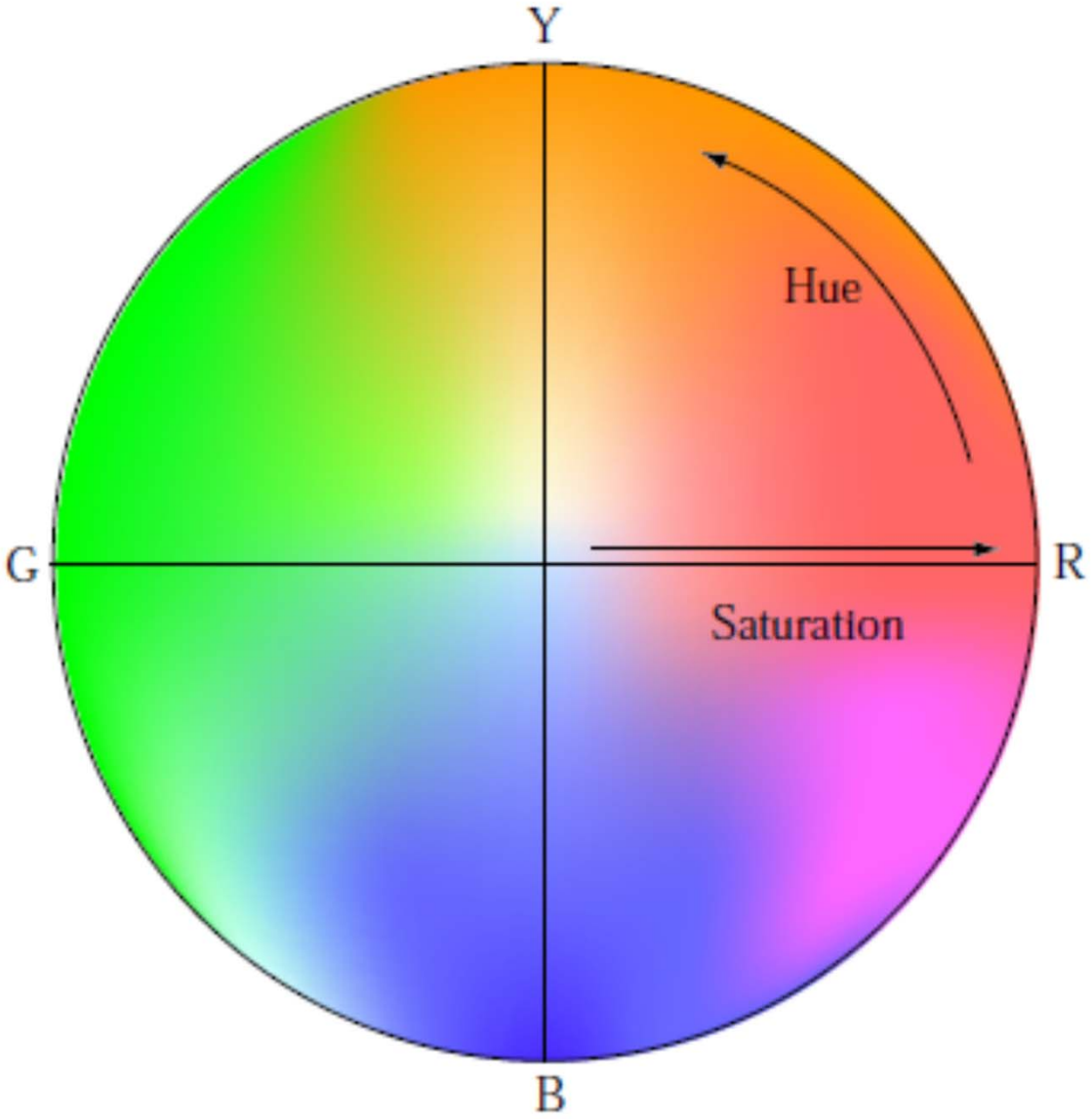

Starry Night by Vincent van Gogh (1889)

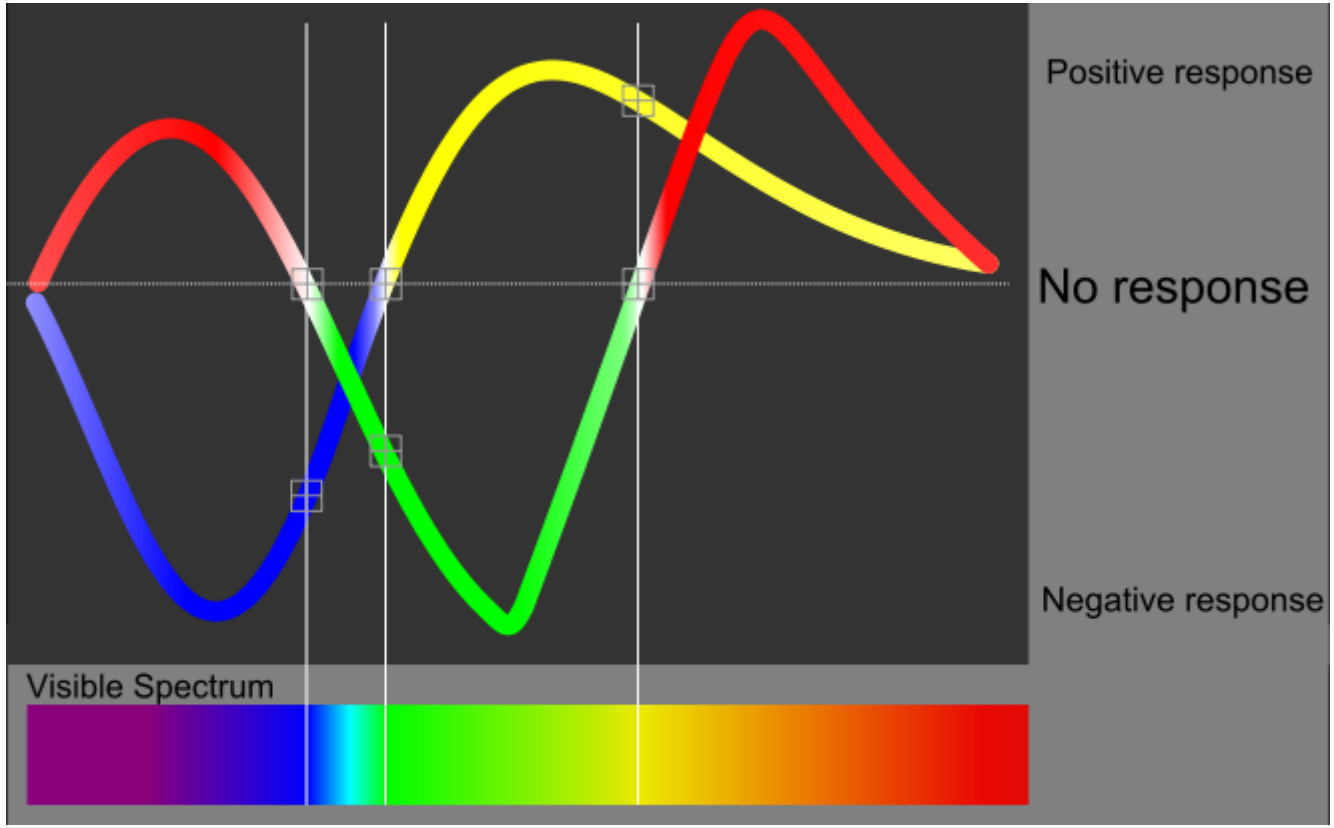

keep staring at the black dot.


