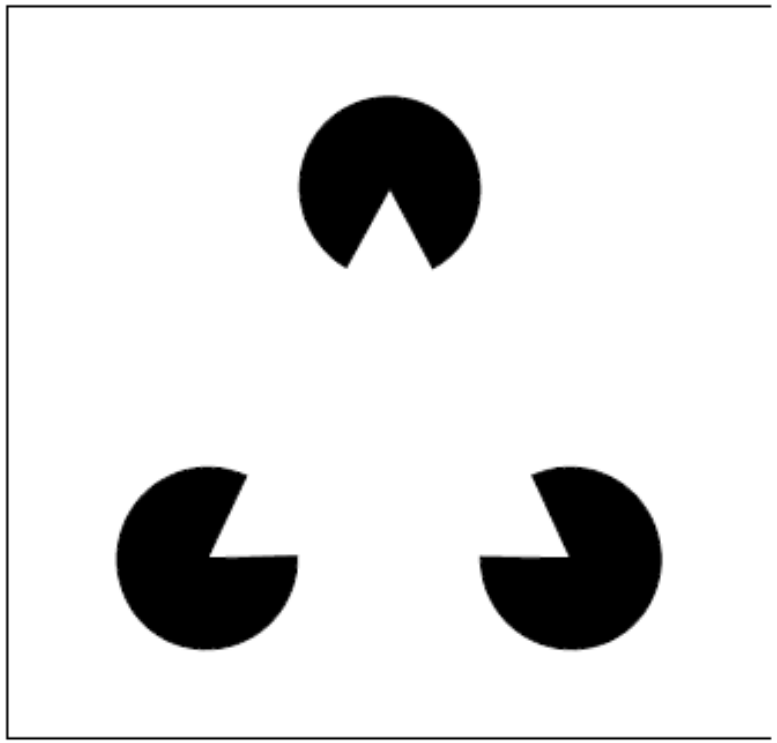
http://www.rci.rutgers.edu/~uzwiak/NBSummer15/NBSummerLect4.html

Neural processing



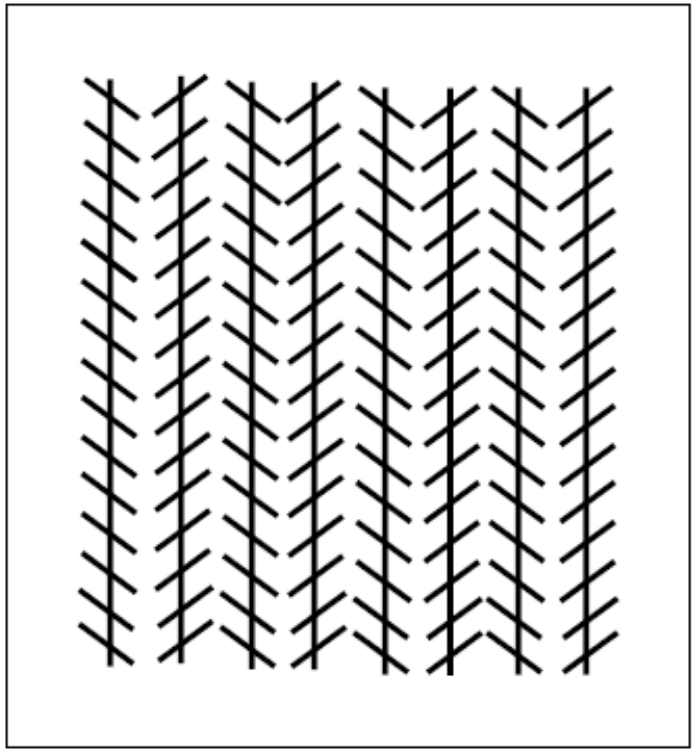
How human vision uses edges

(a) word?

