

What illusions taught us

COGS 500 FALL 2019

İNCİ AYHAN

Perception is ambiguous ●

Silhouettes
and direction
of rotation



Perception is a
constructive act:
data-driven &
top-down
mechanisms

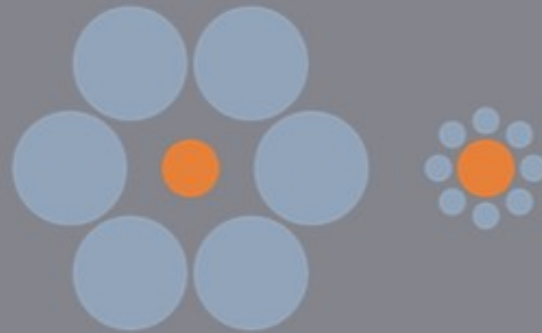


Perception is a
constructive act:
data-driven &
top-down
mechanisms

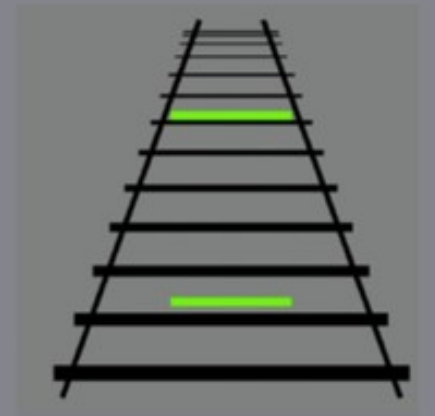
The inner representation might not be as
accurate

... Because perception is a **constructive act**:

Reality and Illusion:

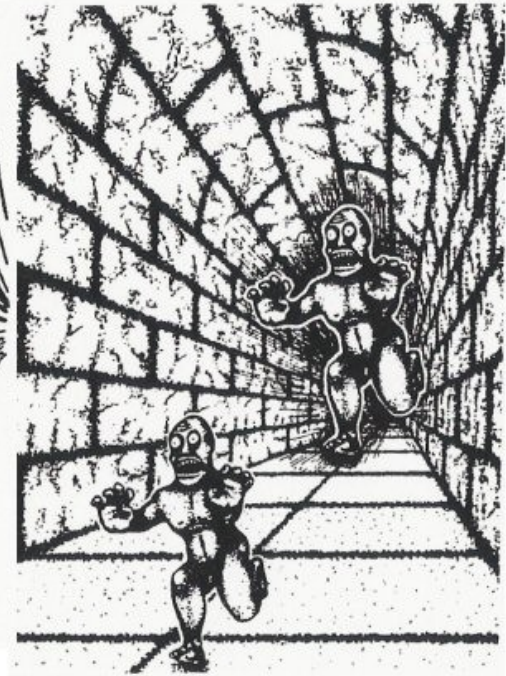
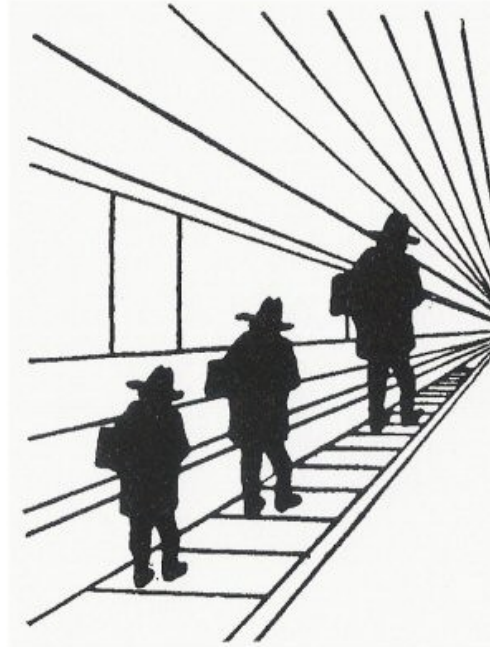
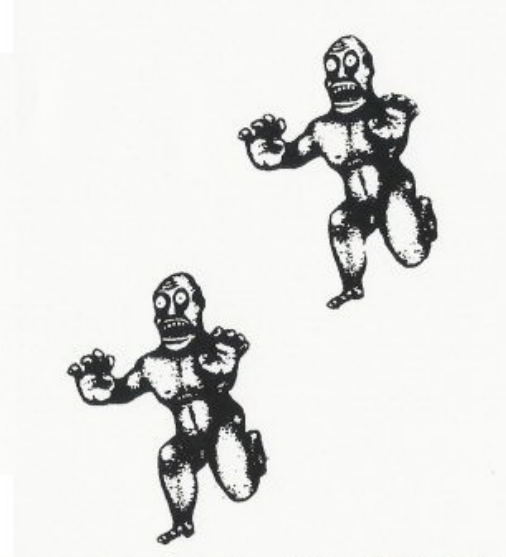


- context is very critical for the perceptual and cognitive system



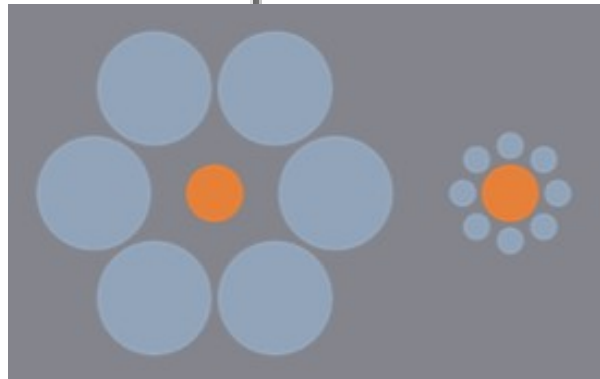
- illusion due to perspective cue context

Context is
what it
counts

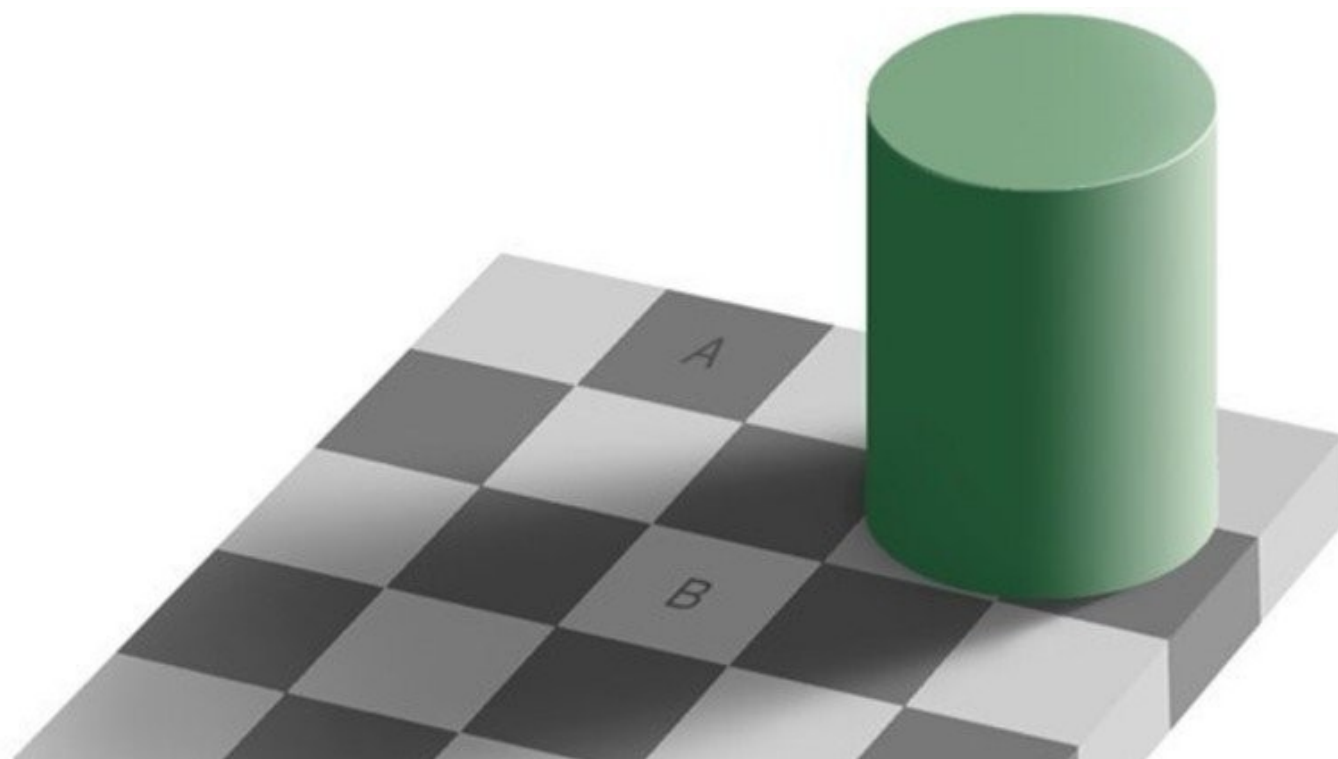


System uses
similar
strategies at the
higher-level
cognition, as
well as the
lower-level
perception