johnsadowski.com

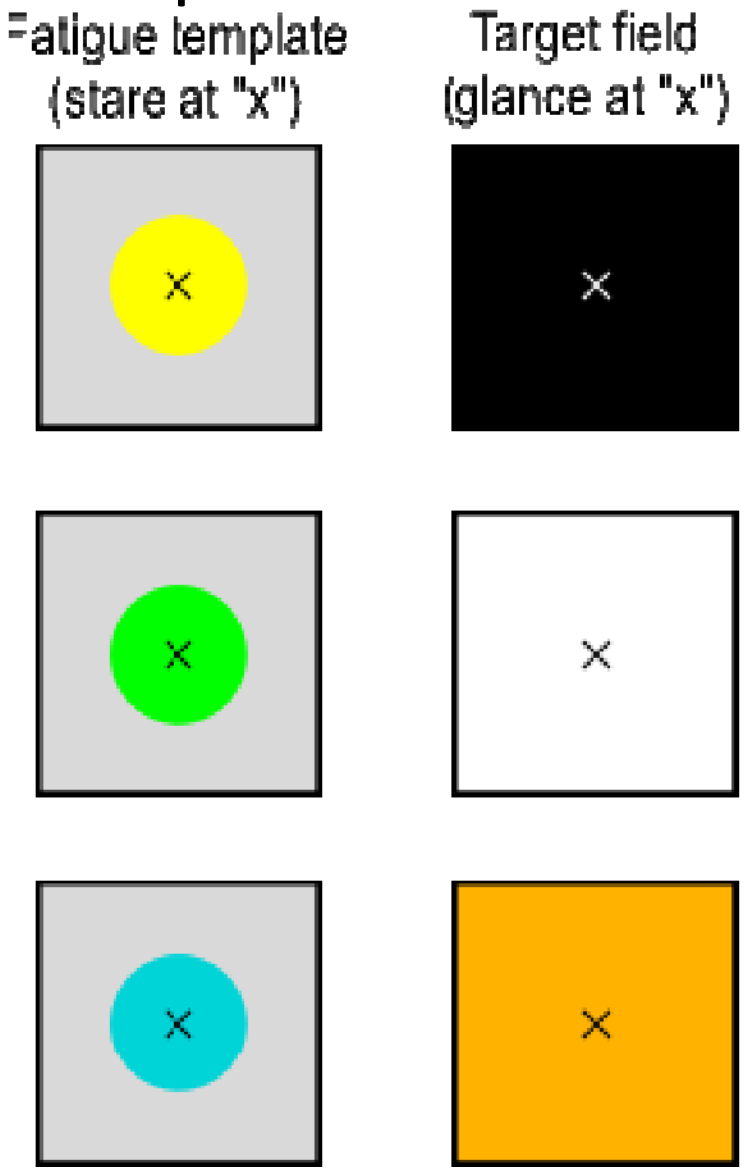


Color cycle

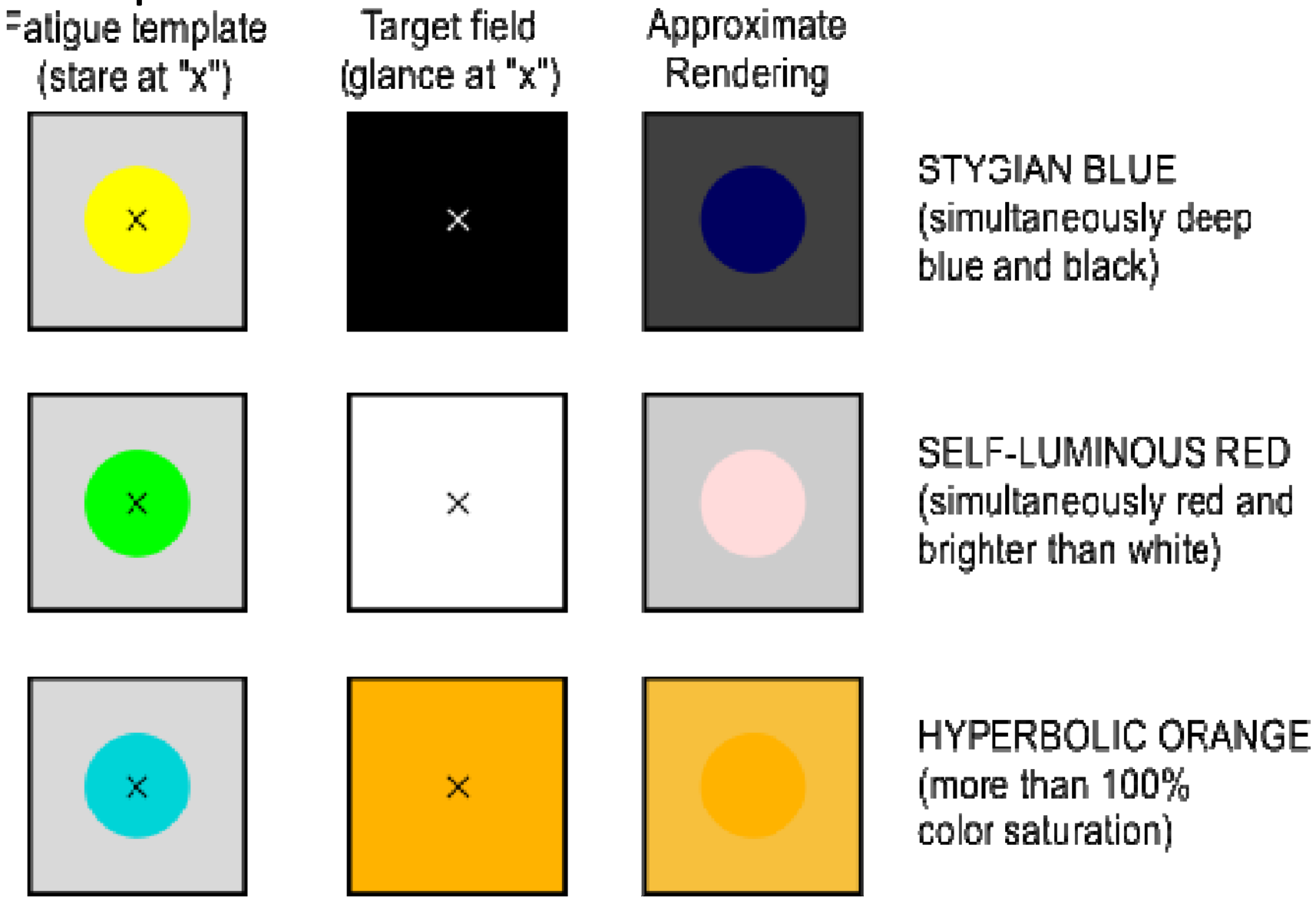
视觉颜色系统


Positive response
No response
Negative response
Visible Spectrum

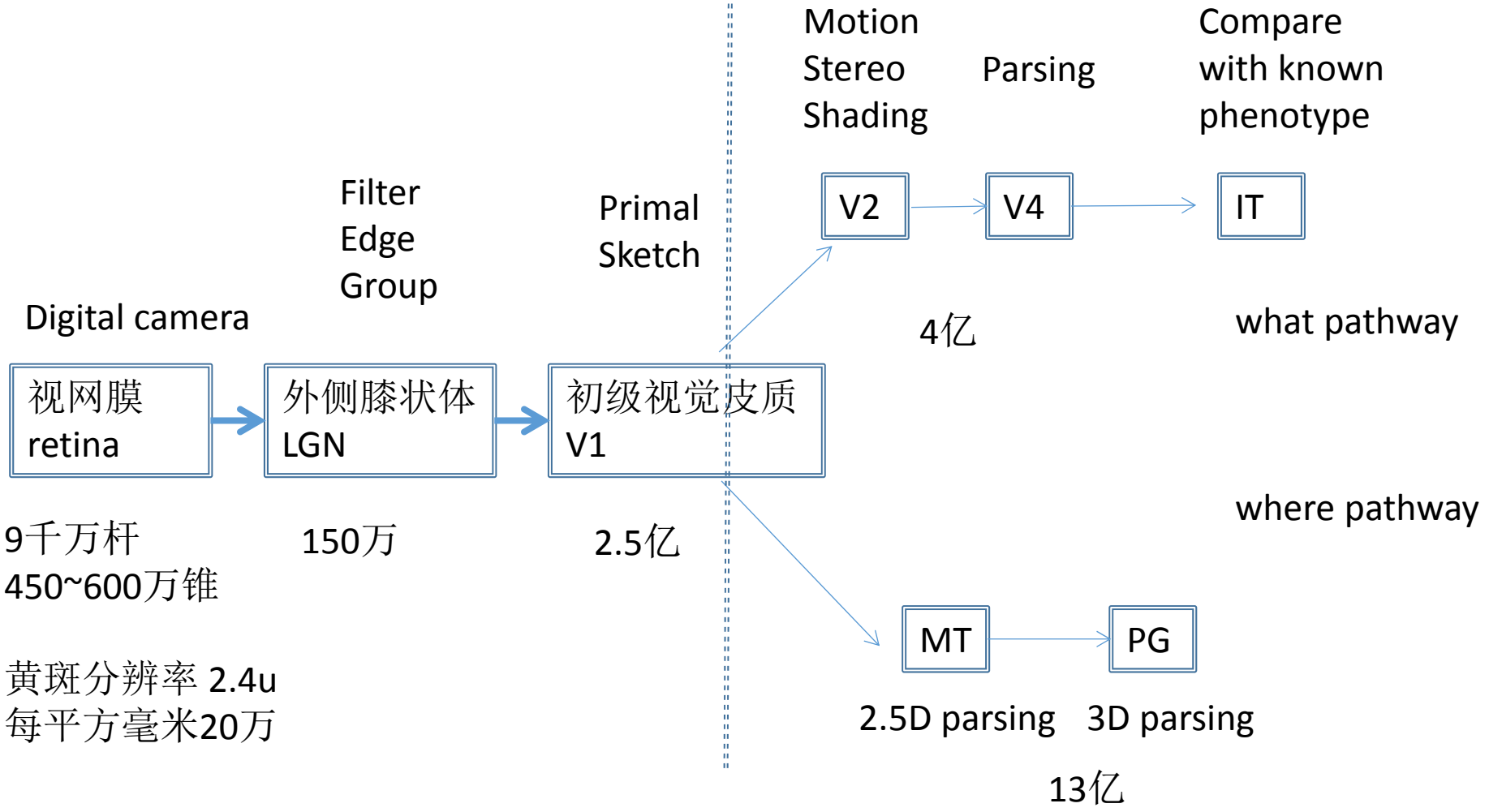
Impossible colors



Impossible colors



视觉的基本神经模式

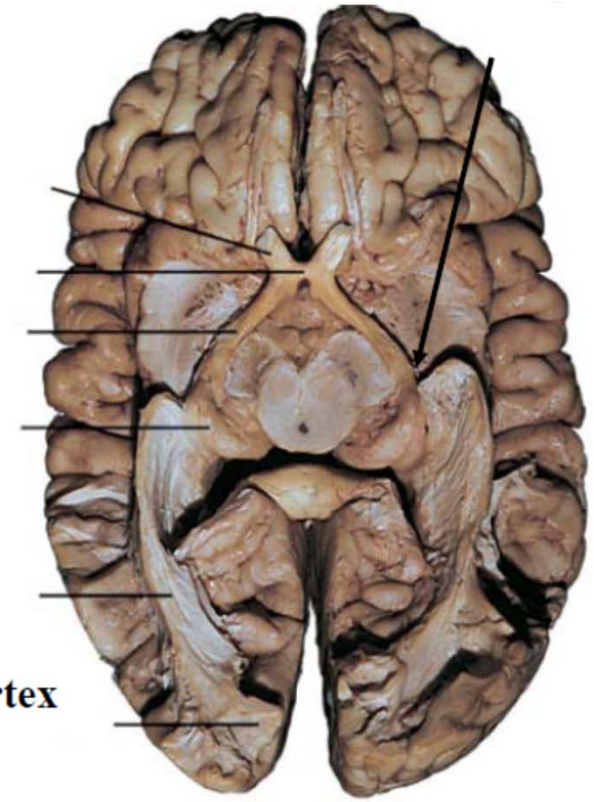


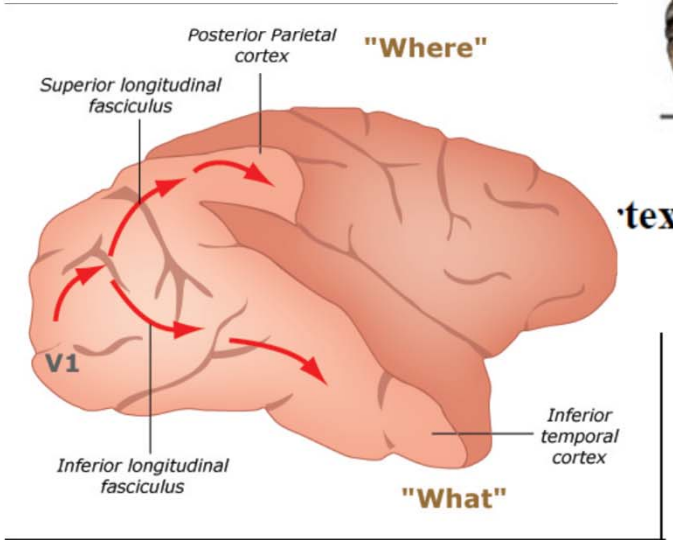
Computations in the early visual cortex, Journal of Physiology - Paris 97 (2003) 121–139

两个神经通路:腹侧通路和背侧通路 where & what

Where:

- 40% 来自黄斑, 60% 来自外周
- What:
- 100%来自黄斑



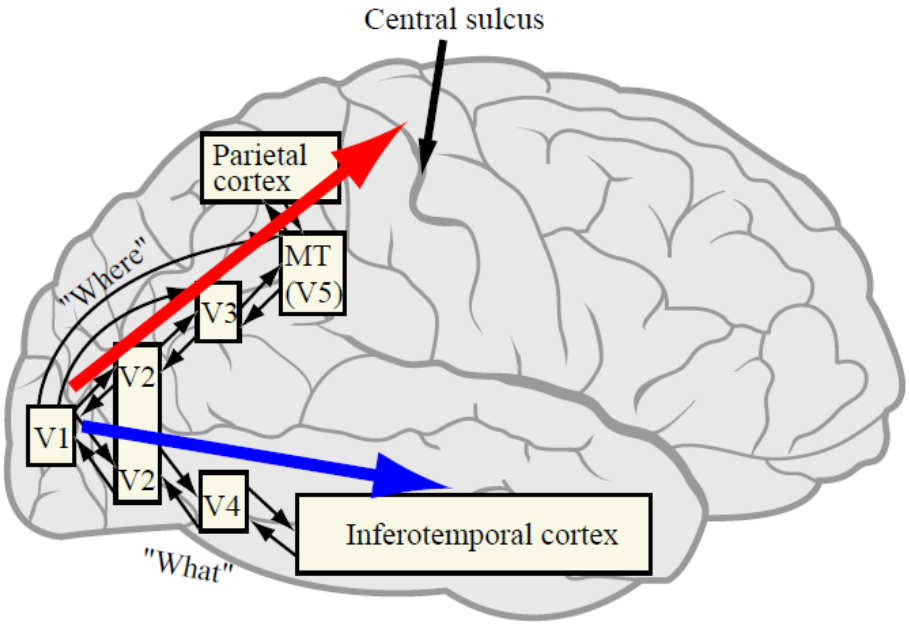


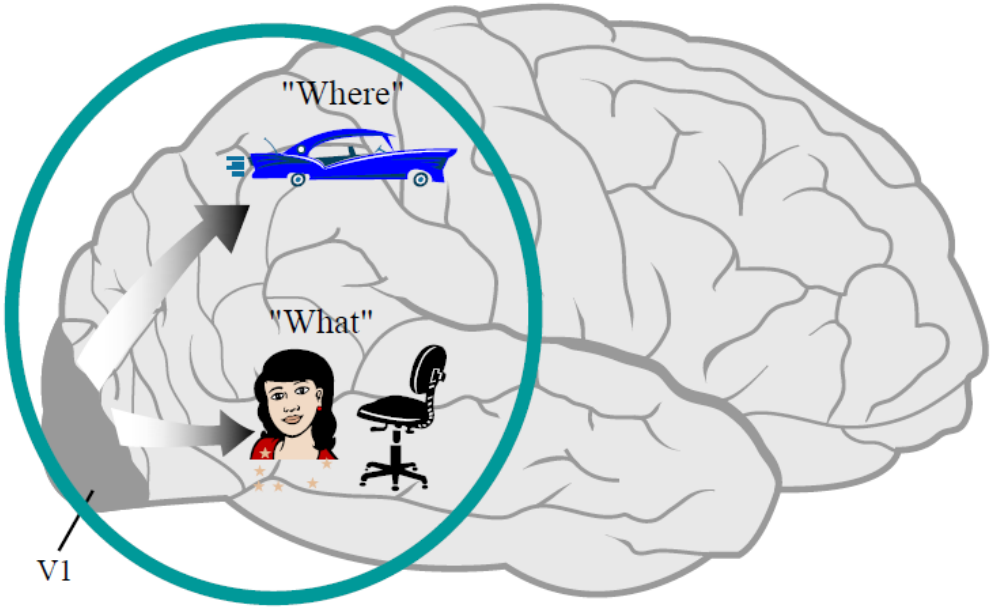
Visual perception

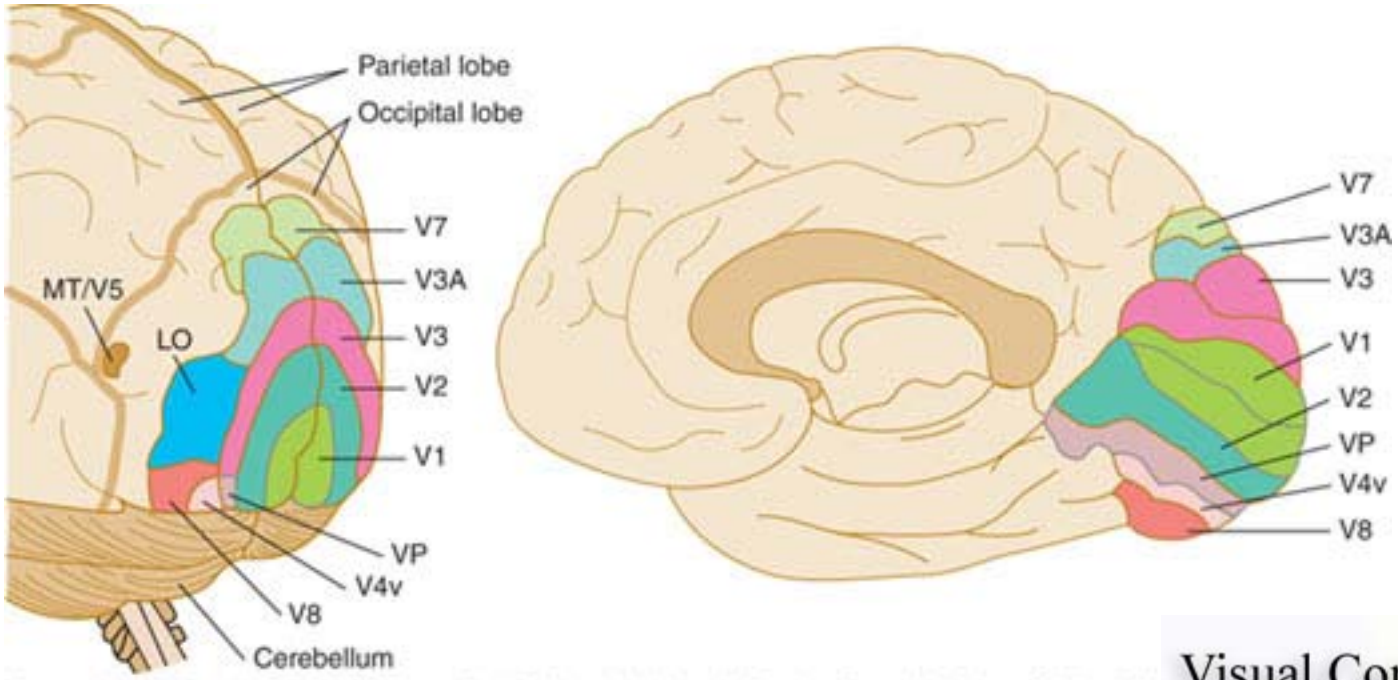
- Many component
- Seprated in the brain

