

# Cognition

Image Source <https://commons.wikimedia.org/wiki/File:Multistability.svg> by Mintz I

# Learning Goals

- Information processing
- Visual pre-processing
- Cognition
- Depth perception

# Visual information processing

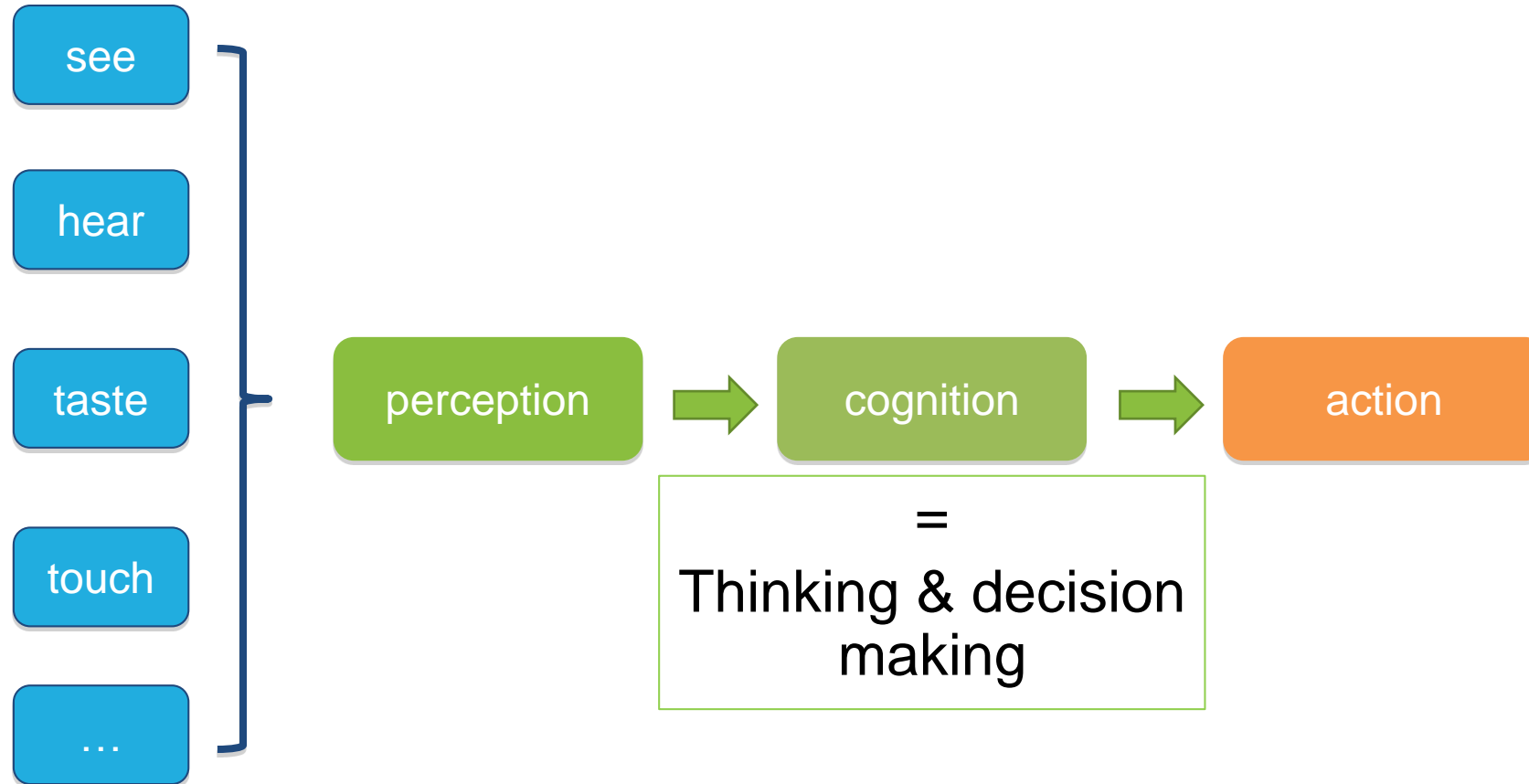
- Perception:  
sensors and signal processing in the eye and brain
- Cognition:  
“understanding” in the brain