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Context is
important



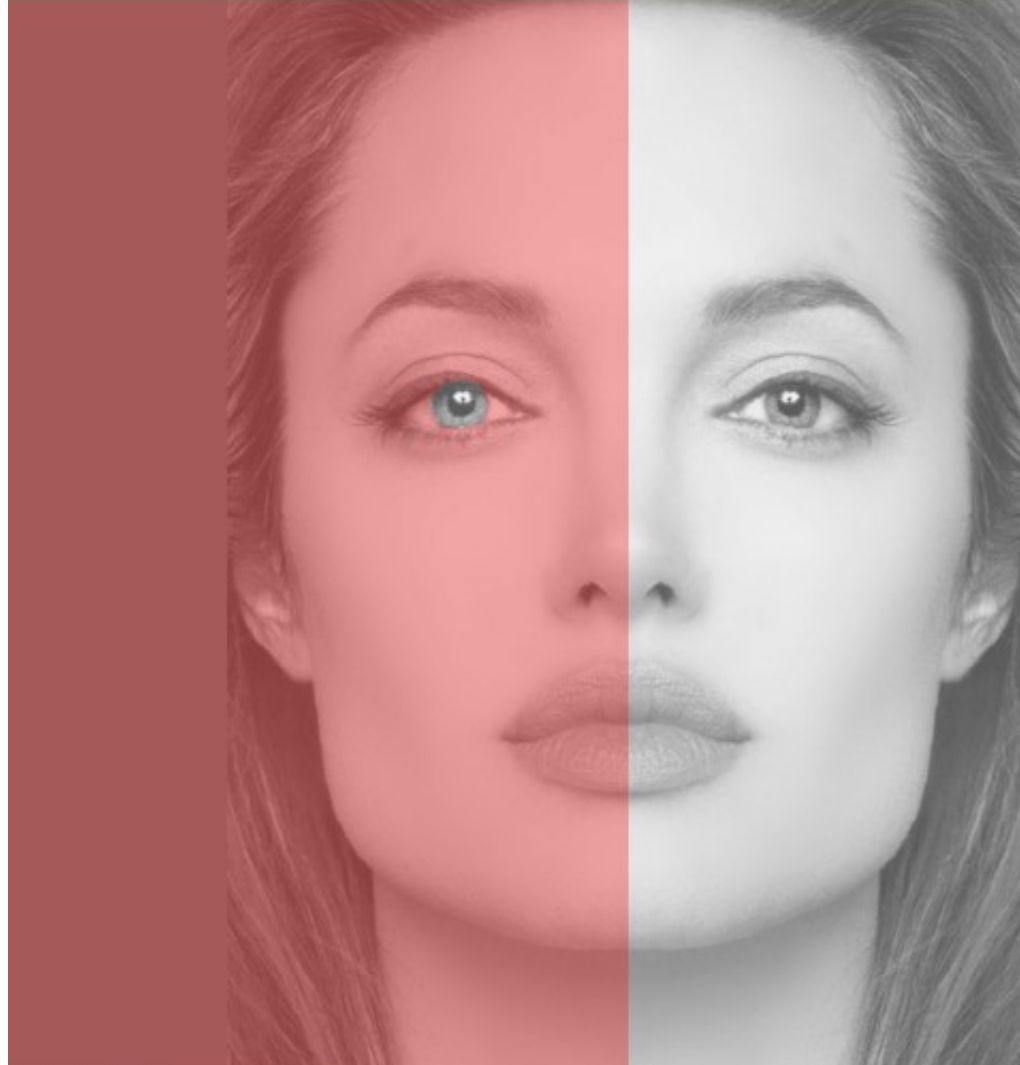
Colour percept changes according to the context