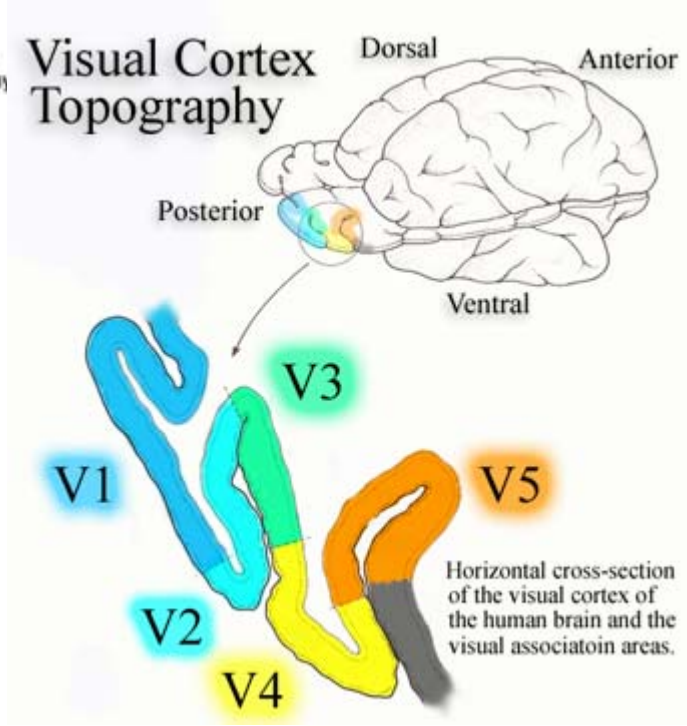
THE CAT

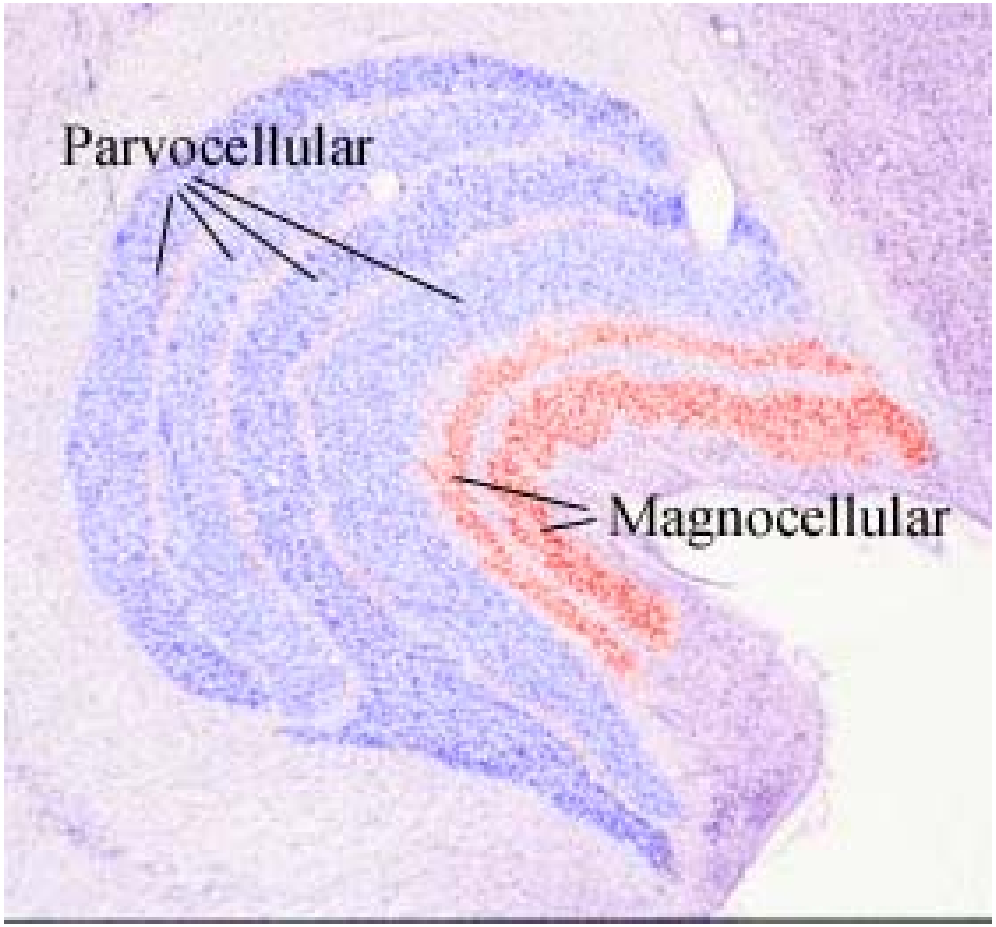
- Top-down & bottom up

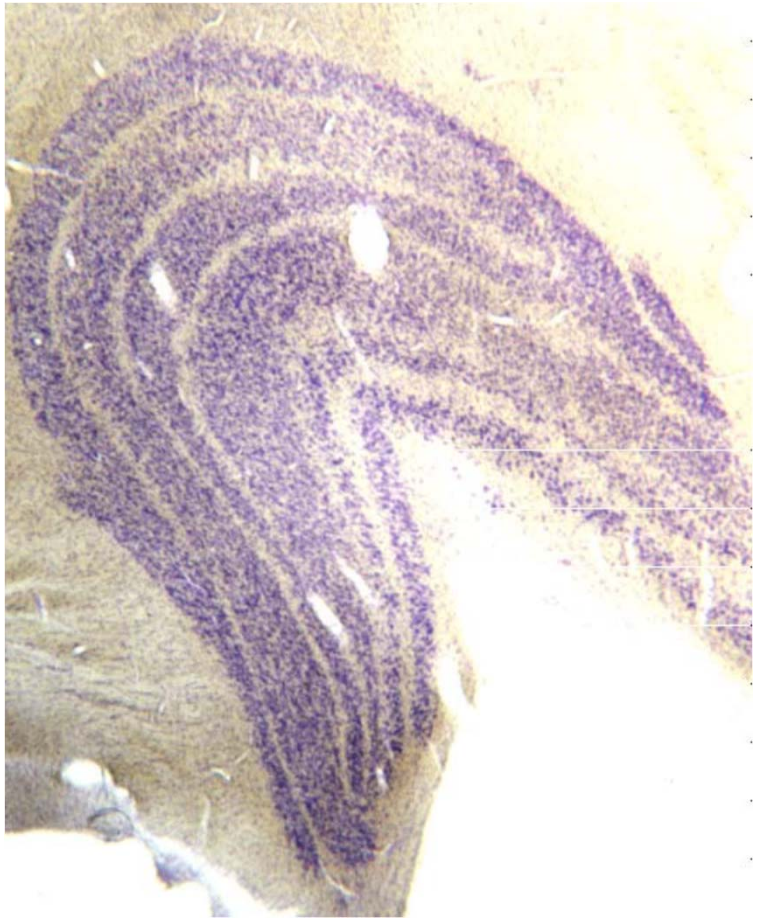












The *parvocellular ganglion cells* are colour-sensitive and project to the four parvocellular layers of the dLGN. The *magnocellular ganglion cells* are achromatic and project to the two magnocellular layers of the LGN.

The slow-conducting parvocellular pathway mediates our perception of colour and acuity; the fast-conducting magnocellular pathway is responsible for our perception of stimulus change (including motion) and is largely colour-blind.

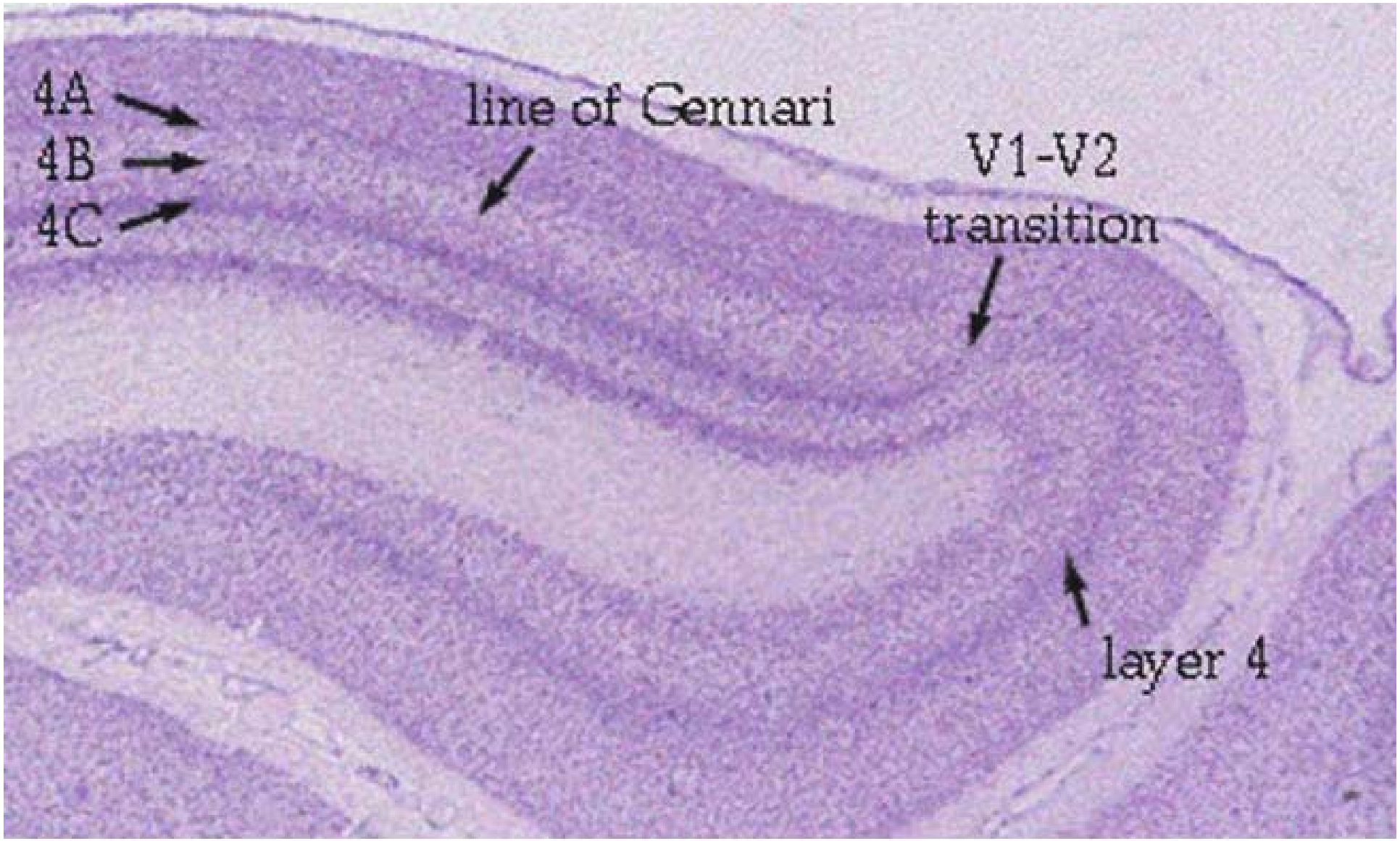
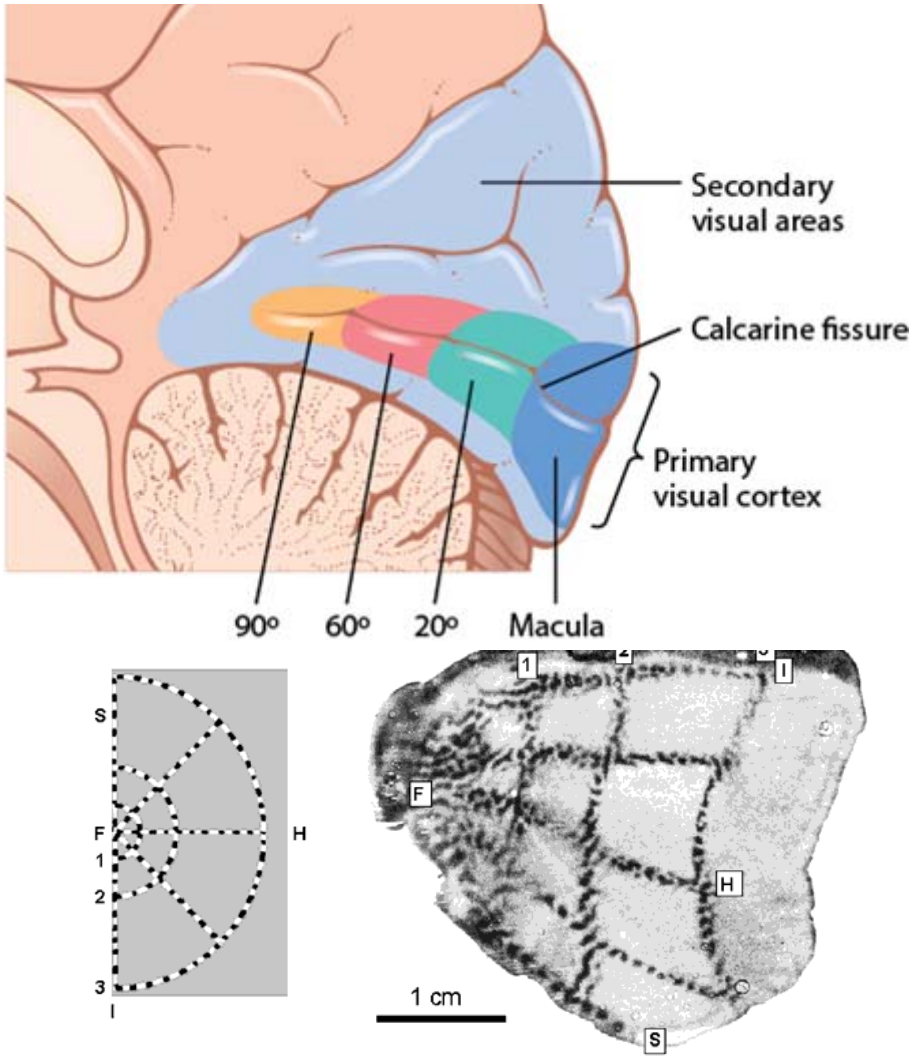
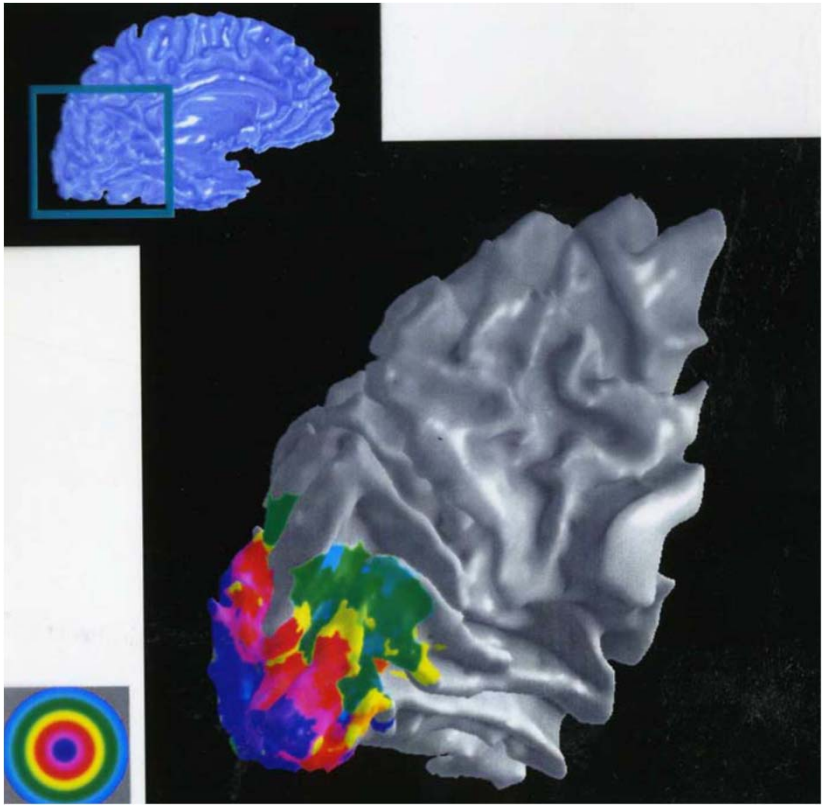


Figure 9. Nissl stained section of the visual cortex to show the border between area 17 (V1) and area 18 (V2).