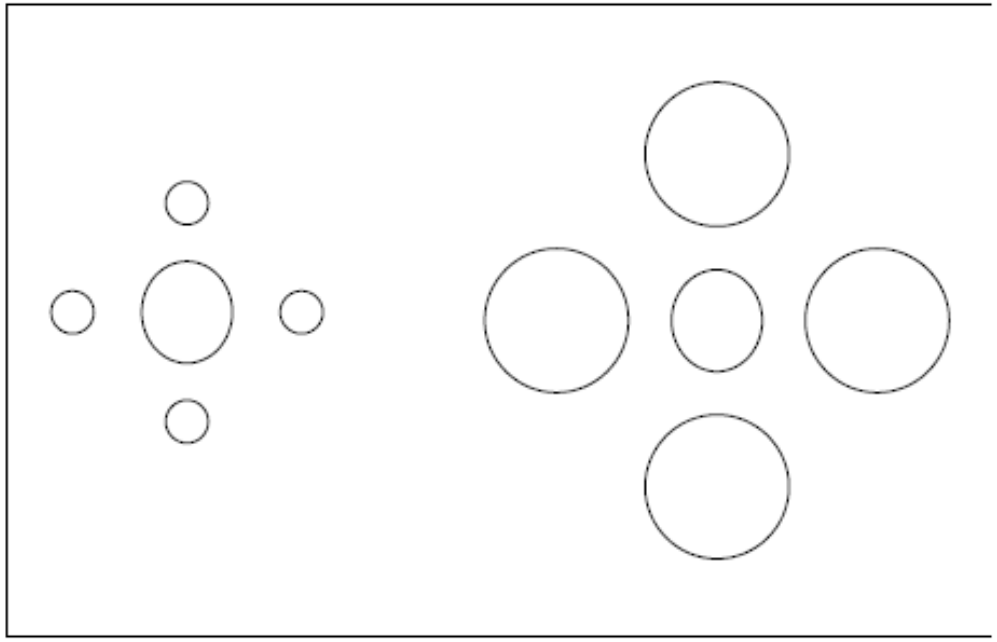


(b) Pacmen?