Simultaneous colour illusion

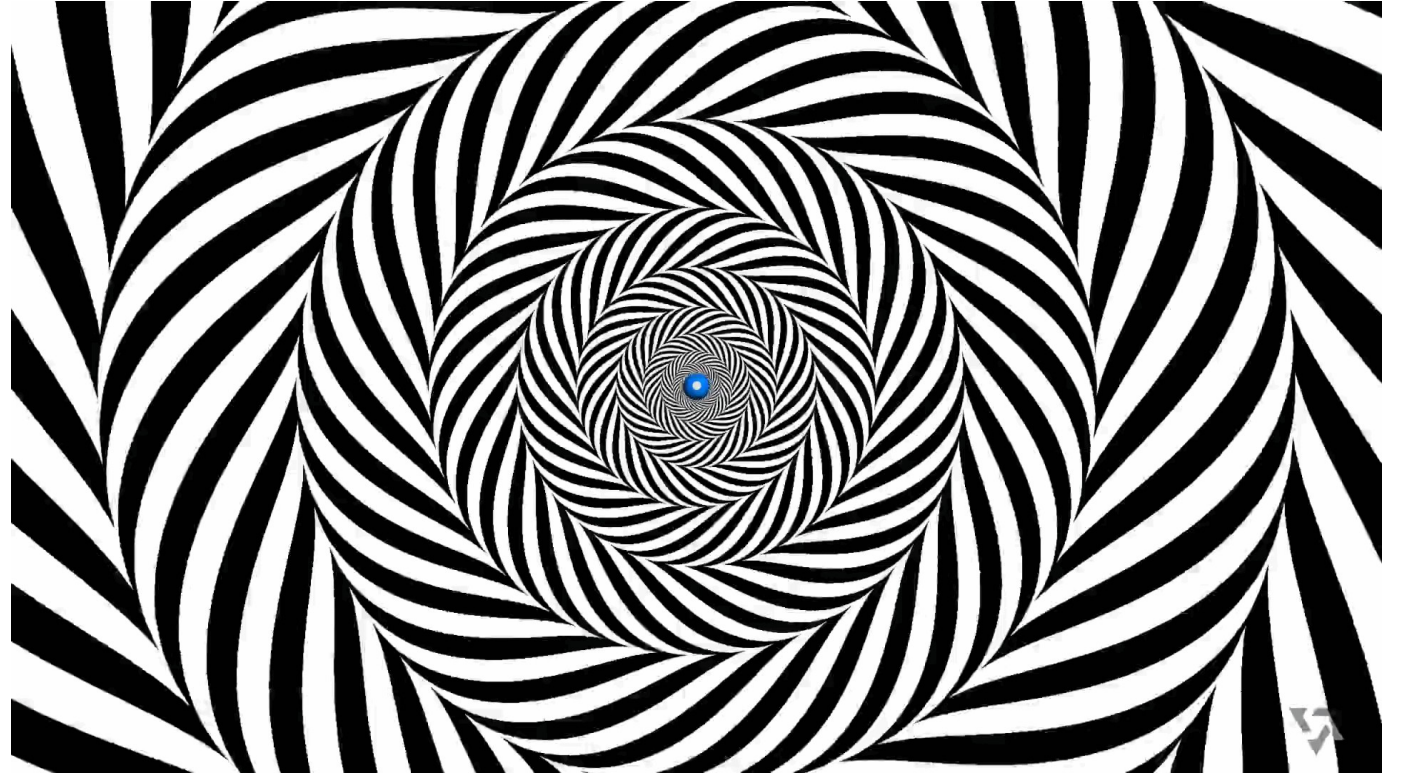


Colour percept changes according to the context

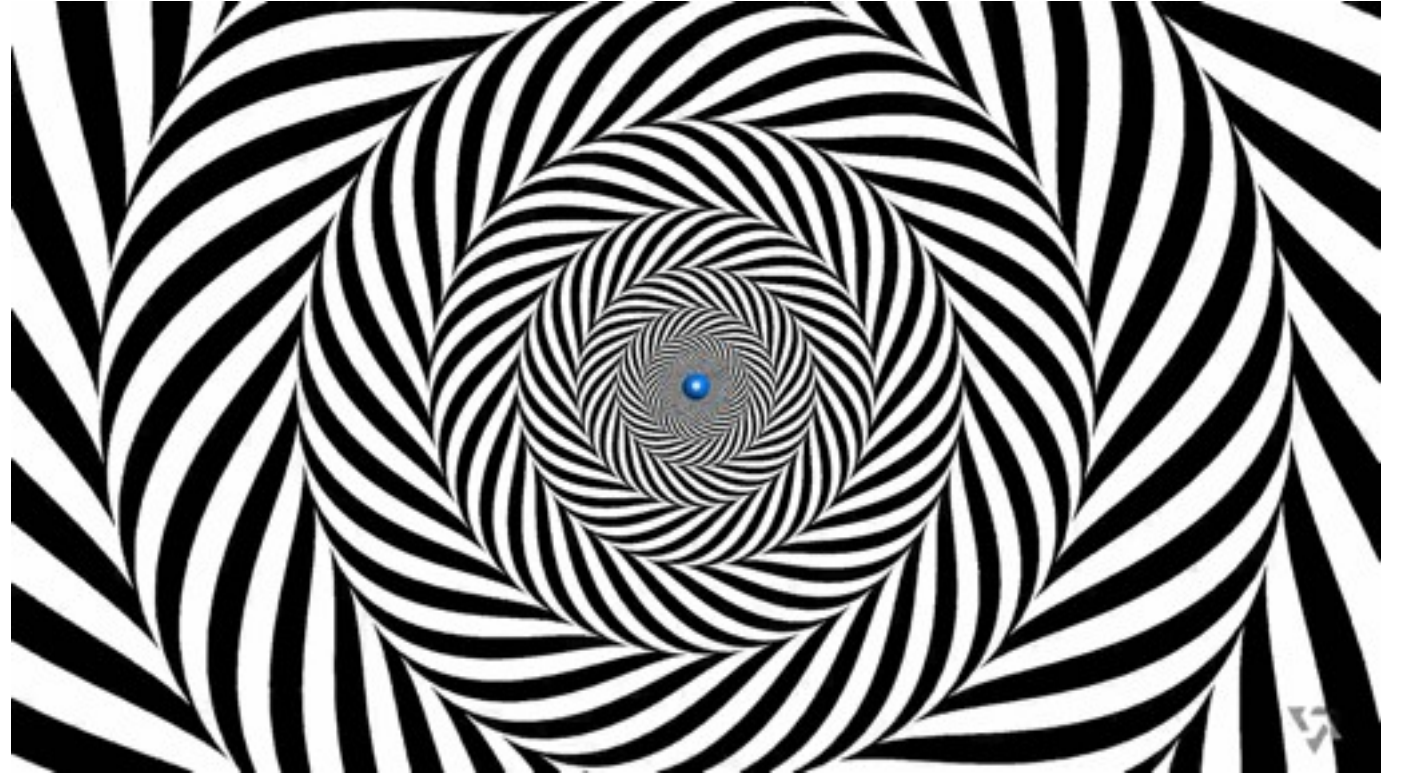
Simultaneous colour illusion



Motion
aftereffect:
opponency
in motion



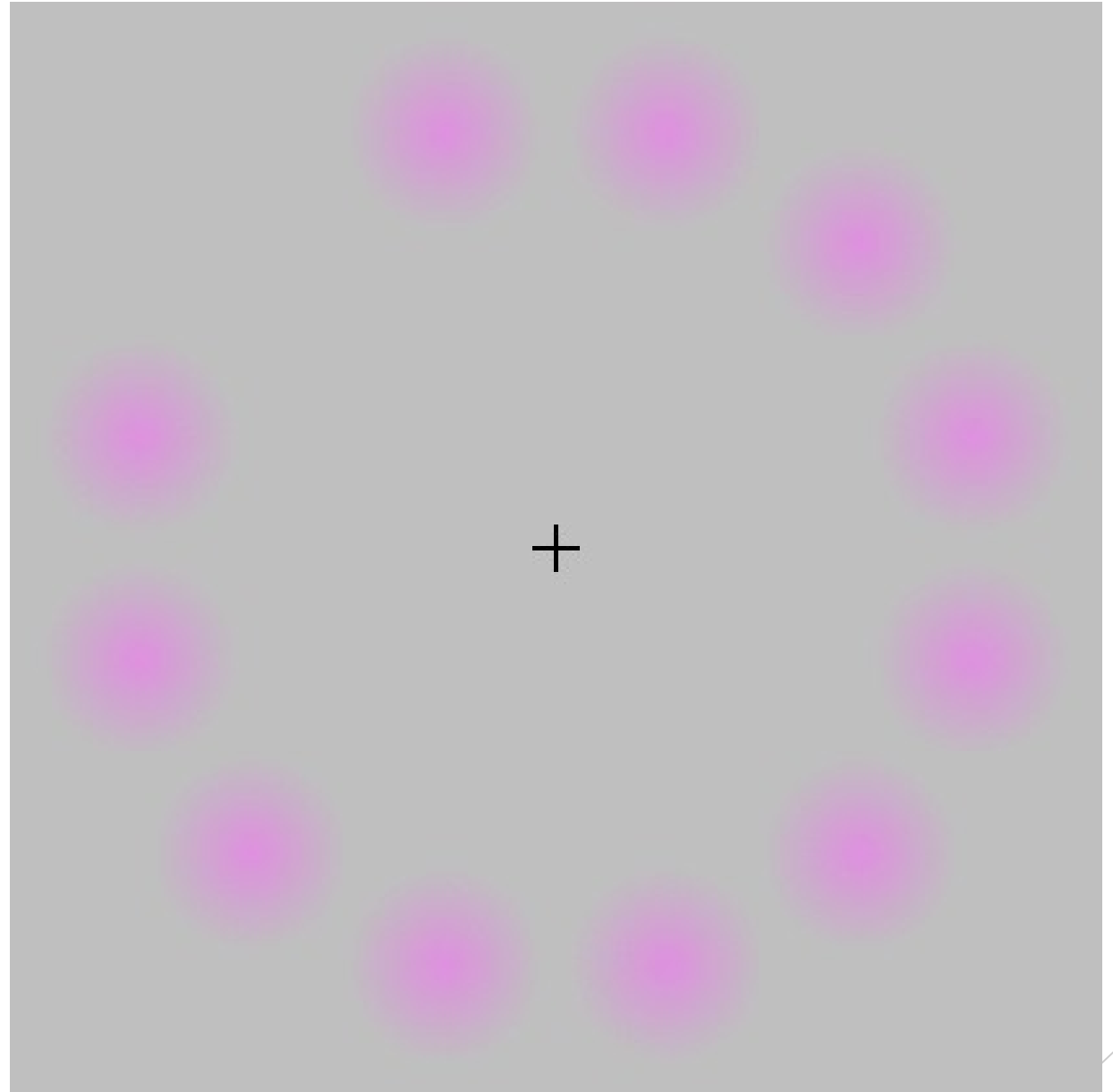
**Motion
aftereffect:
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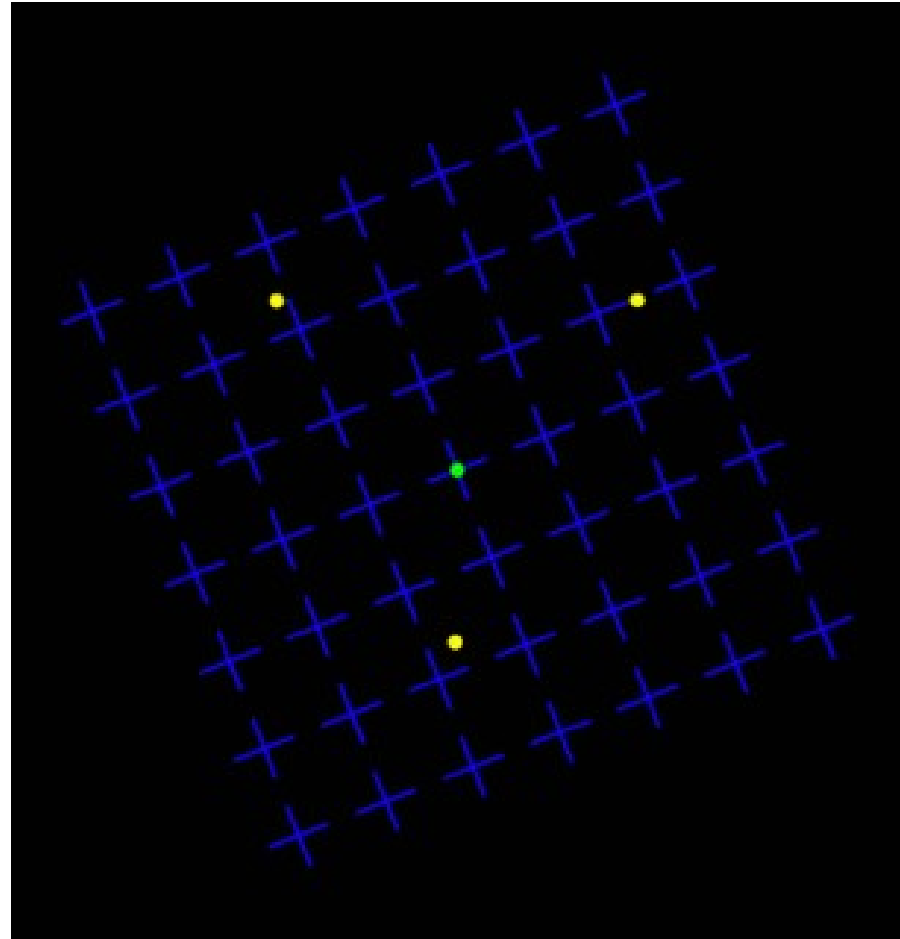
The dress
illusion: system
accounts for the
overall
illumination