Secondary visual areas
Calcarine fissure
Primary visual cortex
90°
60°
20°
Macula
S
F
1
2
3
I
H
1
I
F
H
S
1 cm



Cytochrome oxidase patches in monkey V1

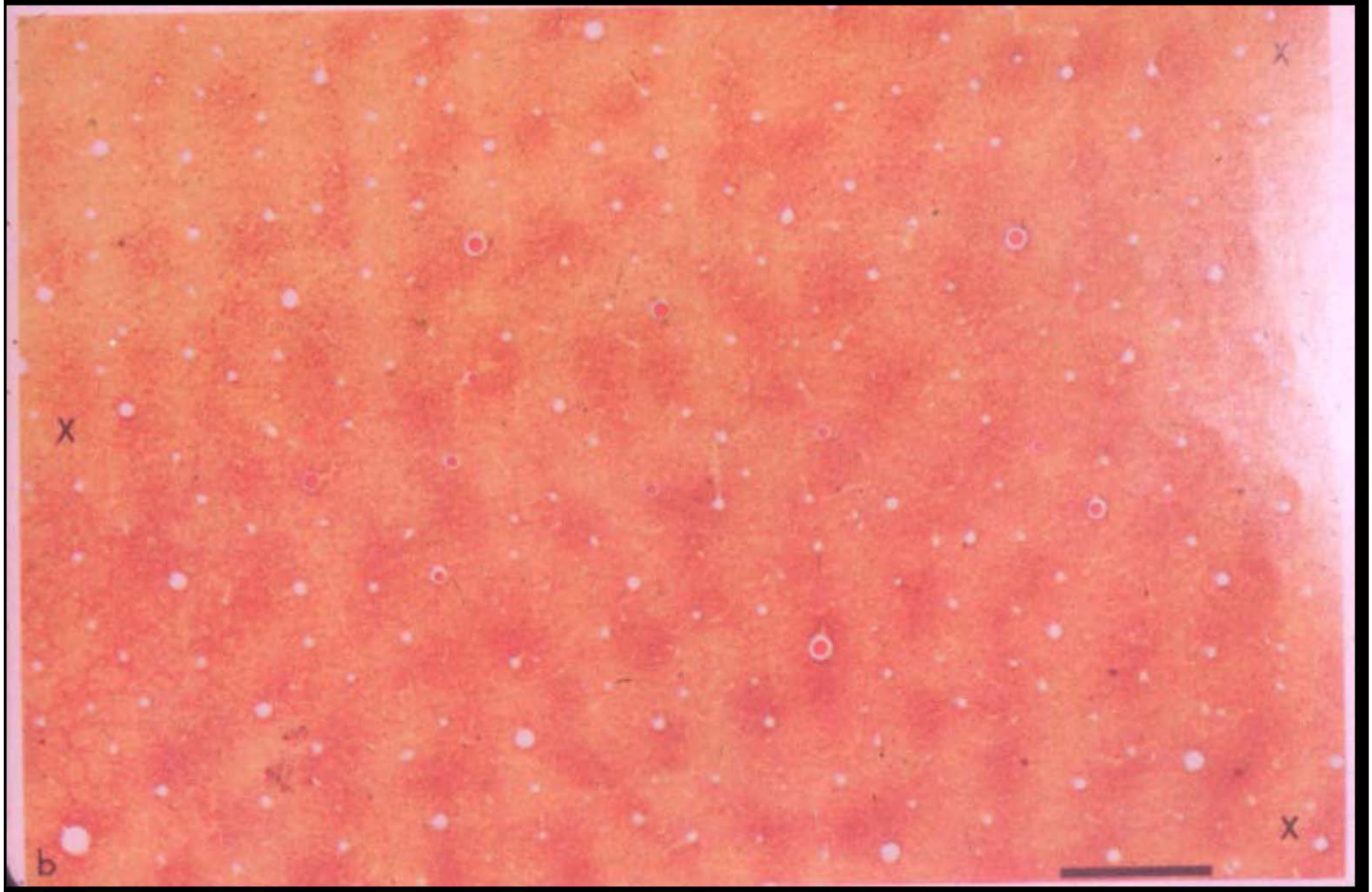
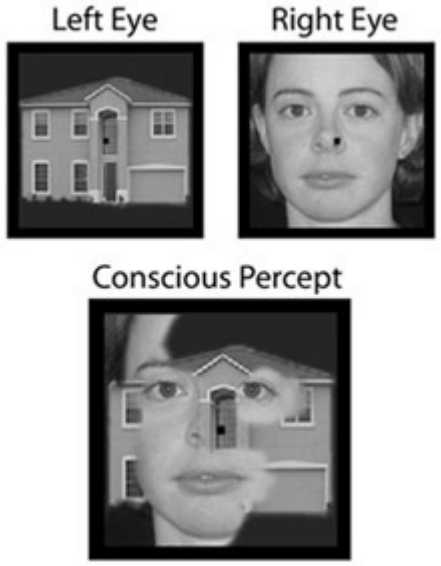


Figure 3. Livingstone, M. S., and D. H. Hubel. "Specificity of Intrinsic Connections in Primate Primary Visual Cortex." *The Journal of Neuroscience* 4, no. 11 (1984): 2830-5. Available under Creative Commons BY-NC-SA.