Tendency to see what is known, wanted, anticipated



Image Source <https://pixabay.com/de/photos/offene-arme-kind-gl%C3%BCcklich-bis-2747115/>

# Human information processing



# Signal pre-processing

- Stimuli are pre-processed in the neuronal networks of the retina
- Example: edge intensification shown in Mach bands

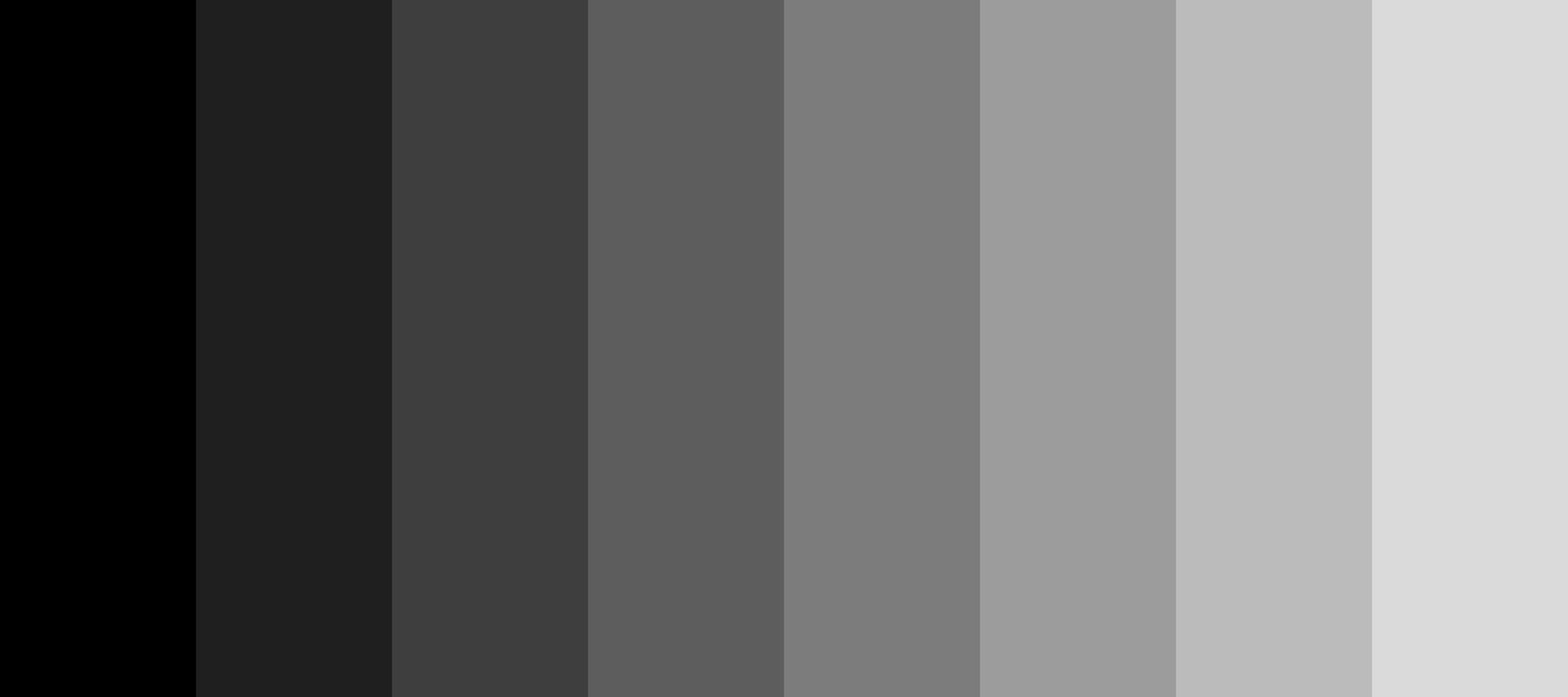


Image Source [https://de.wikipedia.org/wiki/Machsche\\_Streifen](https://de.wikipedia.org/wiki/Machsche_Streifen) by Poloni