Lilac chaser illusion



Silencing by motion



<https://michaelbach.de/ot/mot-silencing/index.html>

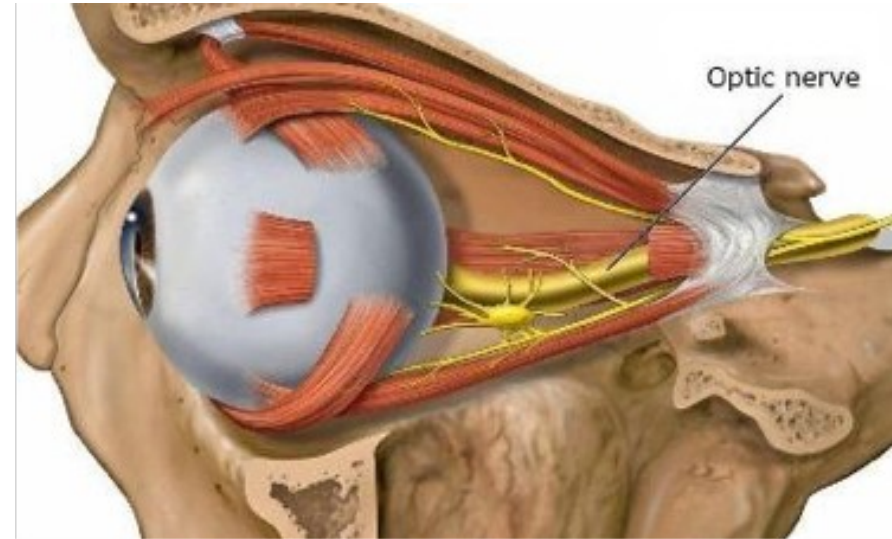
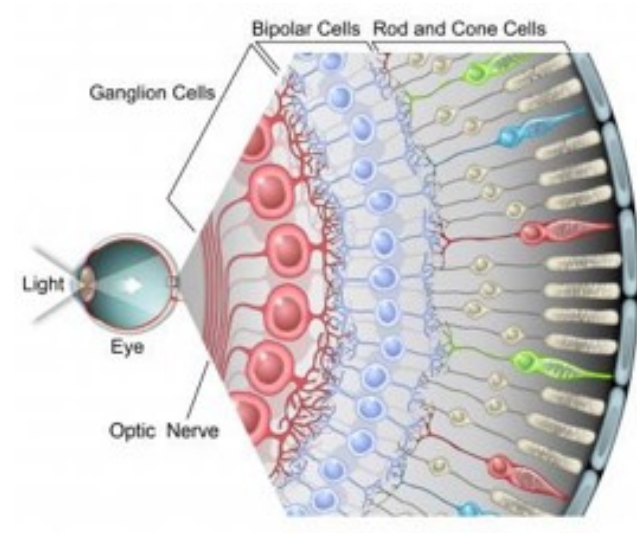
Troxler's fading

Our visual field
is
heterogeneous:
spatial
resolution in the
periphery is low



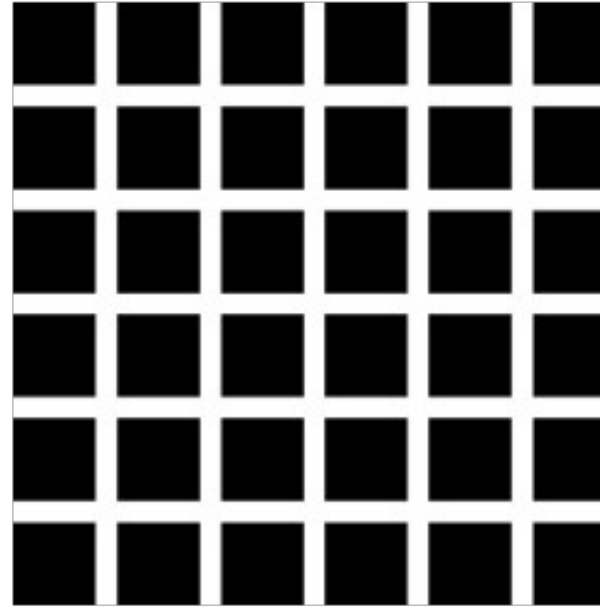
Troxler's fading due to:
Receptive fields being larger and more sensitive to
temporal information (rather than to spatial detail)
on the peripheral retina & eye tremors