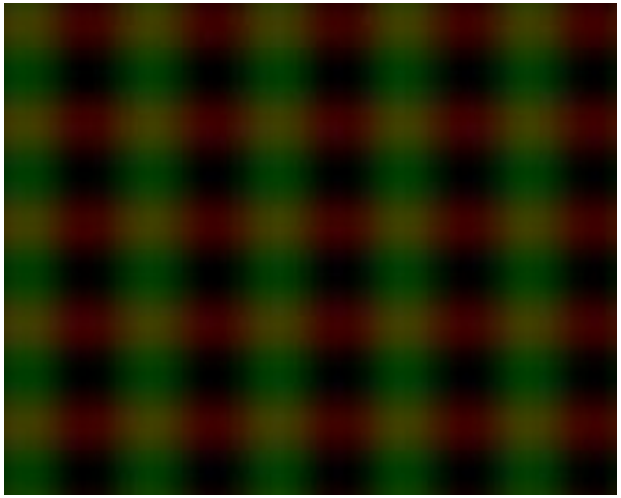
Left -right

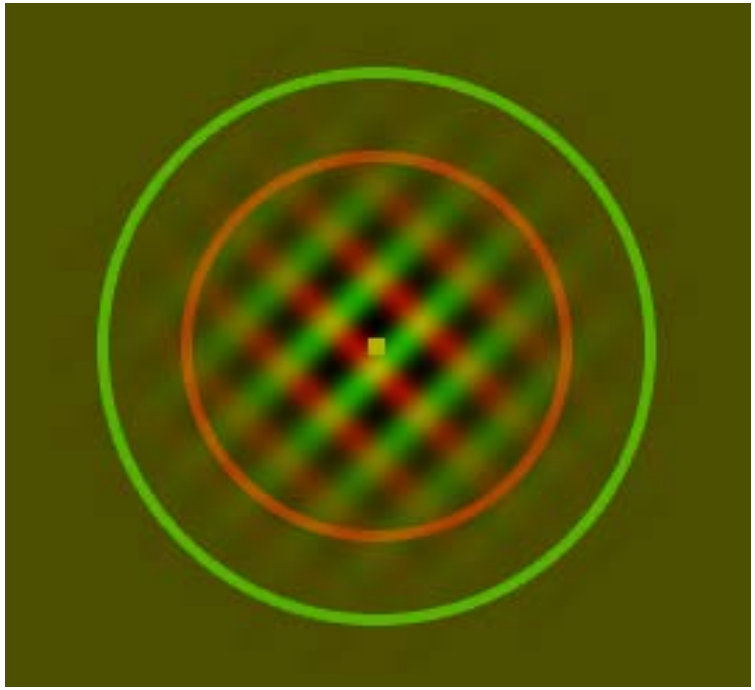
Brain Research, 1977, 122(2), 336-343

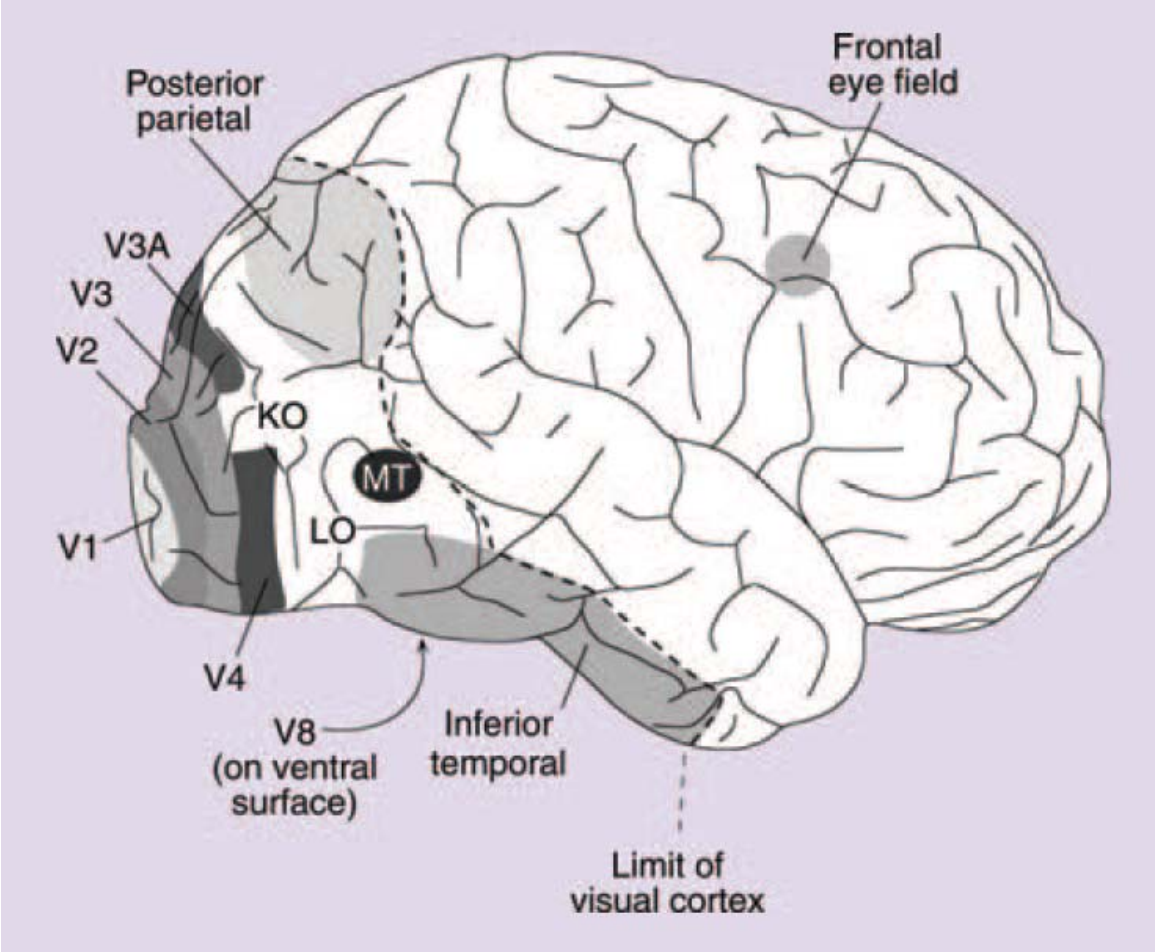
Binocular rivalry

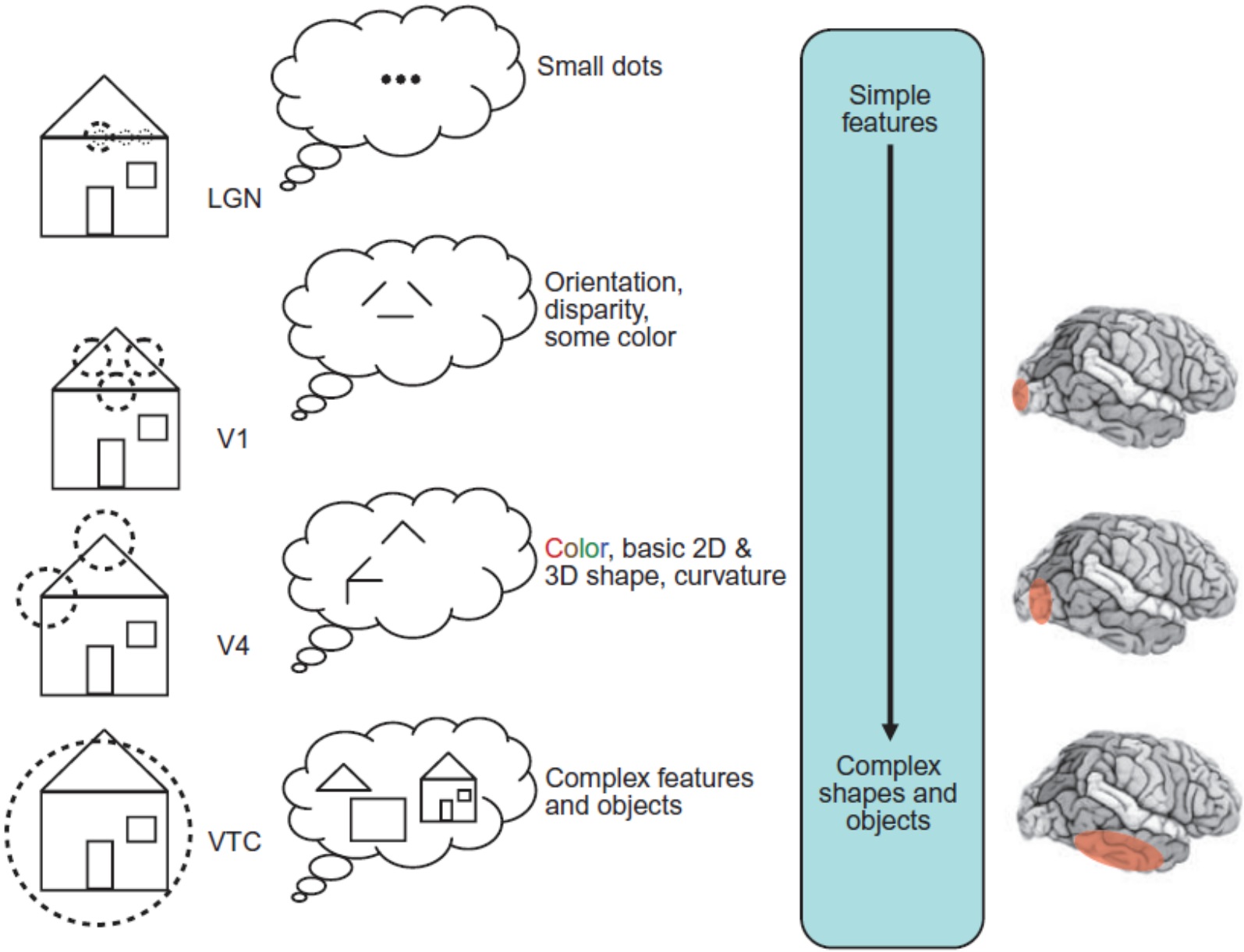


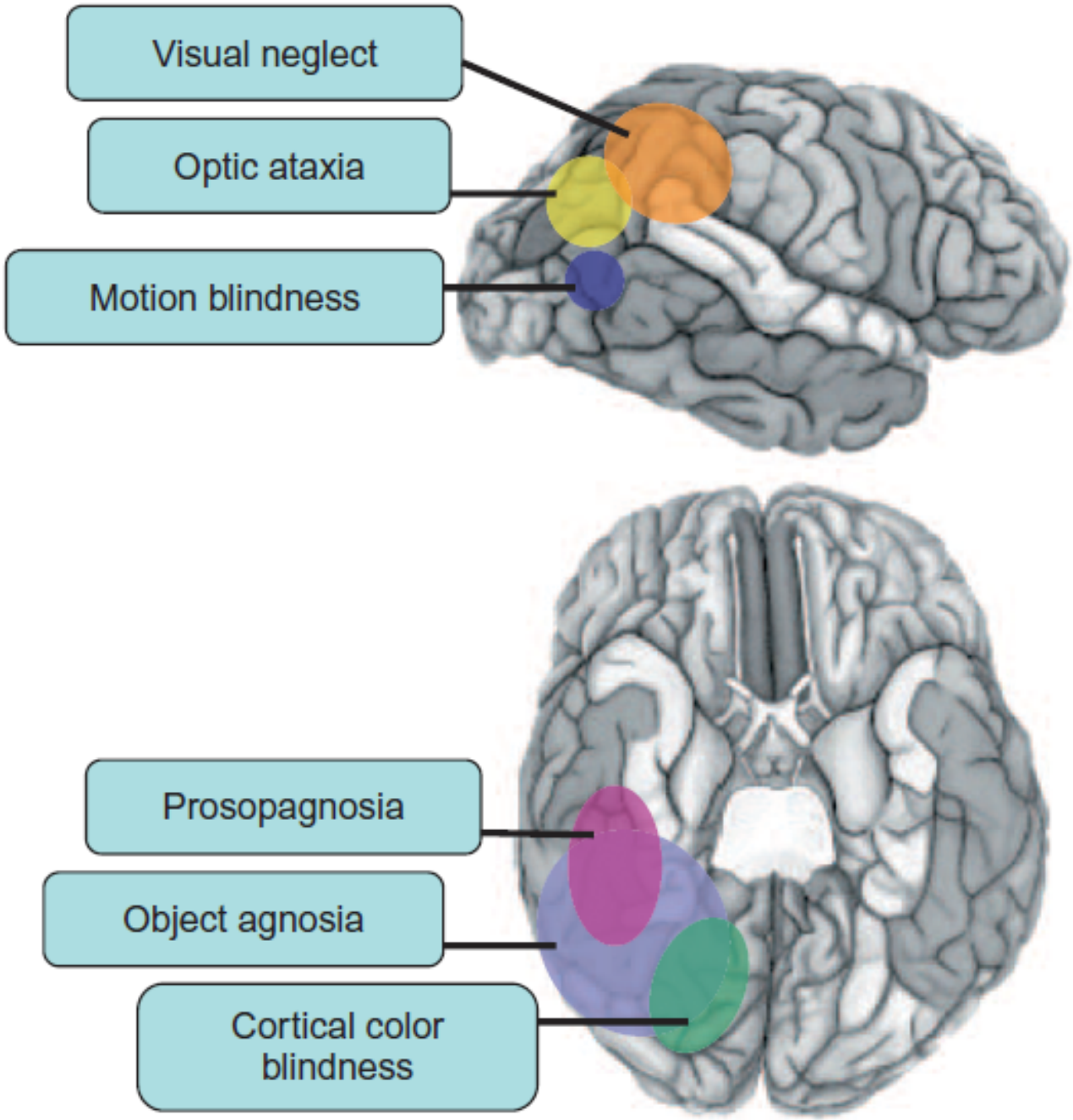
monocular rivalry

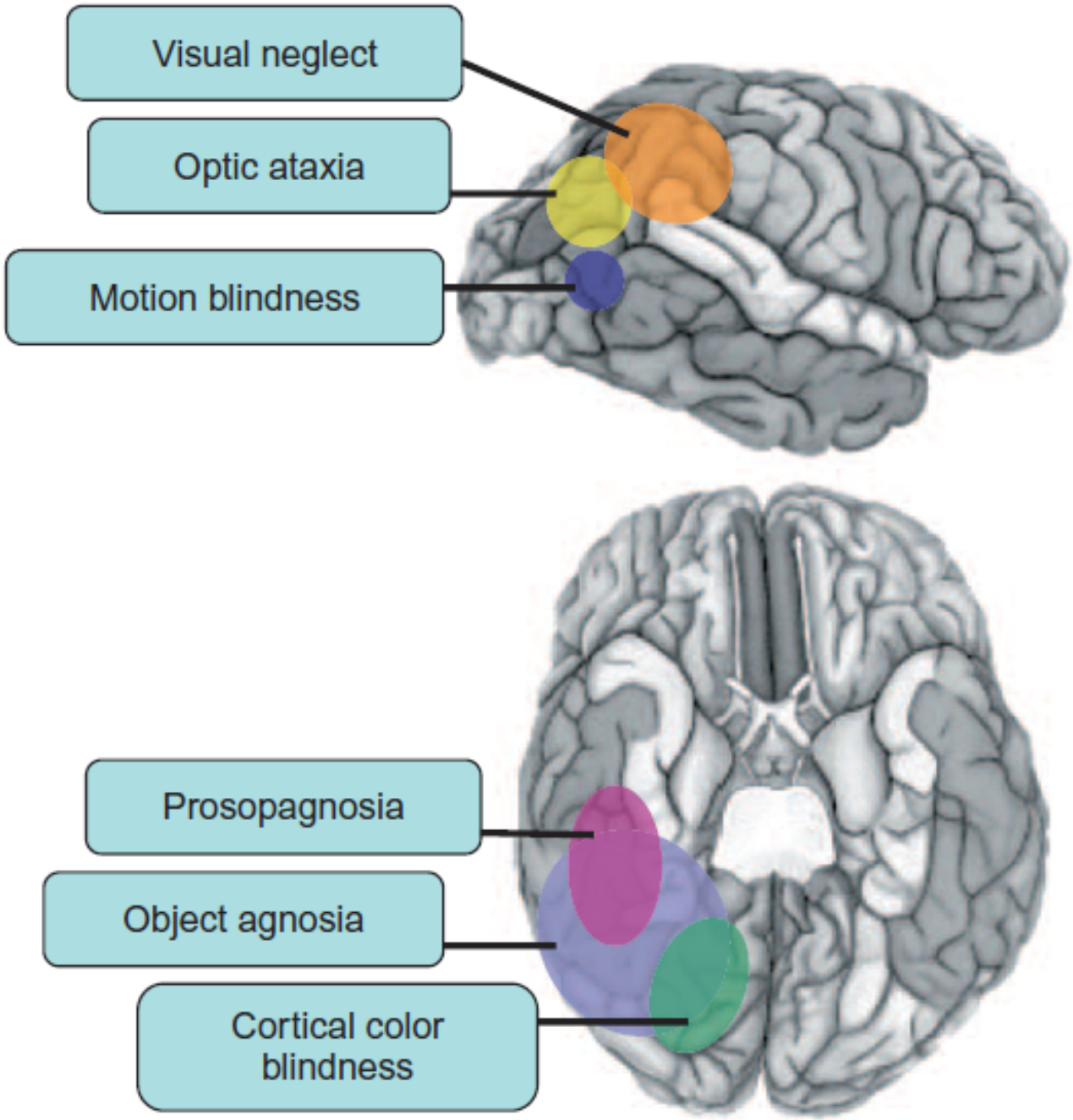





Posterior
parietal
Frontal
eye field
V3A
V3
V2
KO
MT
V1
LO
V4
V8
(on ventral
surface)
Inferior
temporal
Limit of
visual cortex

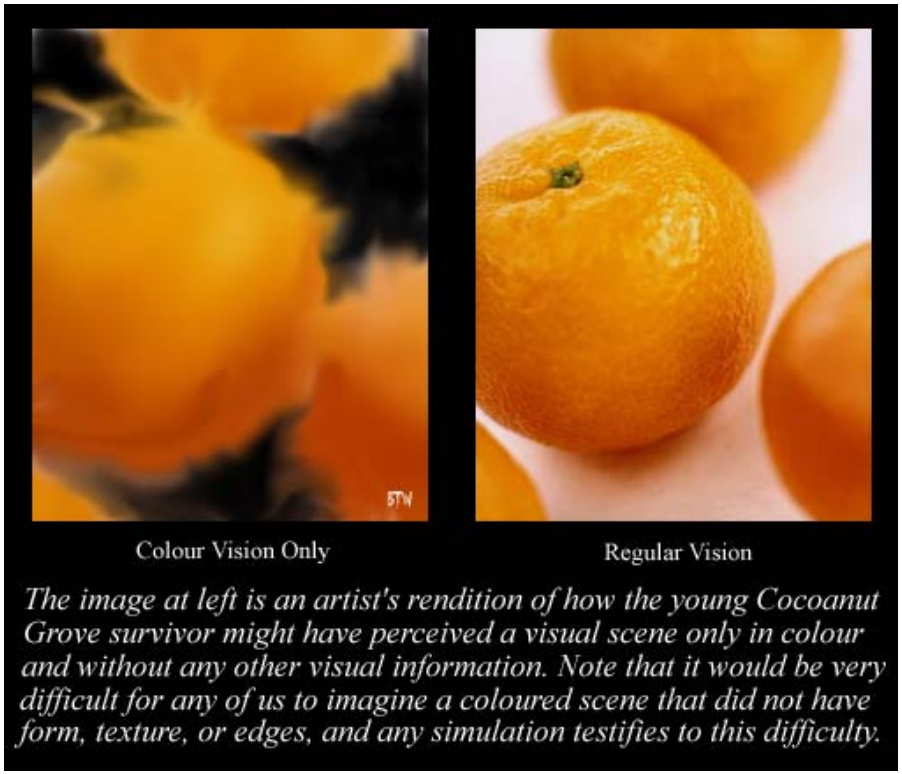

Small dots
LGN
Orientation,
disparity,
some color
V1
Color, basic 2D &
3D shape, curvature
V4
Complex features
and objects
VTC
Simple
features
Complex
shapes and
objects


Visual neglect
Optic ataxia
Motion blindness
Prosopagnosia
Object agnosia
Cortical color blindness


Visual neglect
Optic ataxia
Motion blindness
Prosopagnosia
Object agnosia
Cortical color blindness

Akinotopsia, MT

The patient demonstrated persistent deficits in visual recognition, characterized most prominently by defective recognition of elemental shape and form, associated with alexia, prosopagnosia, visuospatial disorientation and impaired visual imagery. Visual acuity, colour recognition, writing ability and verbal intelligence were relatively preserved.

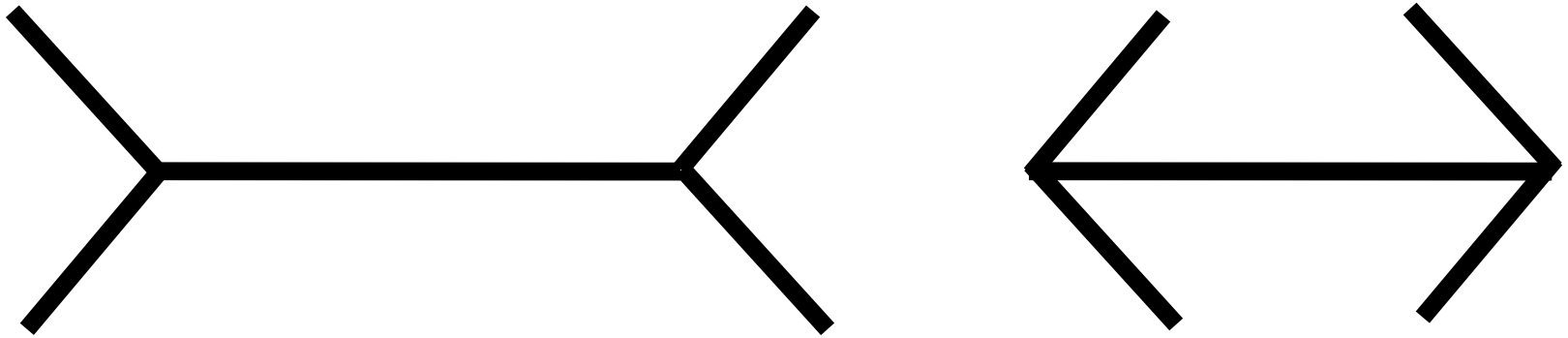


Color, V4

A HISTORIC CASE OF VISUAL AGNOSIA REVISITED AFTER 40 YEARS *Brain*, Volume 114, Issue 2, 1 April 1991, Pages 789–800

Figure 4
Patient X, studied by Landis et al. (1982), consistently read this stimulus as 7415.