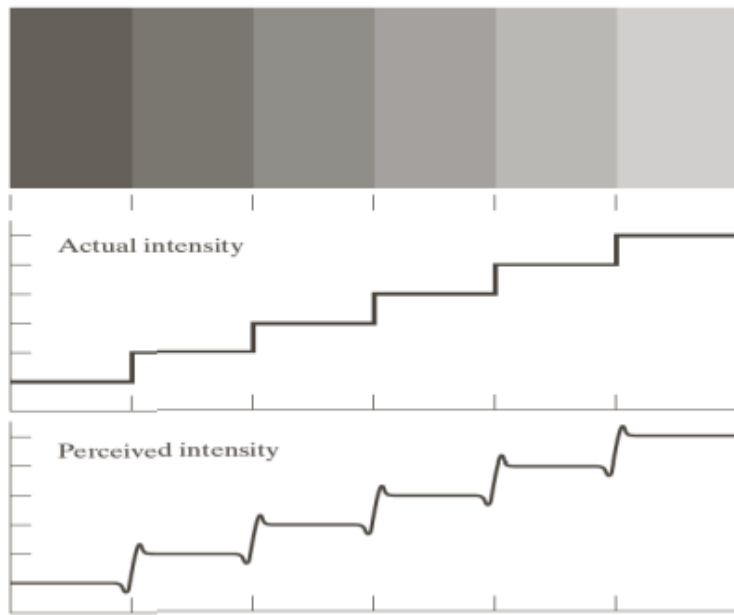
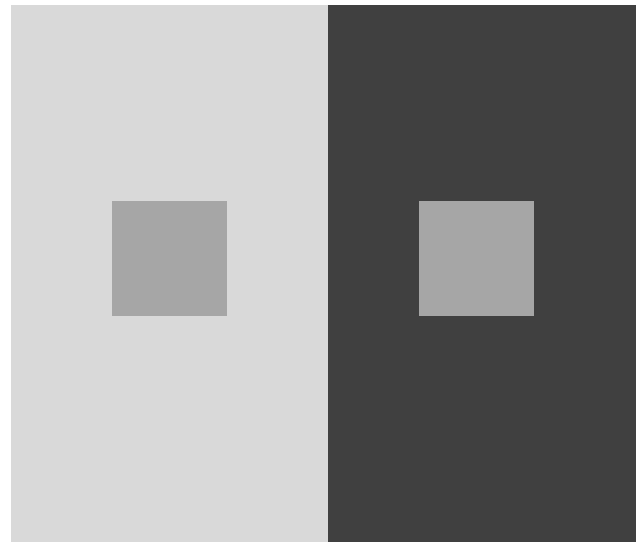


Image Source [https://de.wikipedia.org/wiki/Machsche\\_Streifen](https://de.wikipedia.org/wiki/Machsche_Streifen) by Poloni  
<https://cs.stackexchange.com/questions/117497/mach-band-effect> by Turing101



# Edge Detection through Contrast Intensification

- Simultaneous contrast



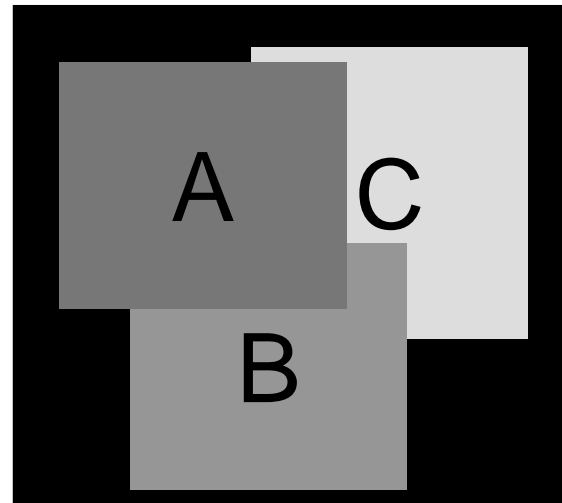
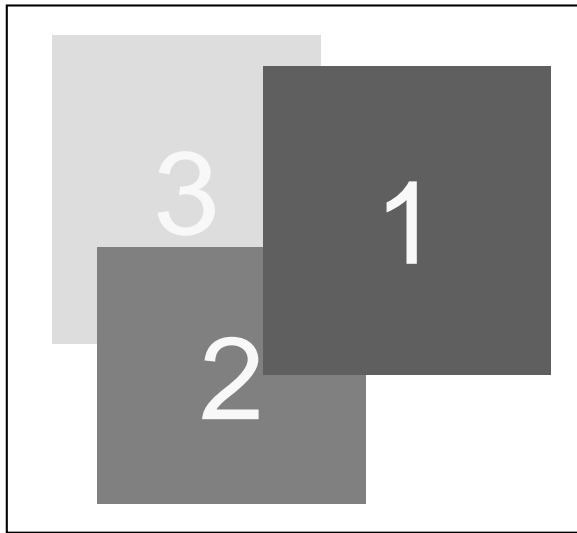
# Edge Detection through Contrast Intensification