Trade-off in the
system: limited
energy and the
hardware



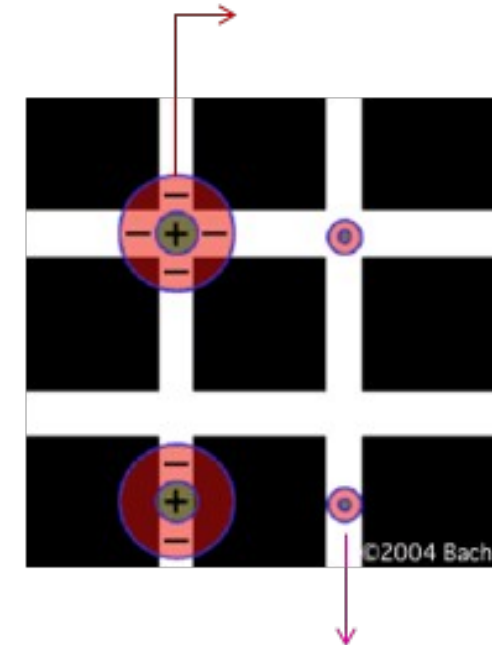
Lateral inhibition

The system
encodes
contrast rather
than the
absolute values



Hermann Grid Illusion

Extra-foveal representation

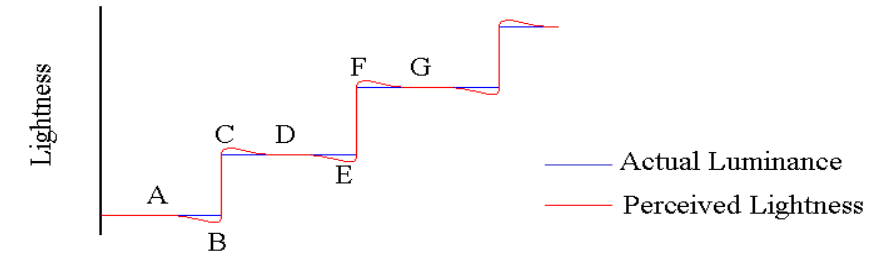
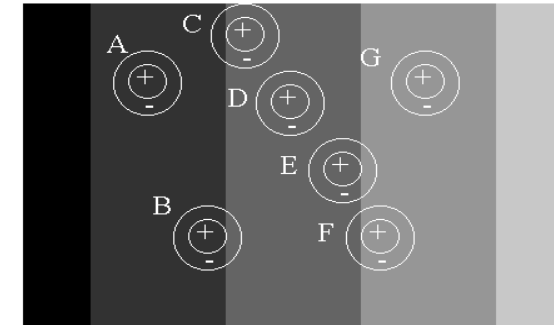
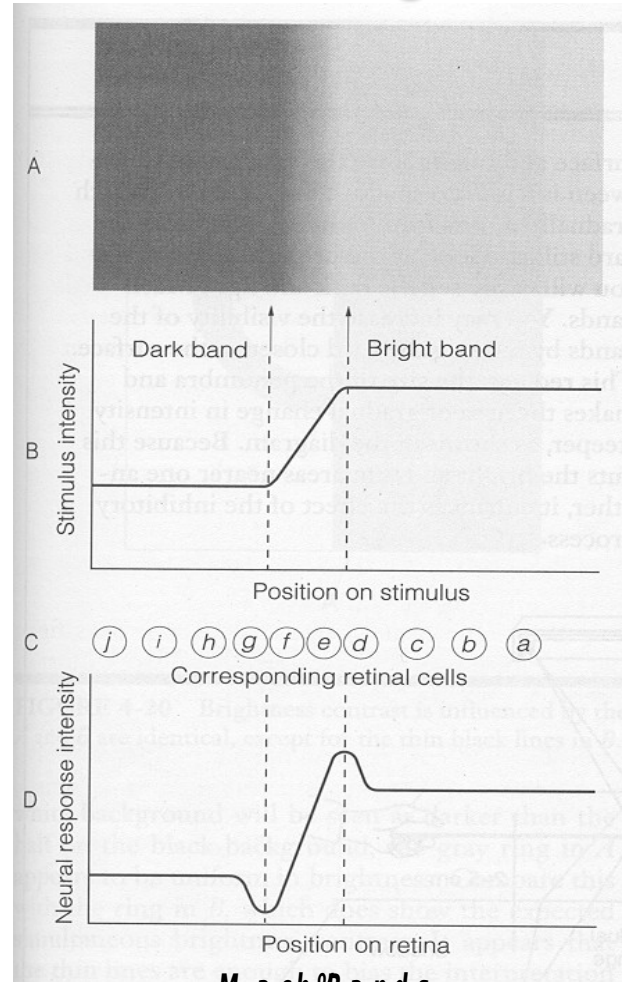


Foveal representation

Lateral inhibition

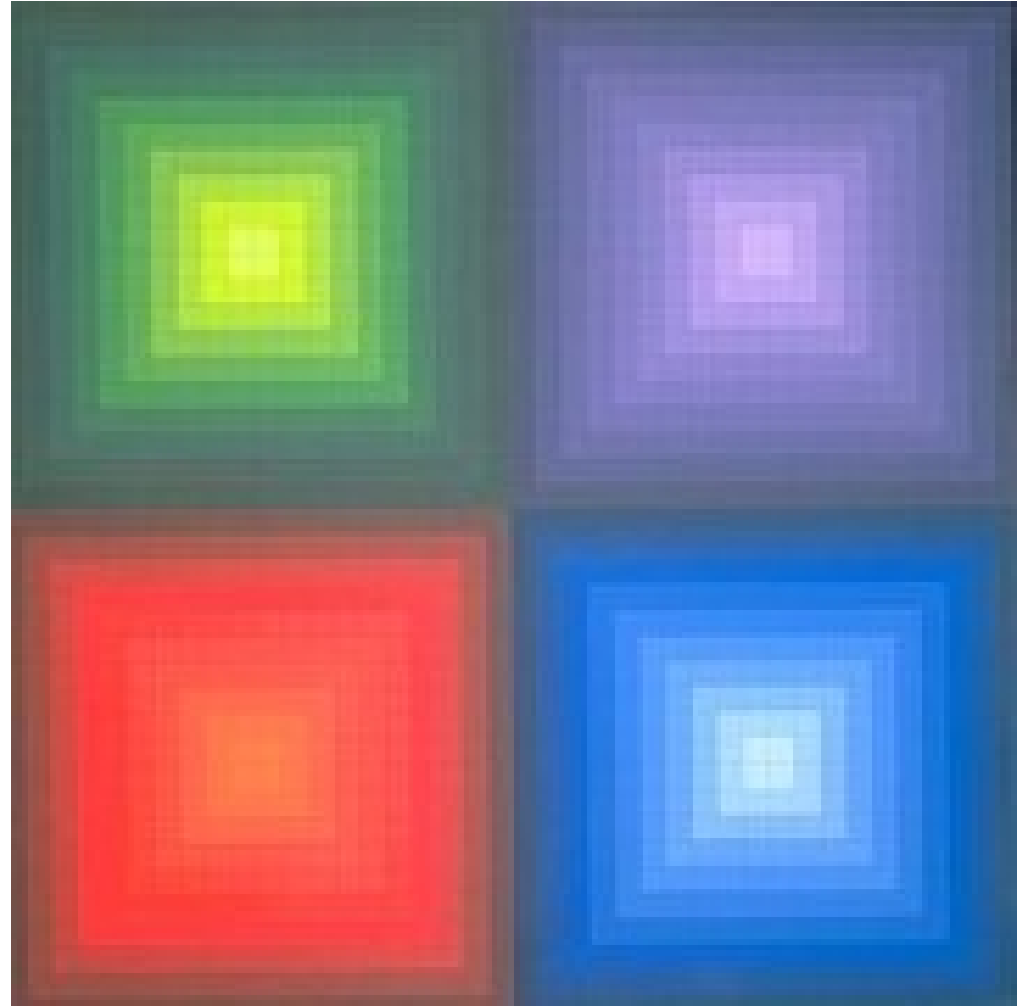
Perceptual Consequences of Lateral Inhibition
Enhancement of Edge Detection

Enhancement of edge detection

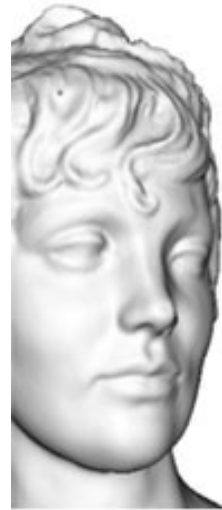


The **physical luminance** of the light emitted or reflected by an object or surface is converted into **perceived brightness** in the visual stream.