Muller-Lyer illusion



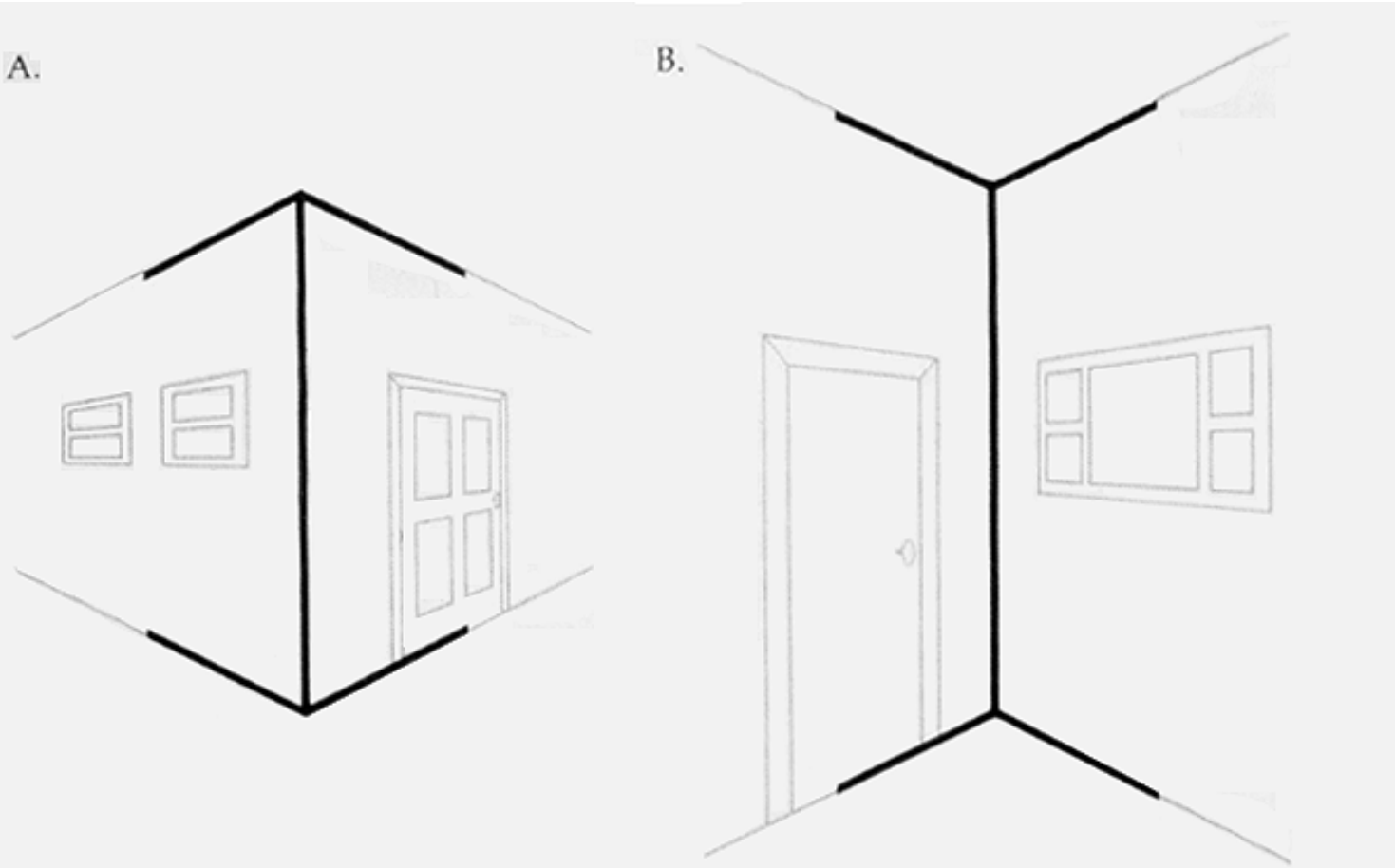
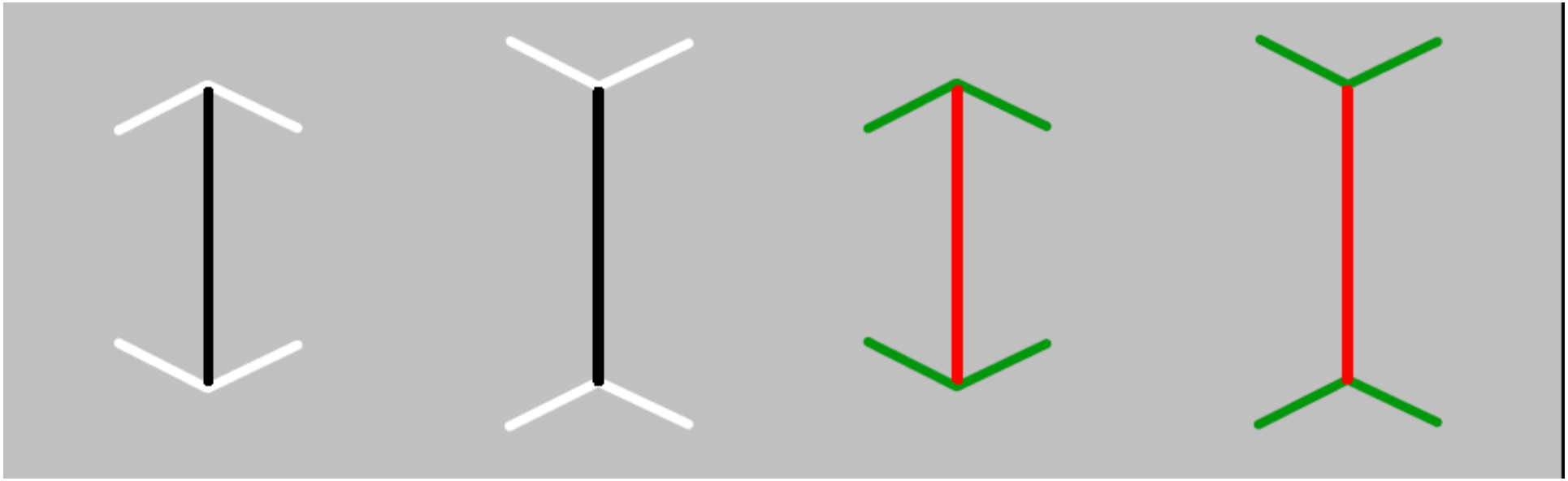


FIGURE 7.25

The Müller-Lyer illusion could arise from implied depth information.