- Simultaneous contrast



# Simultaneous Contrast

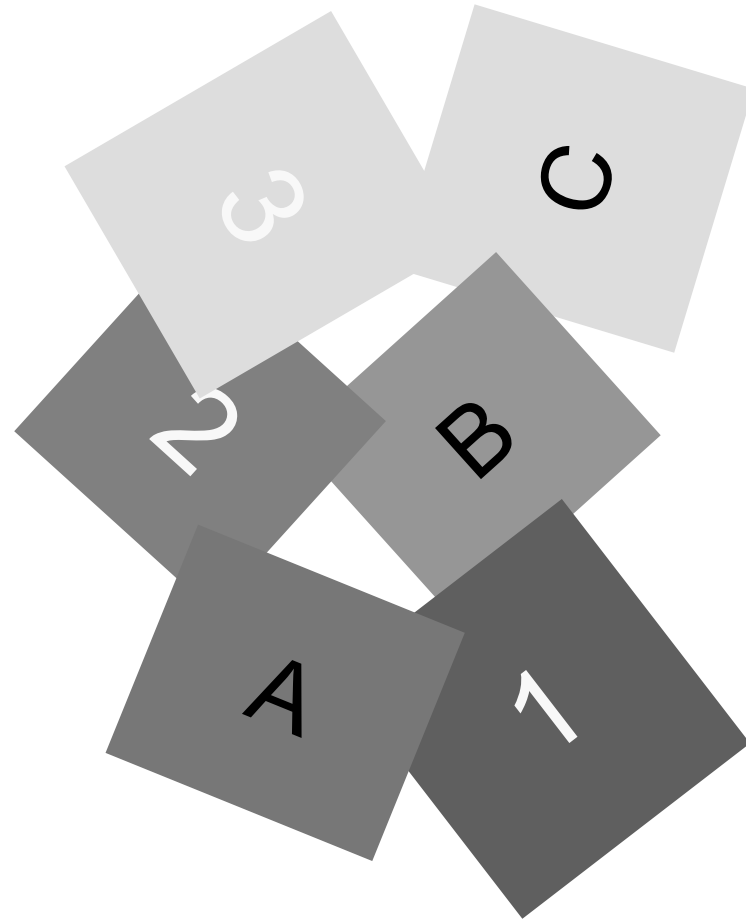
- Simultaneous contrast



Images by Albrecht Schmidt

# Simultaneous Contrast

- $A \neq 1$
- $B \neq 2$
- $C = 3$



Images by Albrecht Schmidt

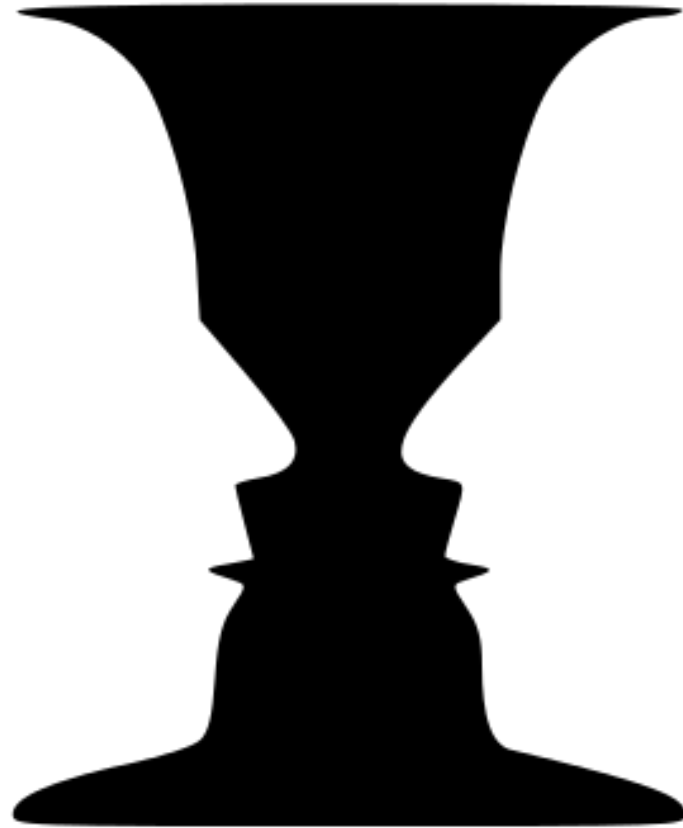


Image Source <https://commons.wikimedia.org/wiki/File:Multistability.svg> by Mintz I