Lateral
inhibition can
also explain the
pyramid illusion



Lateral inhibition: contour extraction



Shaded View



Contours



Suggestive Contours



Ridges & Valleys



Apparent Ridges

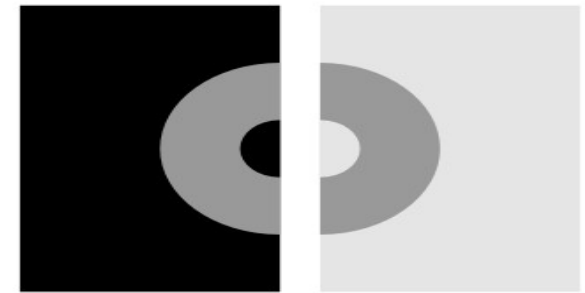
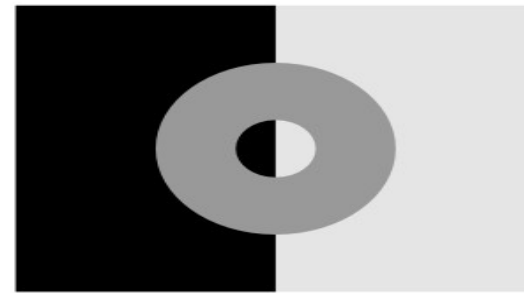
Simple 'line' drawings of an 'image' are 'enough' for 'us' to 'recognise' a figure. 'Clearly, 'information about edges' must 'carry' essential' information 'about' the 'visual' world.

Neural encoding strategies to reduce redundancy and enhance contrast

Neural encoding strategies to reduce redundancy and enhance **contrast**

Contrast: The difference in luminance between an object and the background or between lighter and darker parts of the same object.

System
exaggerates
the
differences



Wertheimer-Koffka Ring Illusion



Filling-in high-level mechanisms

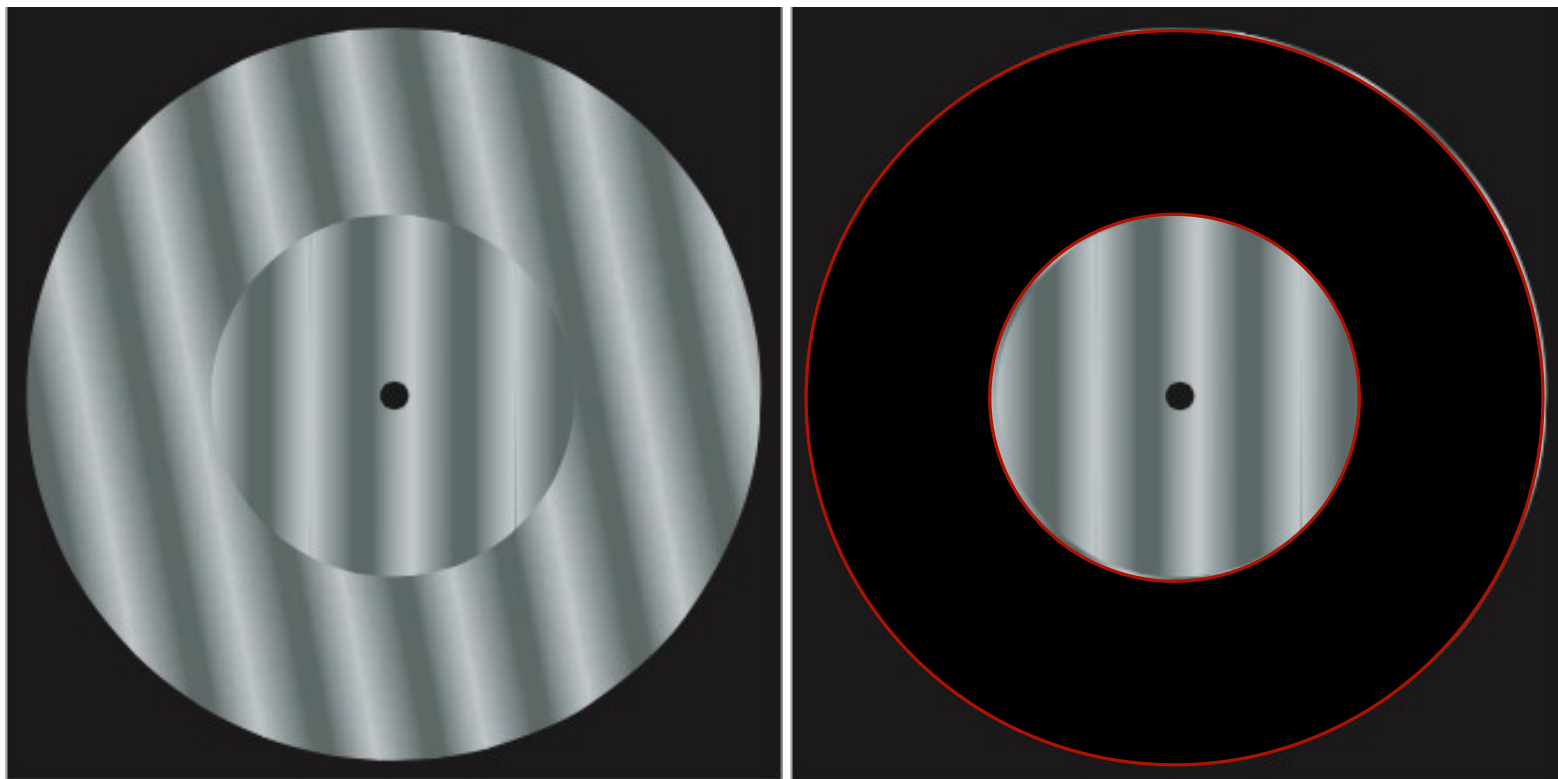


Simultaneous contrast retinal mechanisms

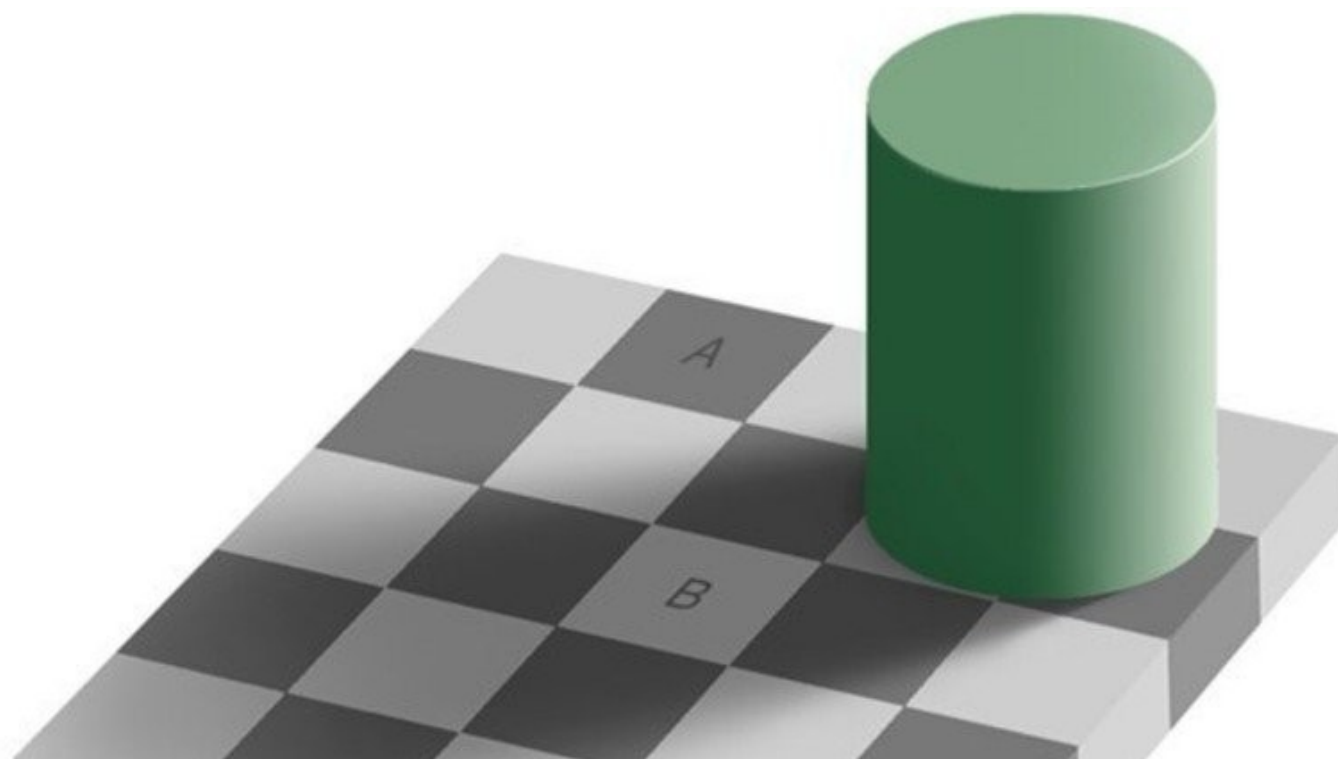
Wertheimer & Koffka: Amongst Founders of Gestalt Psychology