Muller-Lyer illusion

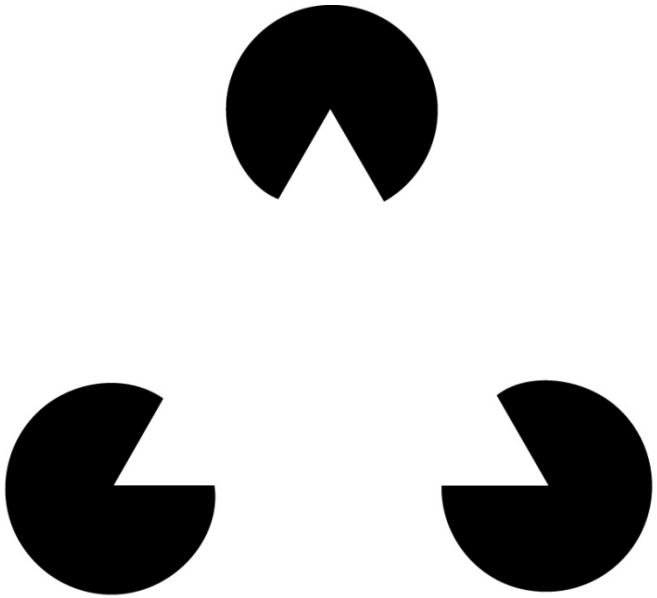


Shape

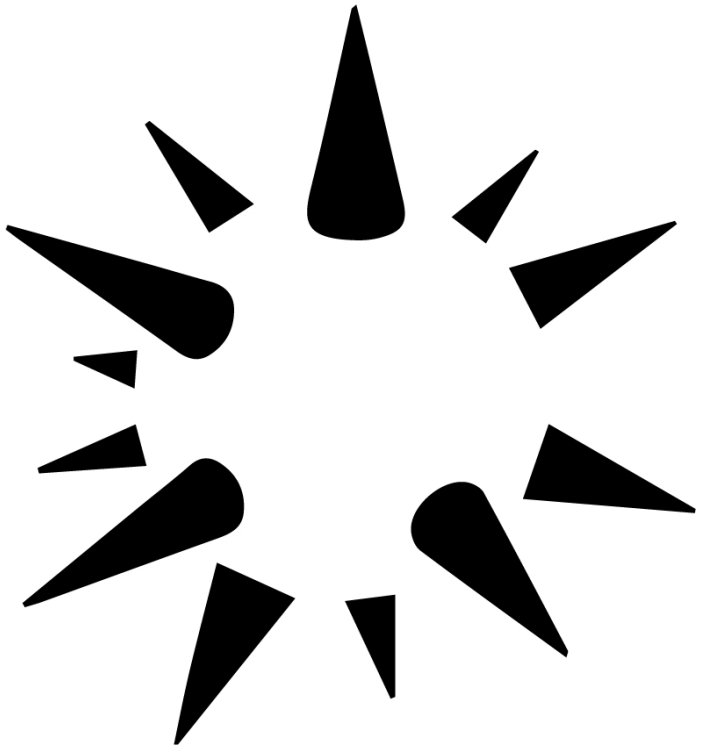
- What define a shape

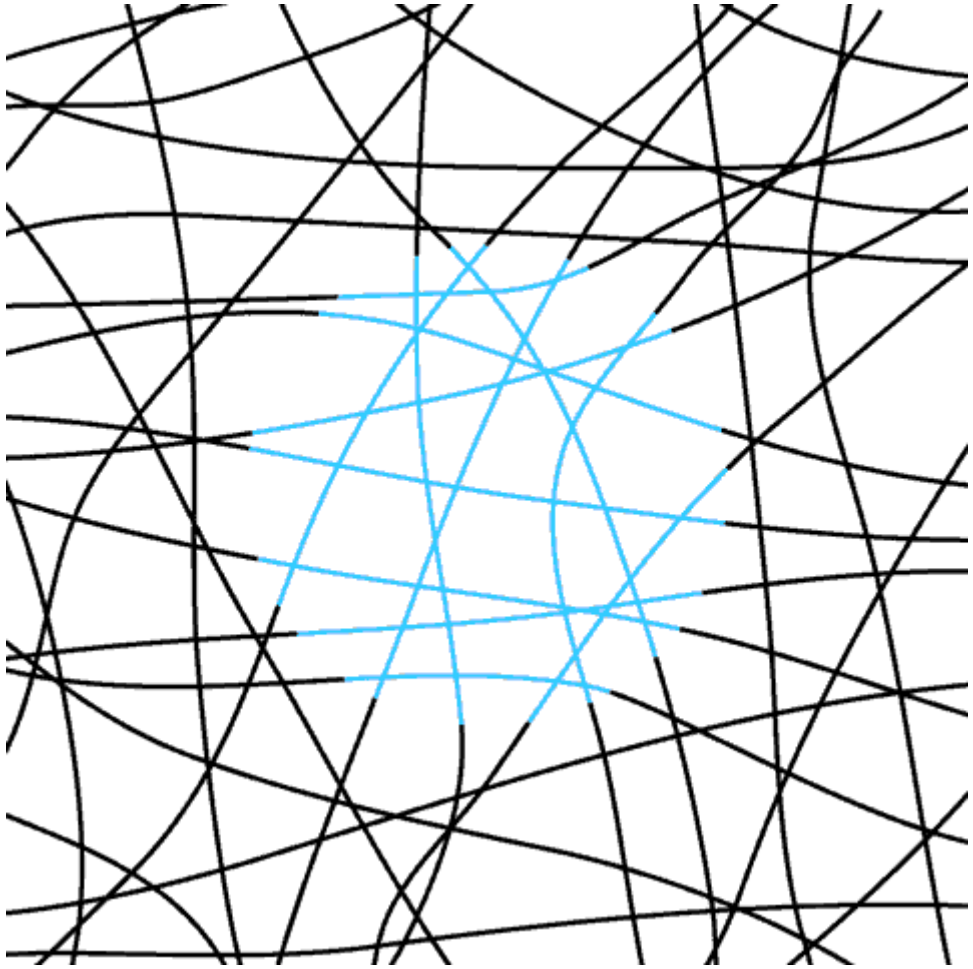
Kanizsa's Triangle

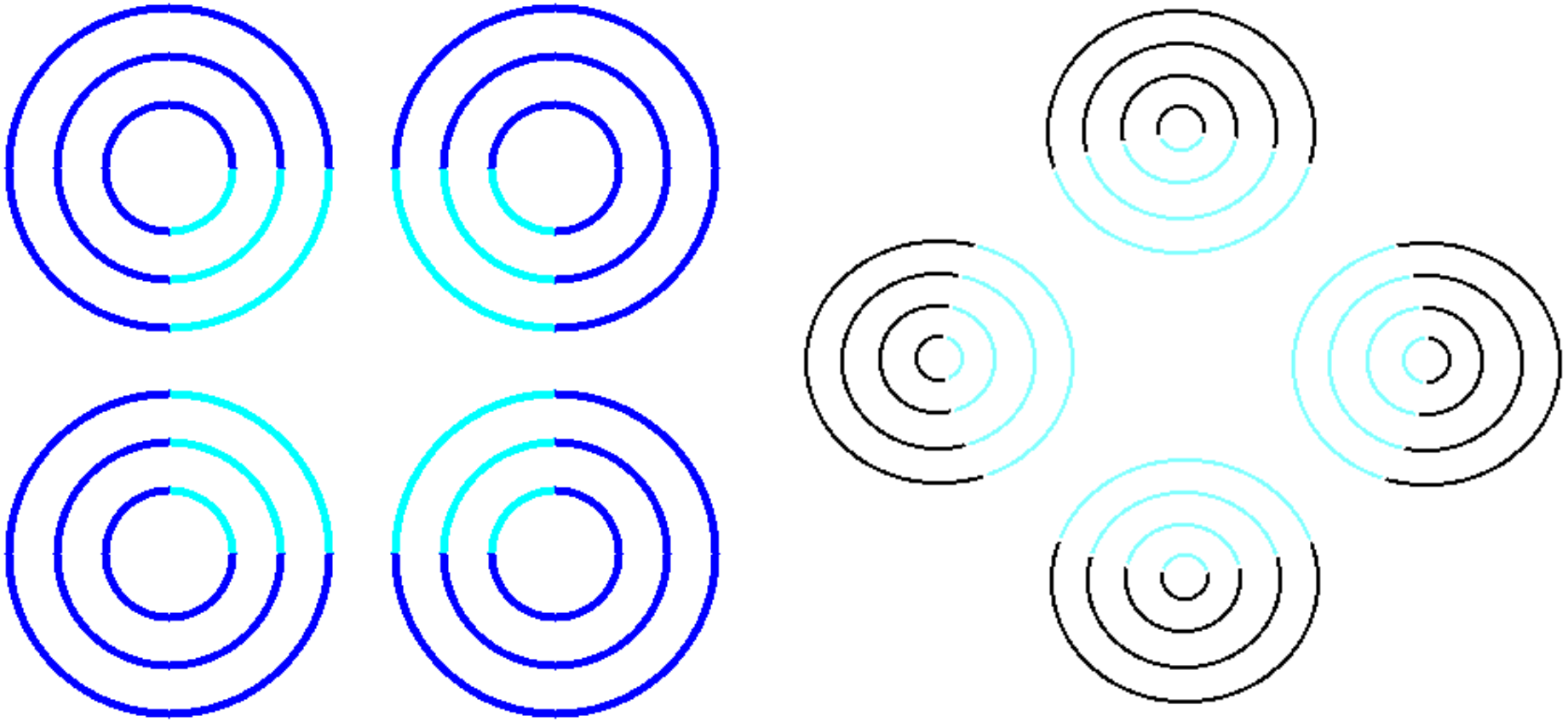
A



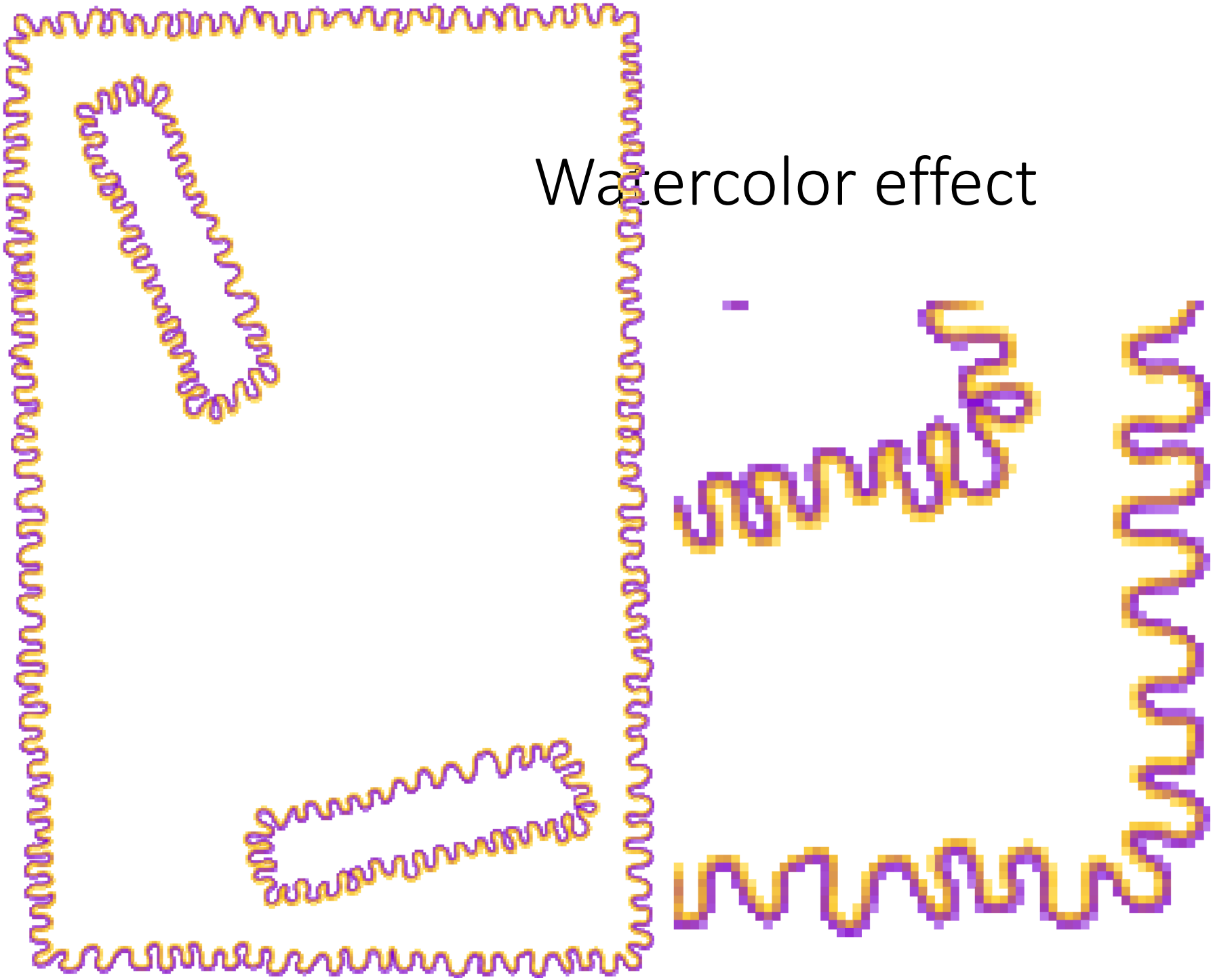
C



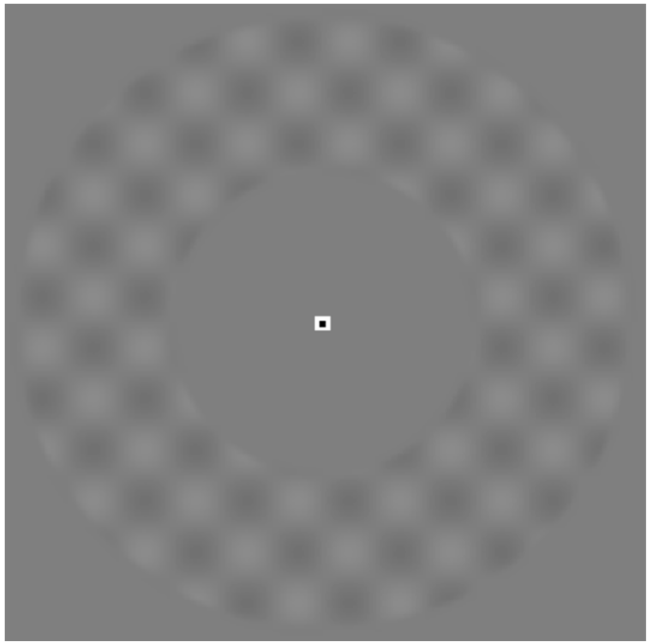


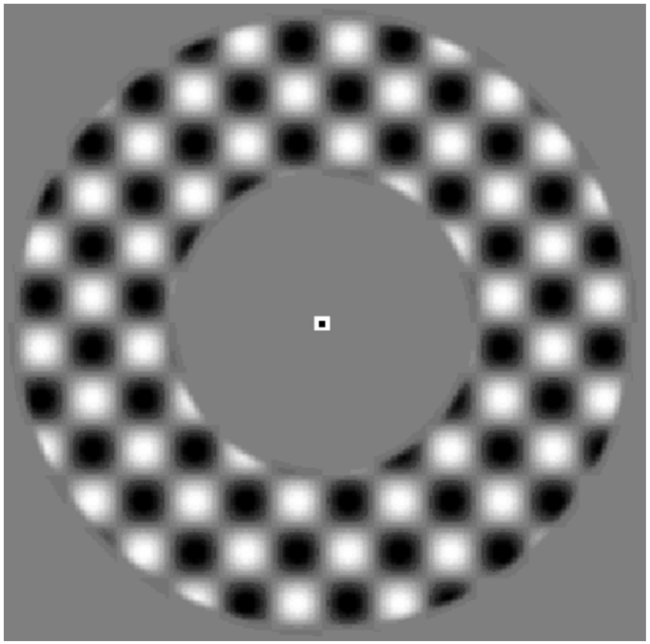


Watercolor effect

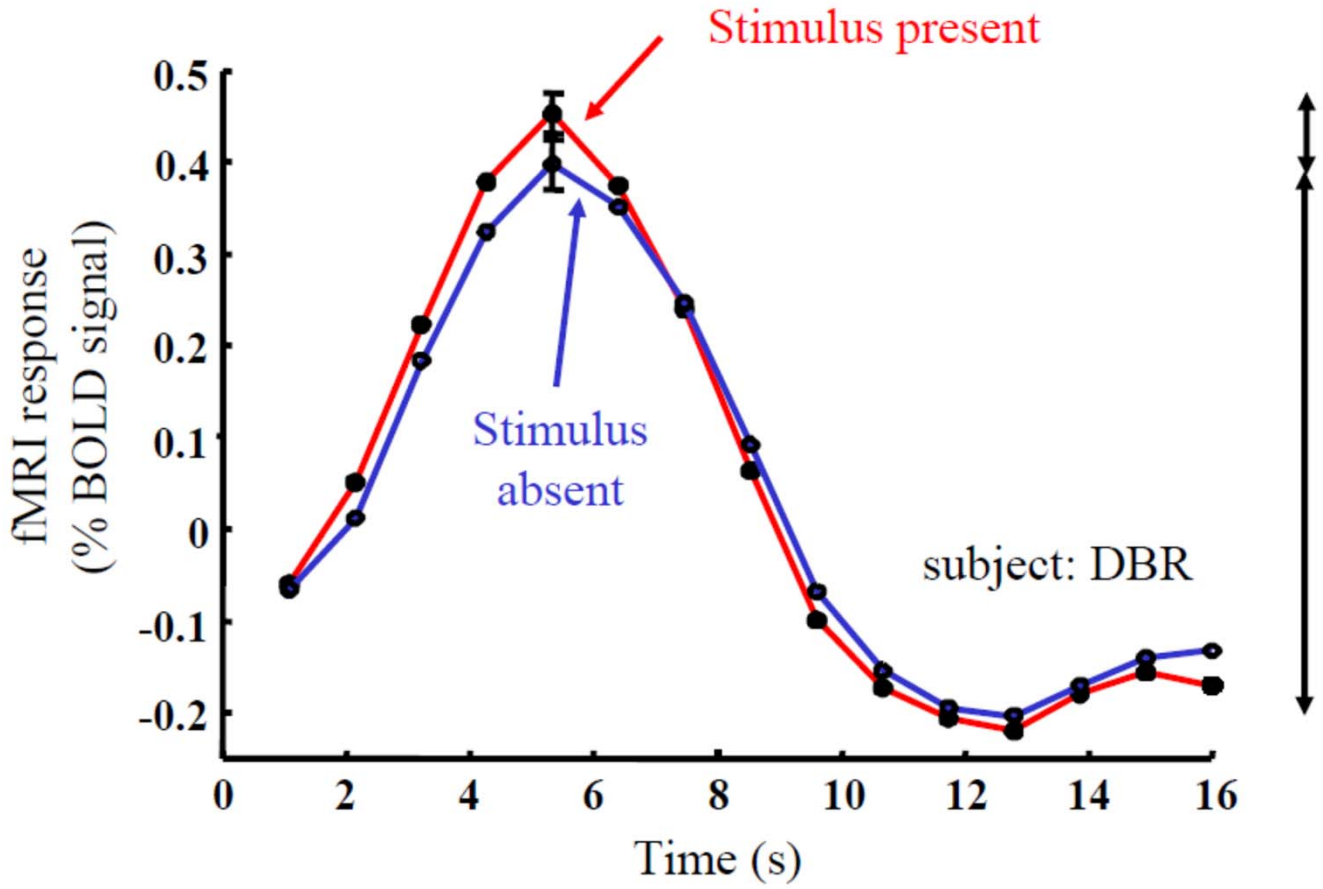


What do you expect to see when the stimulus is *absent*?