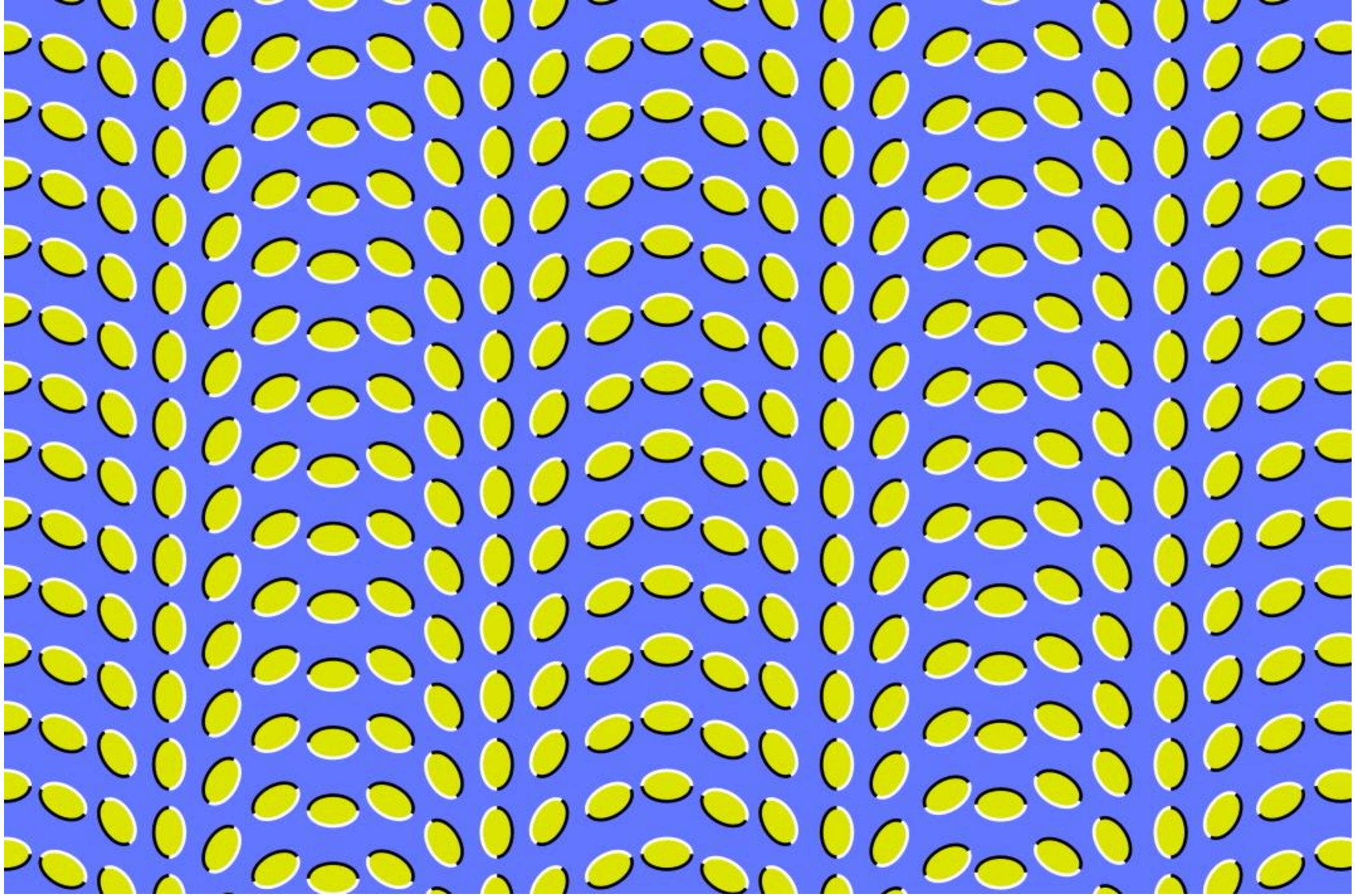
Static illusions

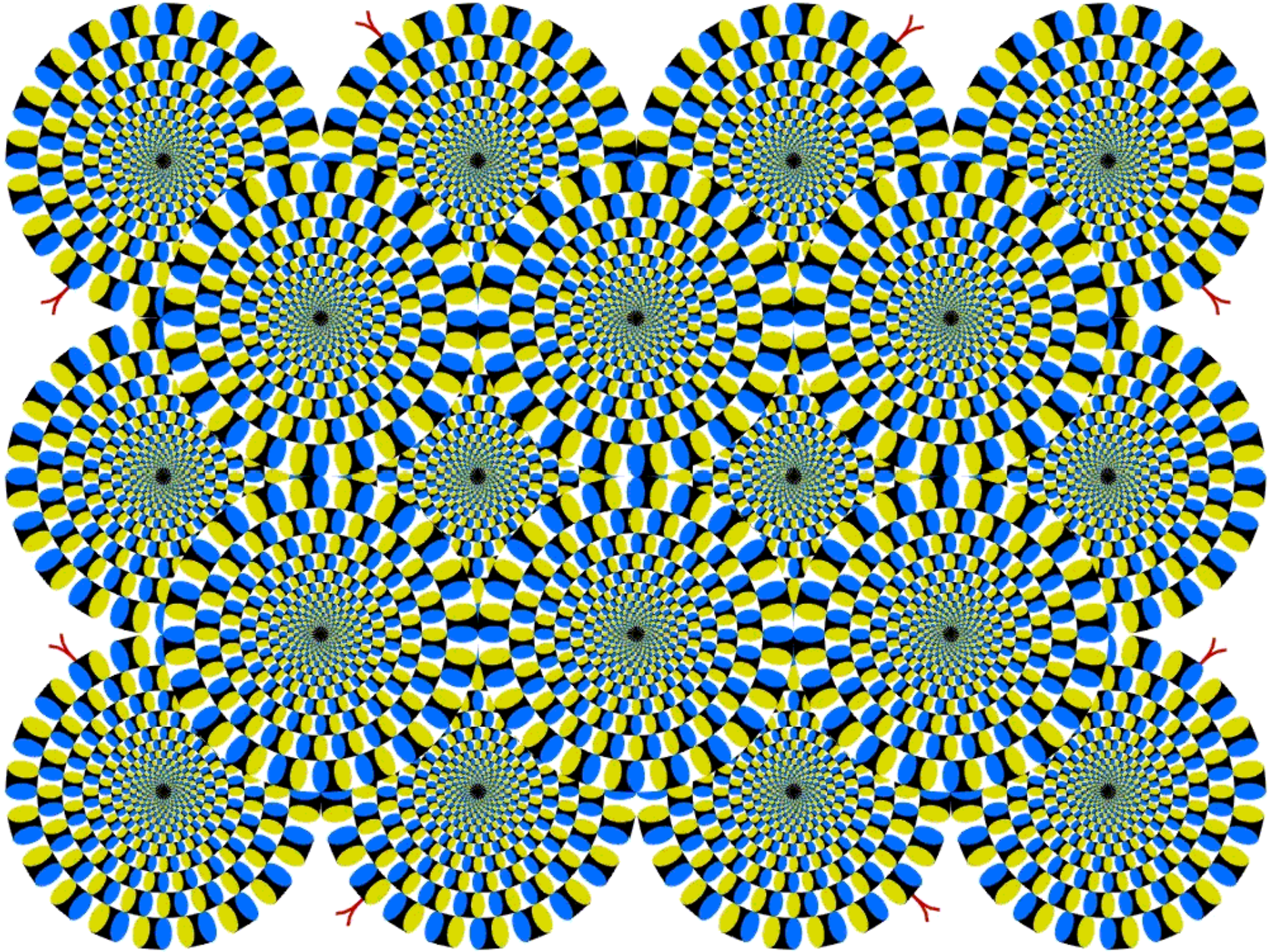


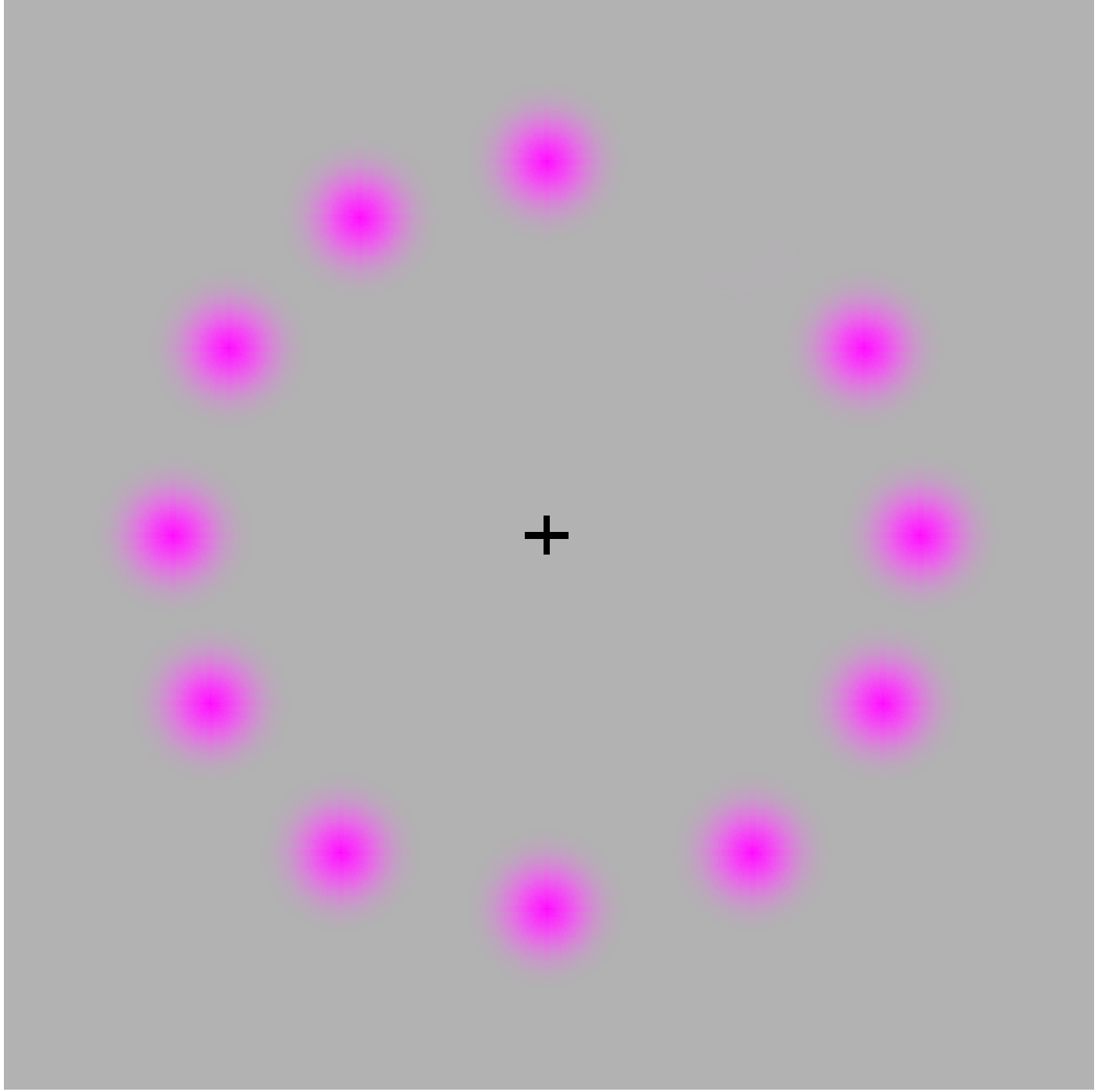
(a) Zollner



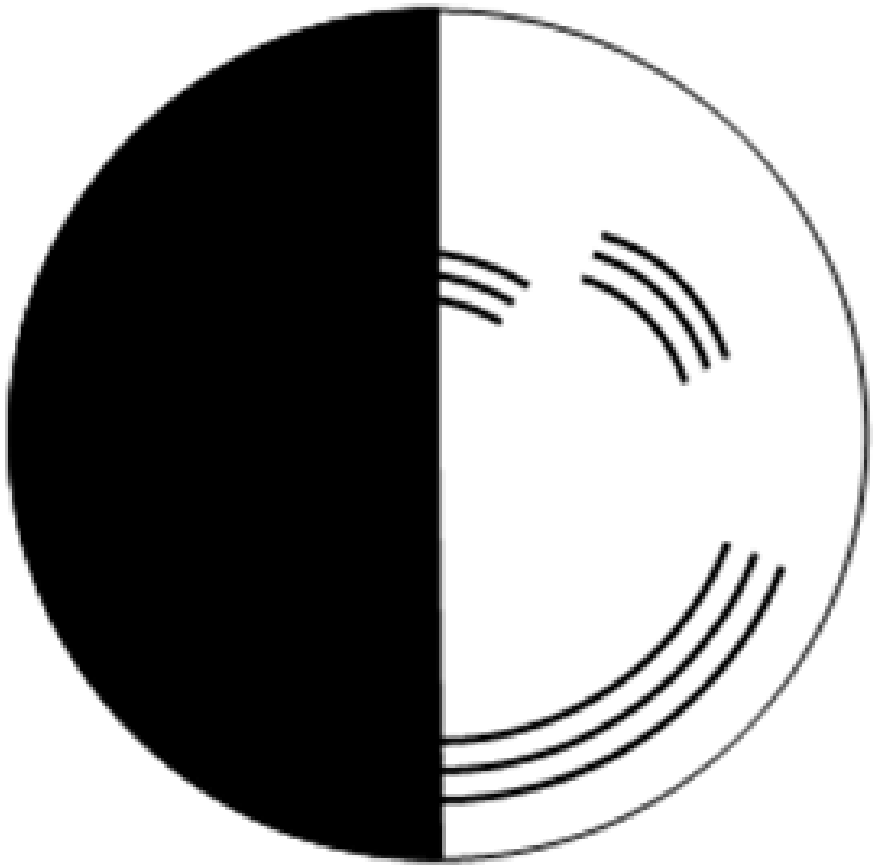
(b) Ebbinghaus







Benham’s disk



Combining Computer and Human Vision

Eyewitness statement

"24 year old male average height wearing shirt"

Human vision with notions of psychology

Database of images

Generate descriptions

Computer vision by human vision

Computer vision by human vision

Generate description

Image of crime

Subject	Gender	Age	Height	Nose W	Top
?	M	24	171	2.4	Shirt

Subject	Gender	Age	Height	Nose W	Top
123456	M	25	172	2.3	Shirt
123457	F	36	156	2.2	Blouse
123458	M	58	182	1.2	T shirt

Database of descriptions

Martinho-Corbishley, Nixon and Carter, *IEEE TPAMI* 2018