Neural encoding strategies to
enhance not only luminance but
also **texture** contrast

System
exaggerates
the
differences

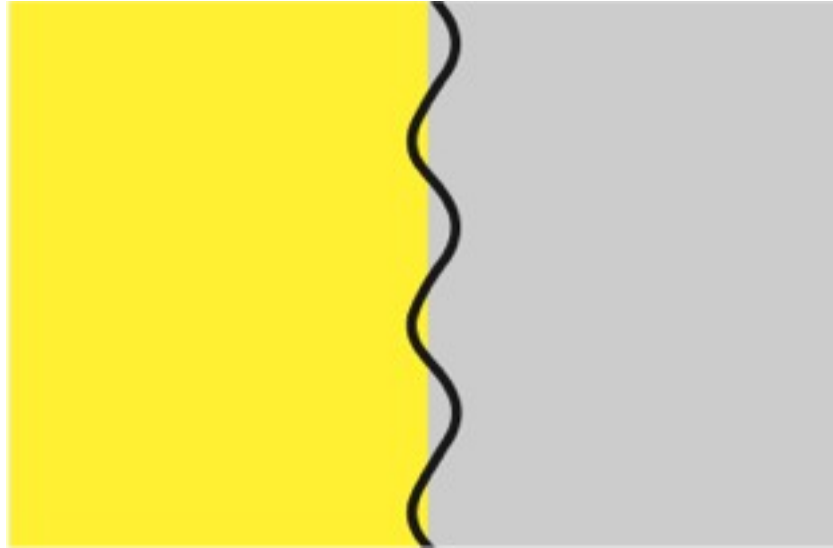


Context is
important



A demonstration of top-down filling-in in case of uncertainty

The spatial resolution of the colour system is low in the periphery



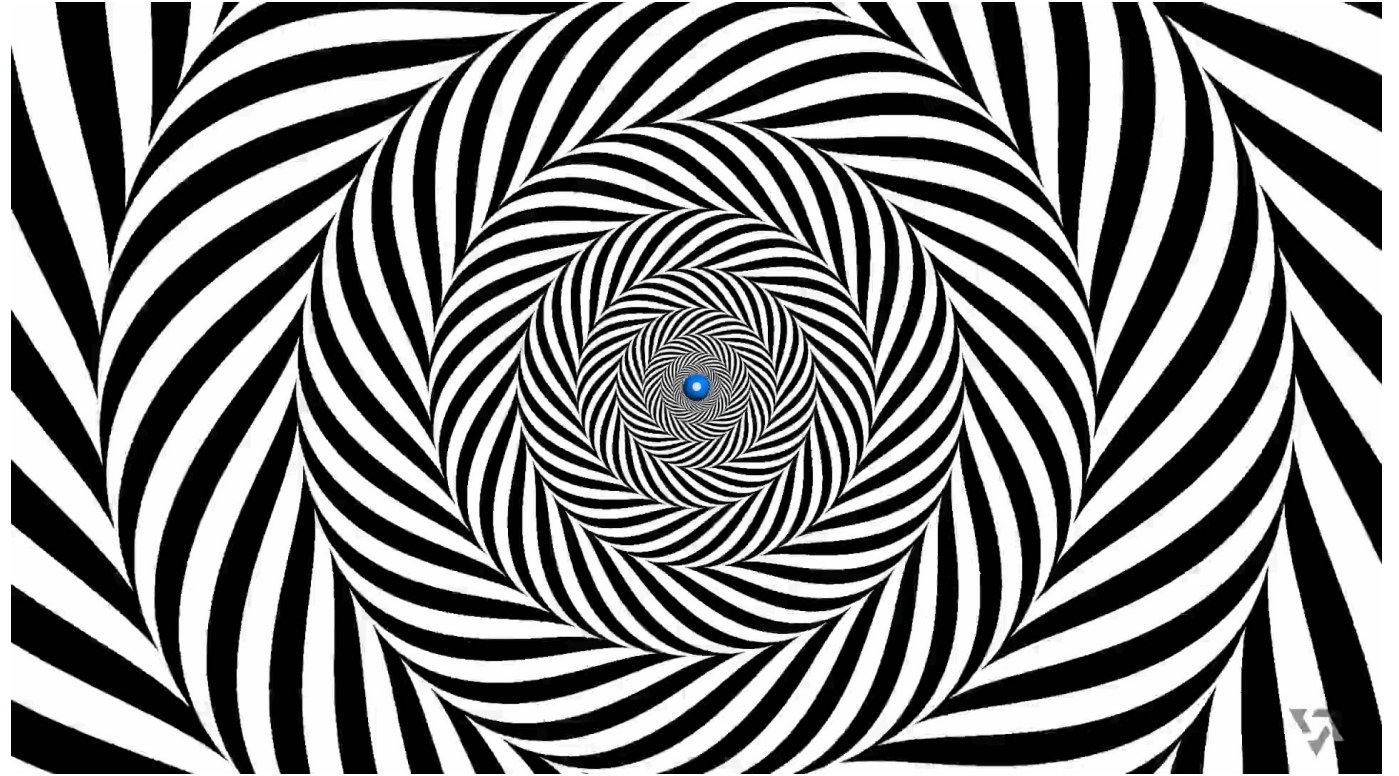
Assimilation as opposed to lateral inhibition