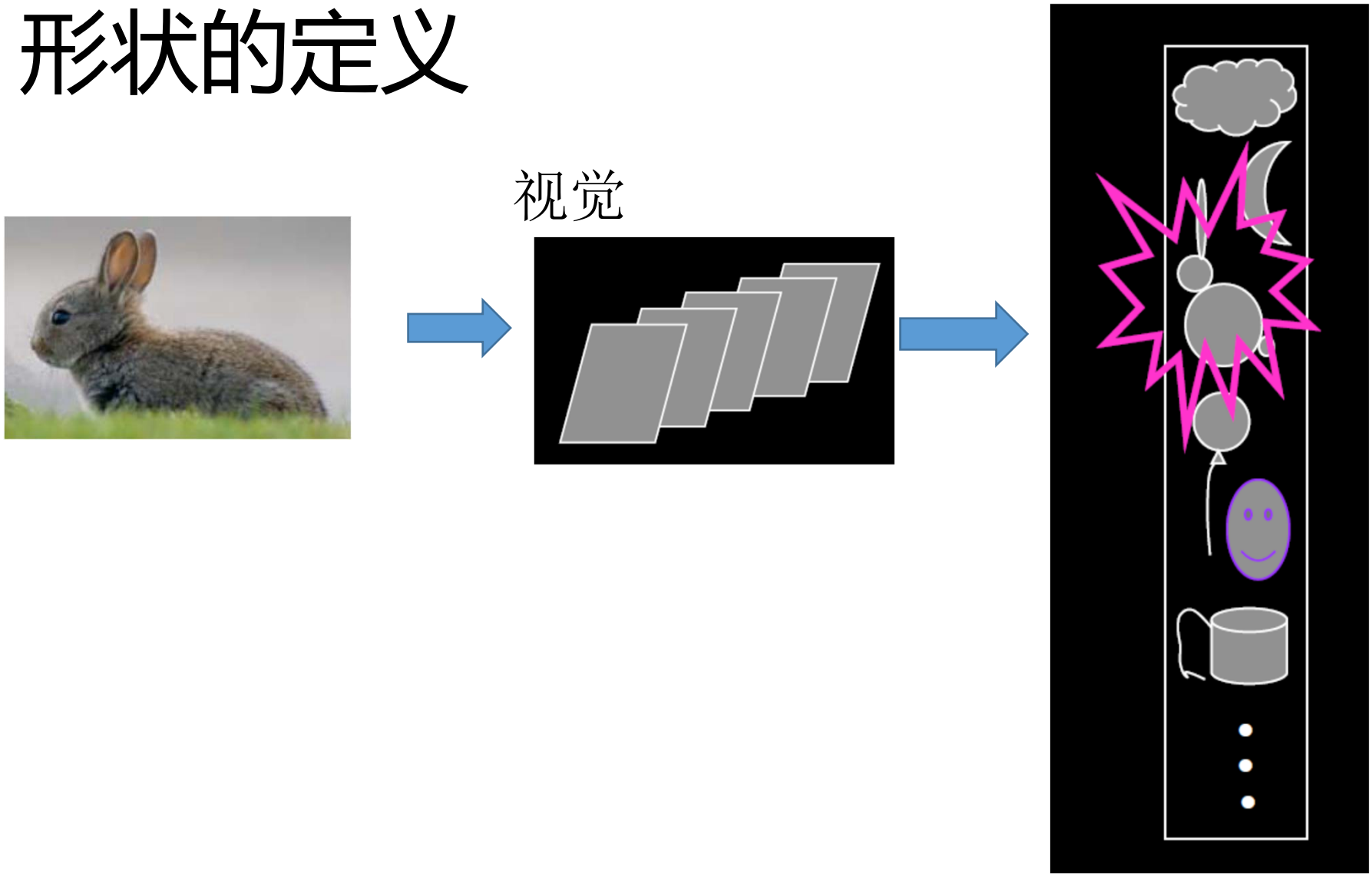


The unseem

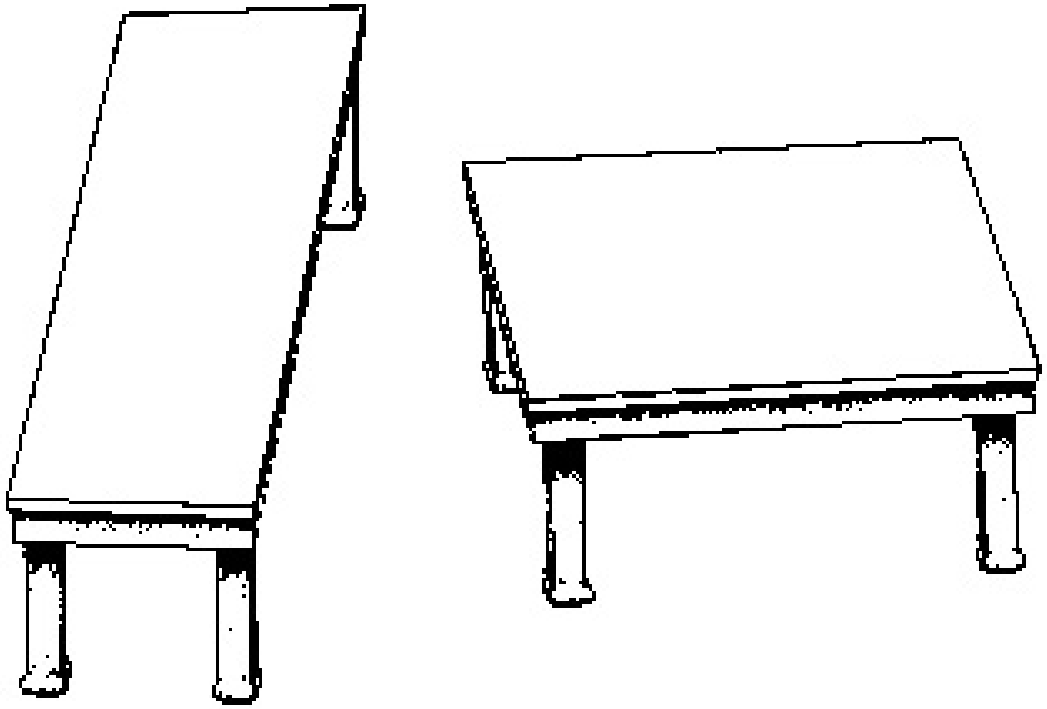


Ress, Backus, & Heeger, 2000 ,*Nat Neurosci* **3:**940,

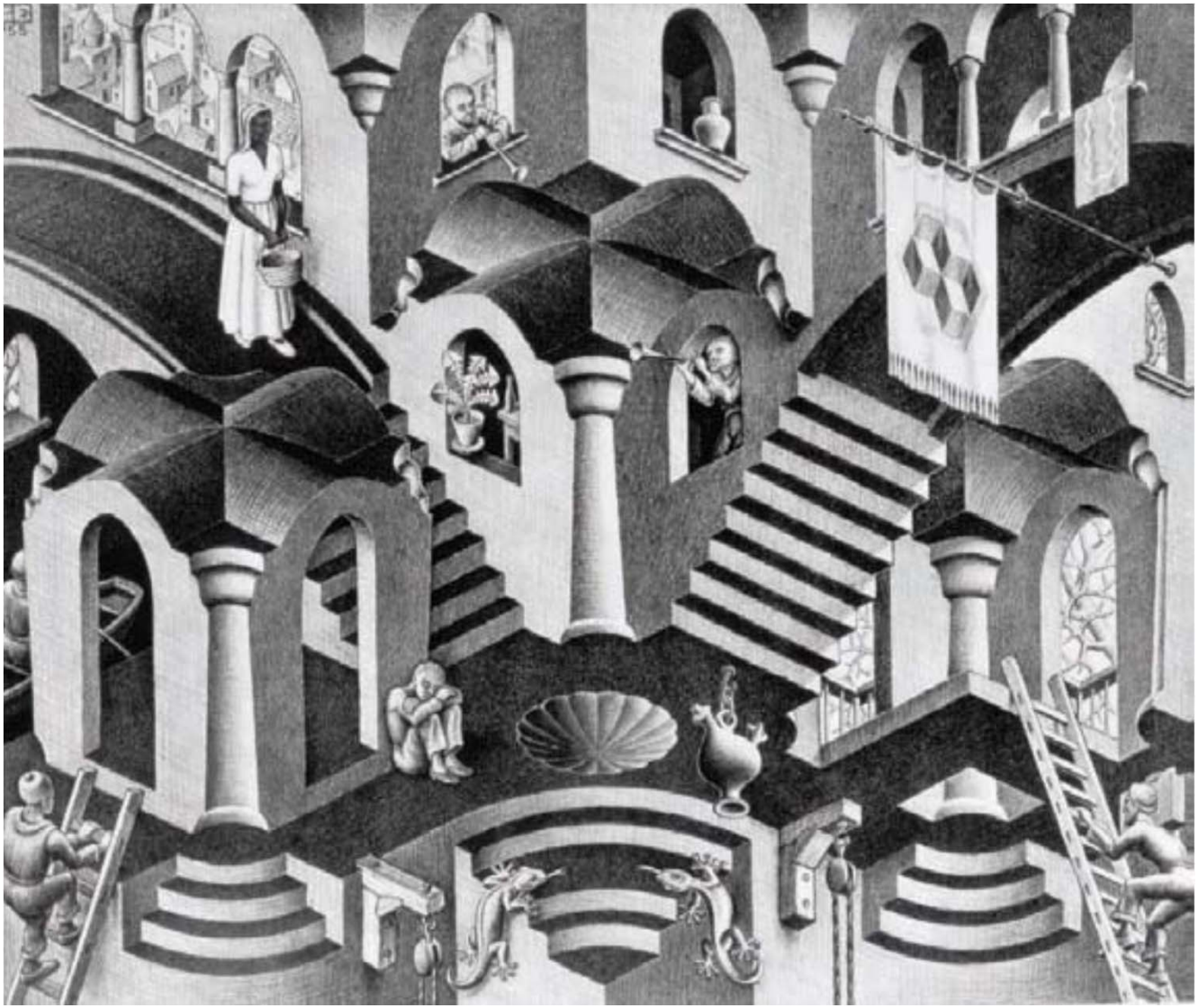
形状的定义

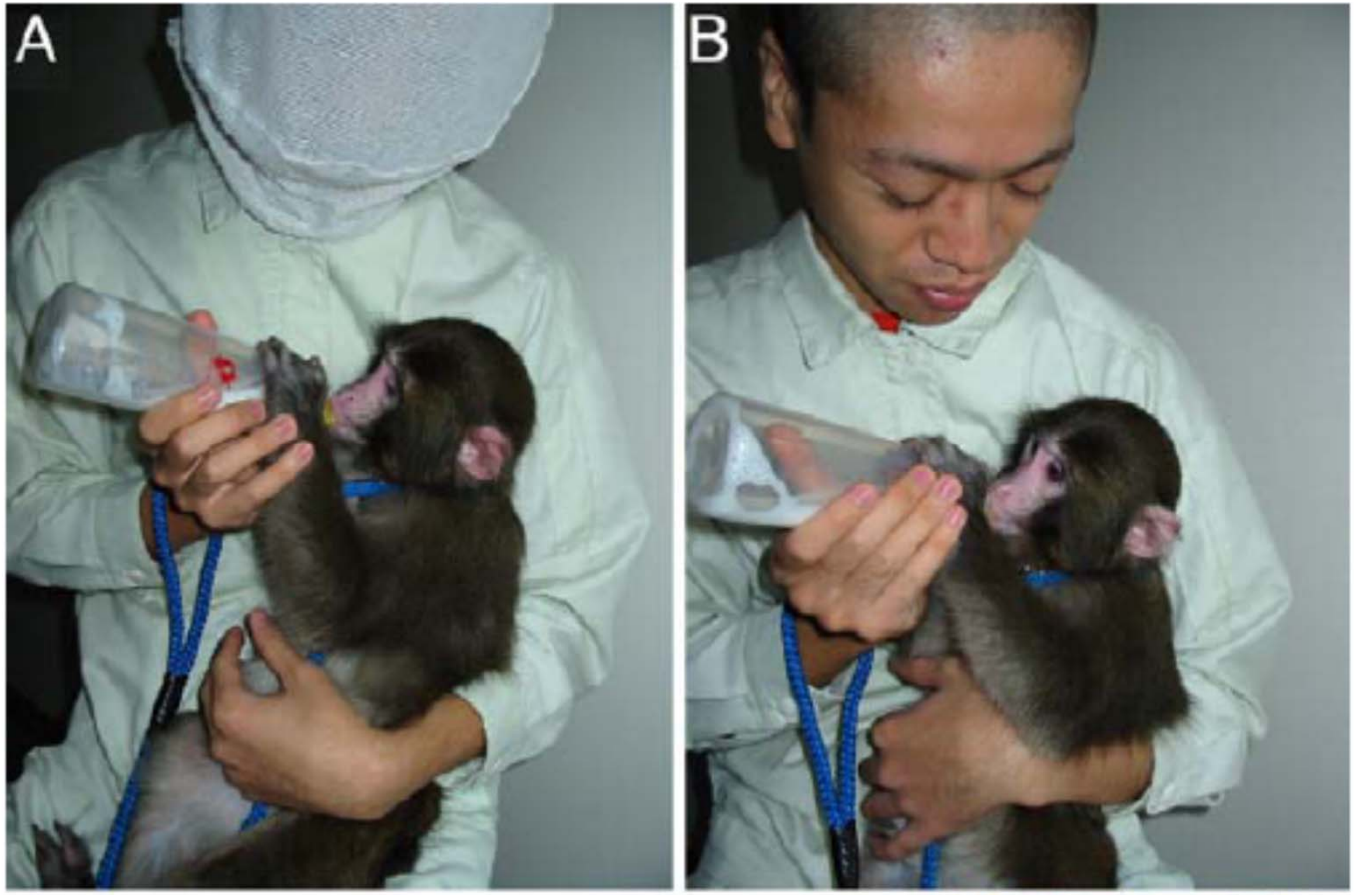


物体

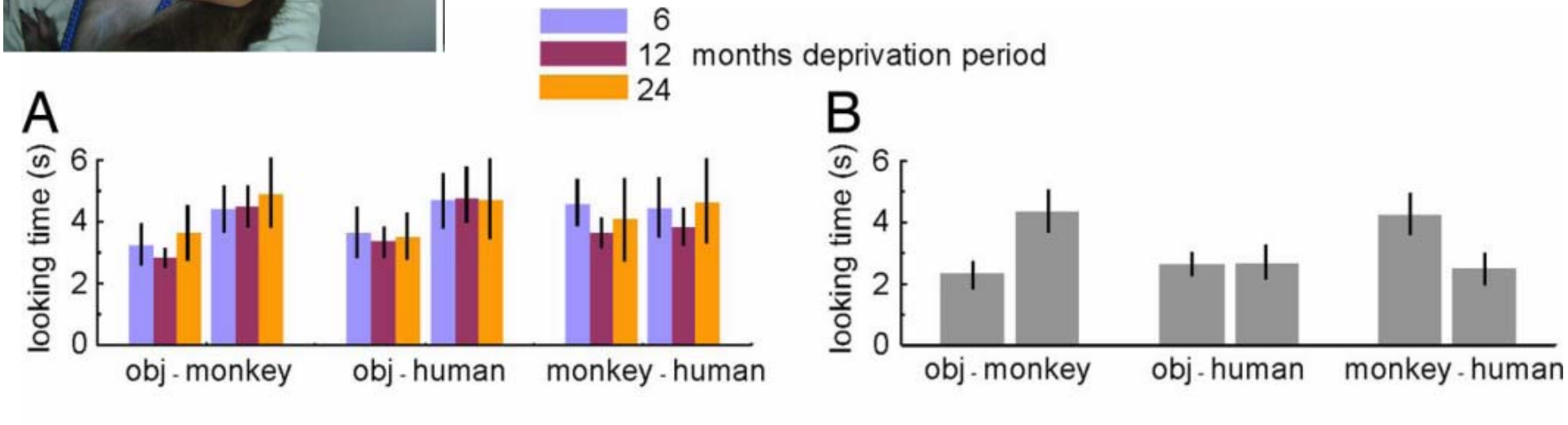


我们的解析是强制性的





An infant monkey and her living circumstance Sensitive period Sugita, Yoichi (2008) Proc. Natl. Acad. Sci. USA 105, 394-398



PNAS **2008 105(1): 394-398**