The spatial resolution of the colour system is low in the periphery

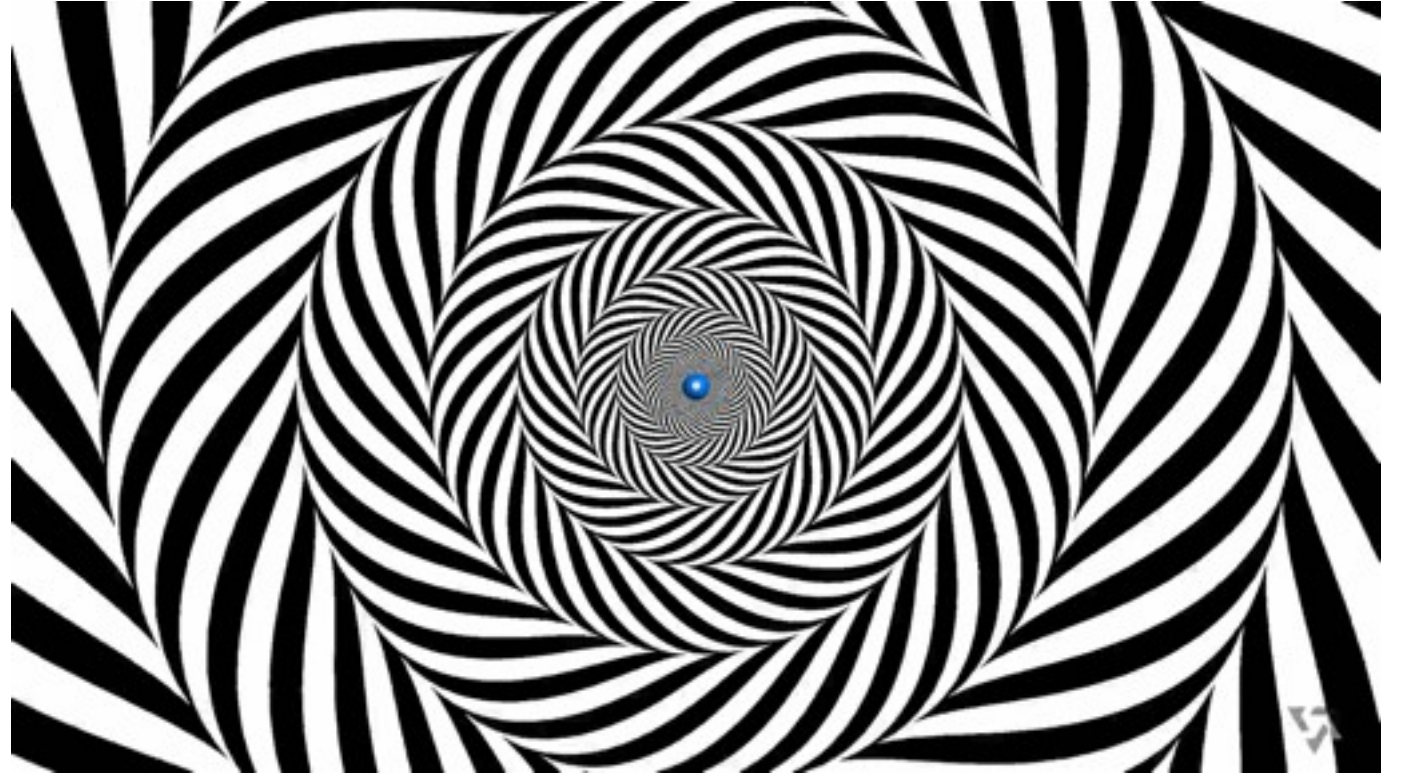


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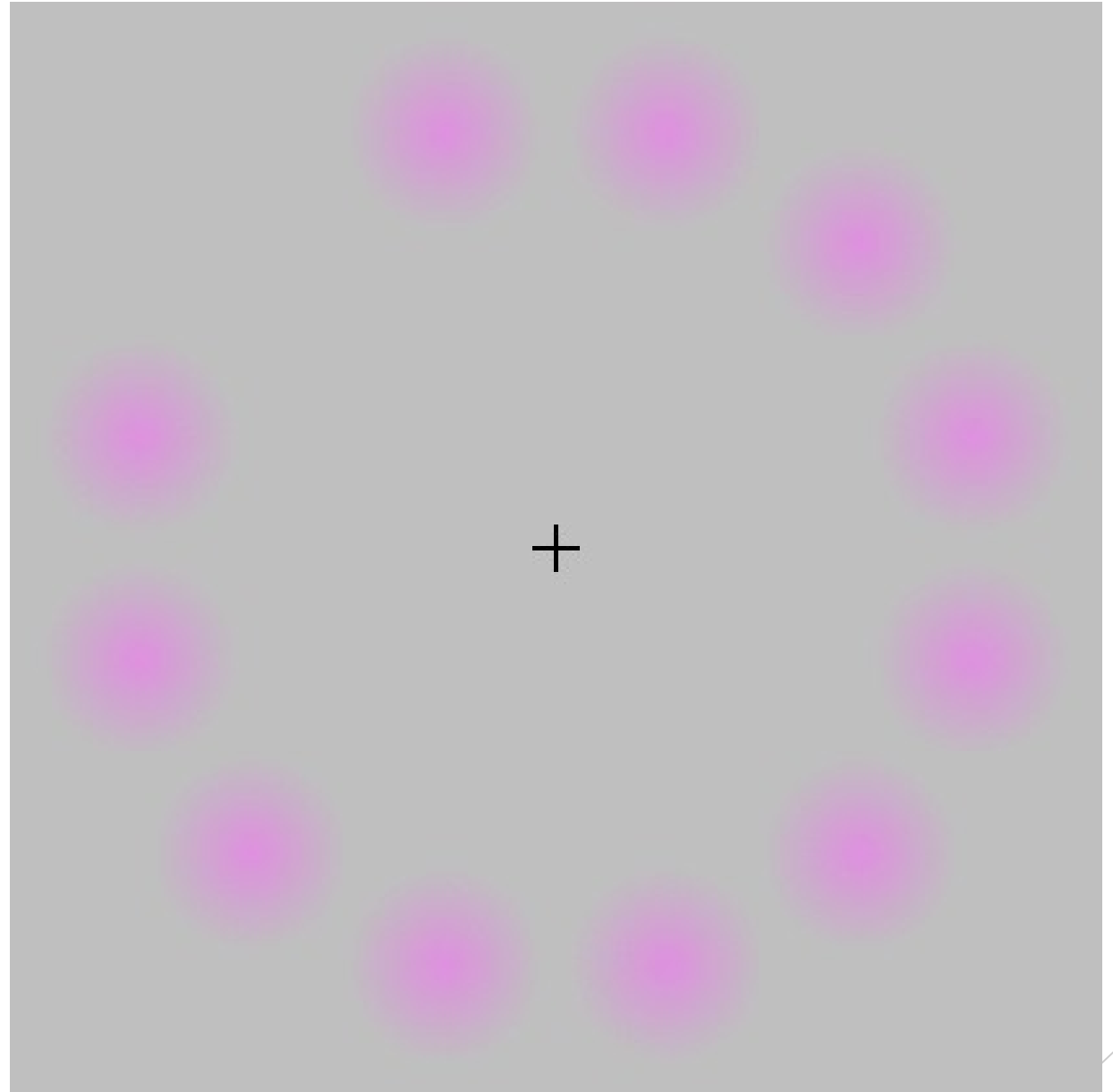
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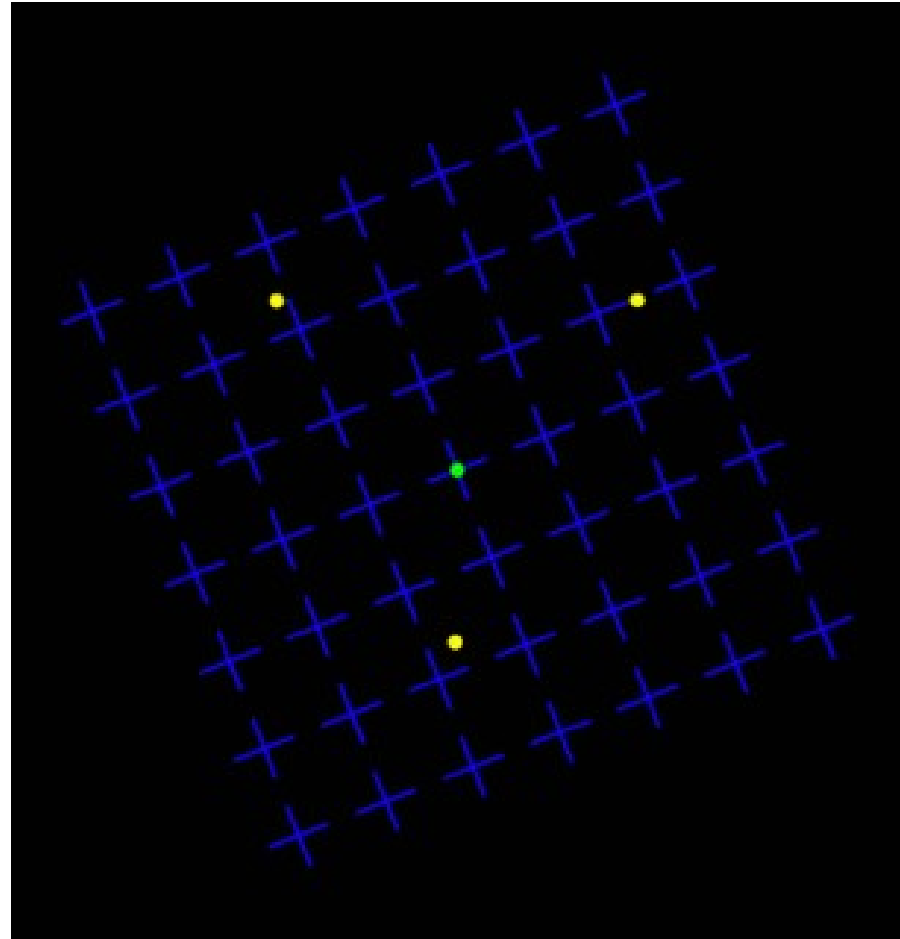
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