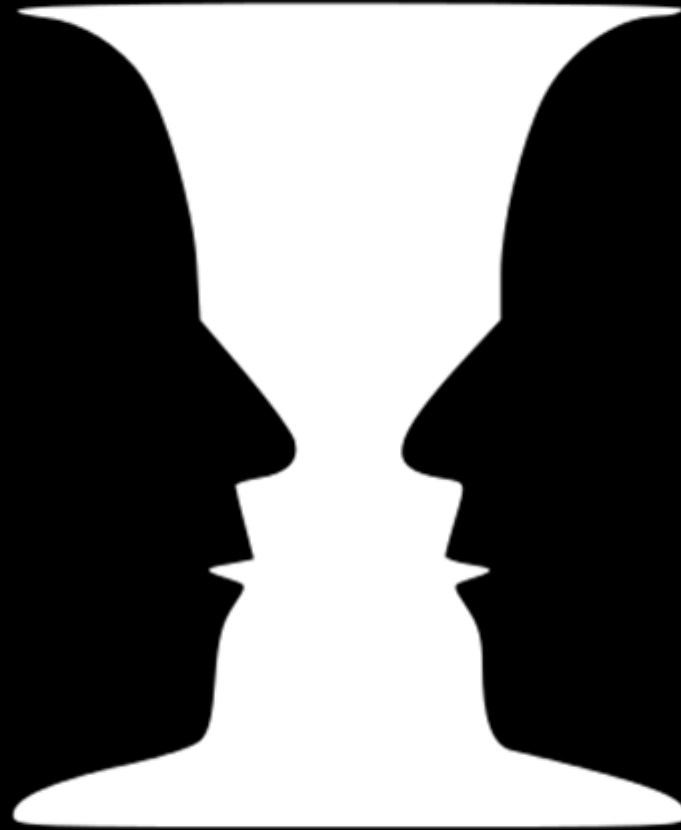
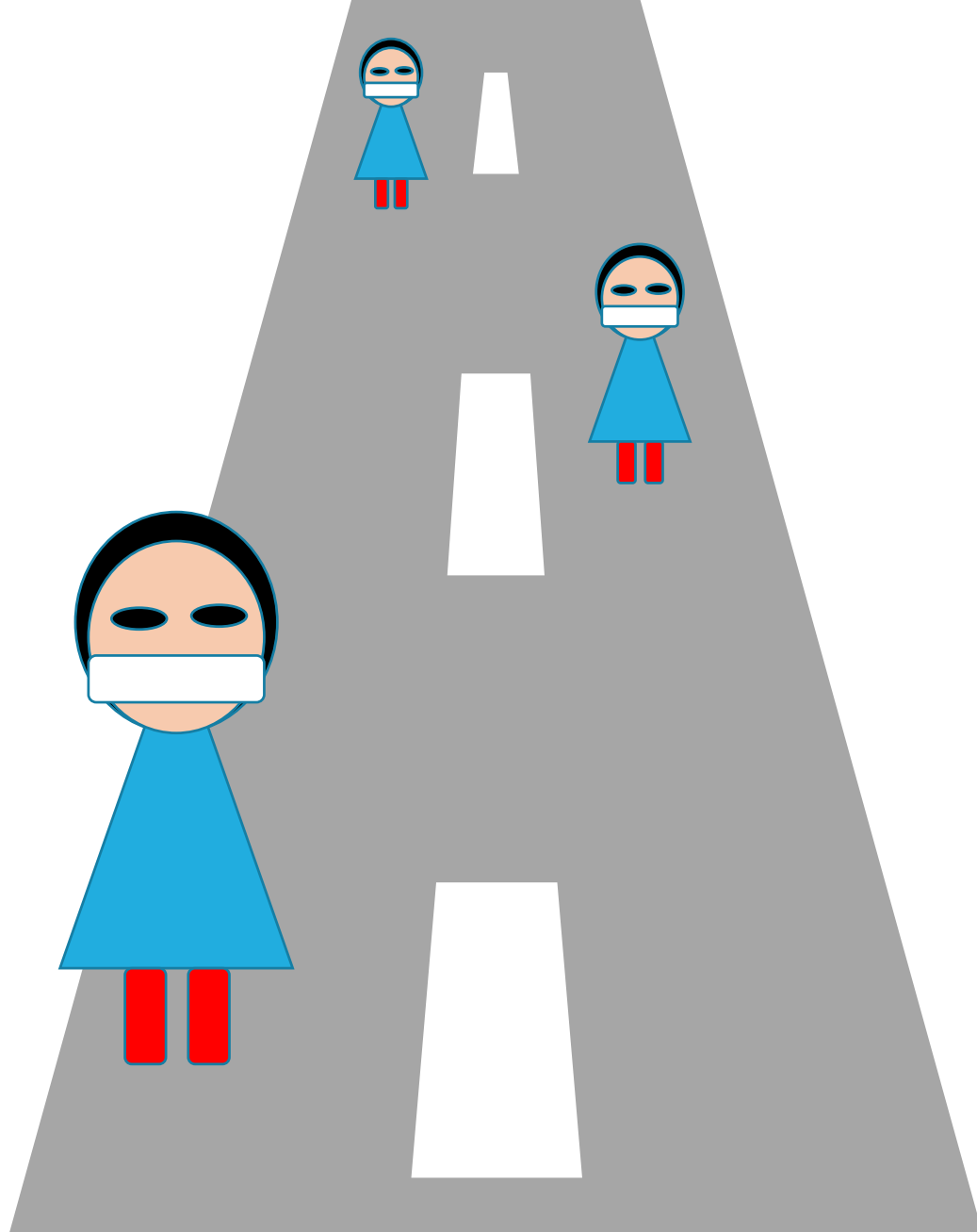
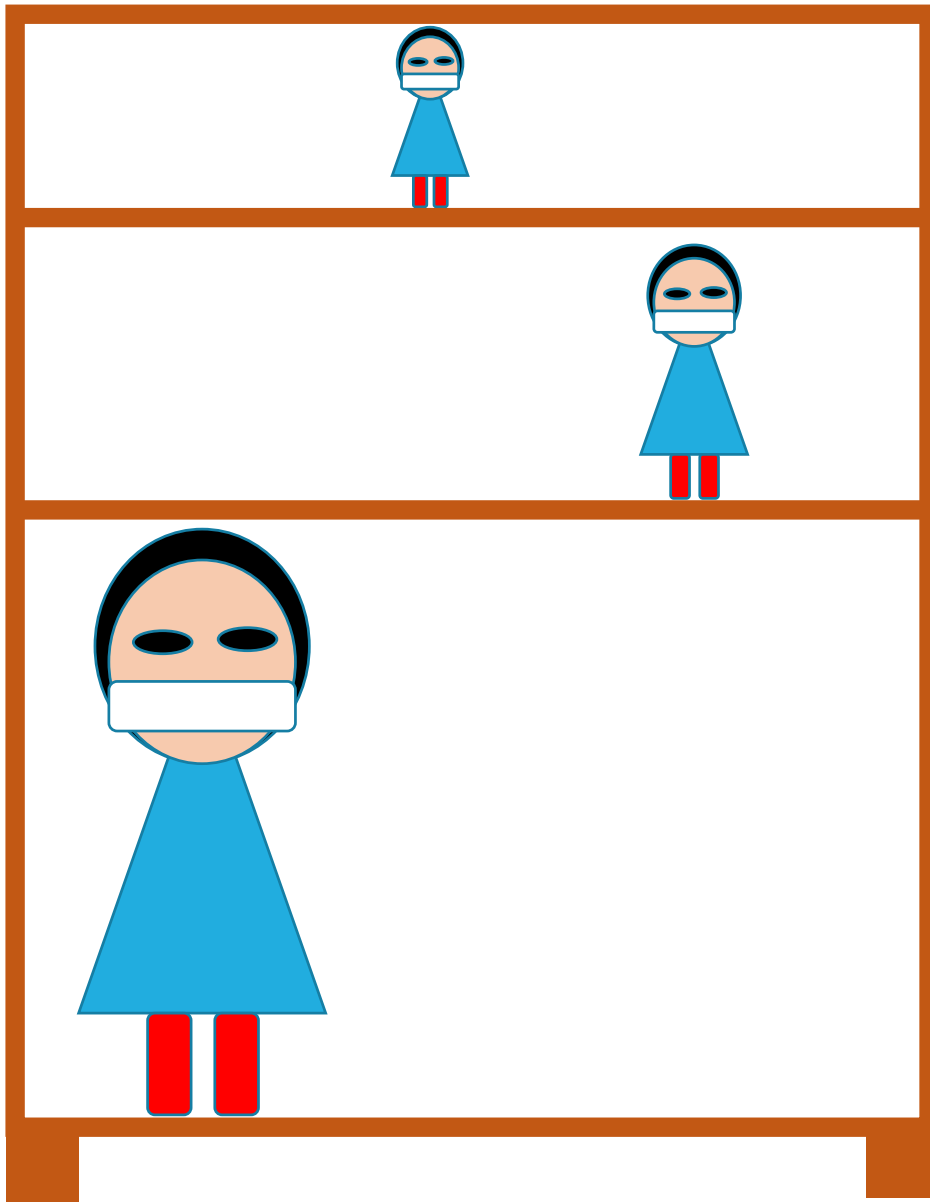
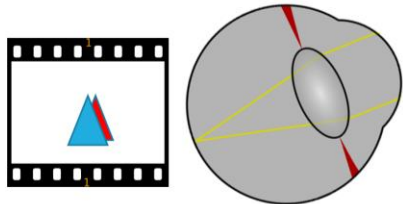
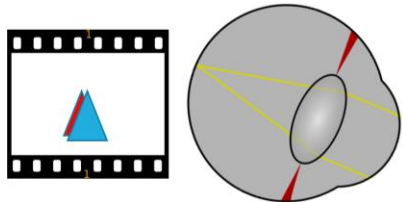
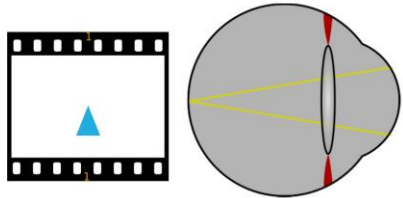
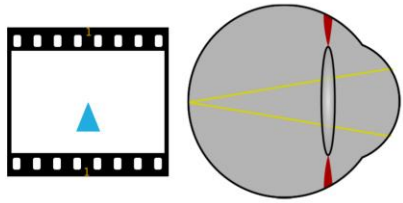


Image Source <https://commons.wikimedia.org/wiki/File:Multistability.svg> by Mintz I









## Depth perception

- Binocular disparity
- Vergence
- Accommodation



## Depth cues

- Blue / sharpness
- Occlusion
- Increased size over distance





Image Source <https://www.flickr.com/photos/pjgardner/178553427> by Jessica Gardner

# Depth Perception

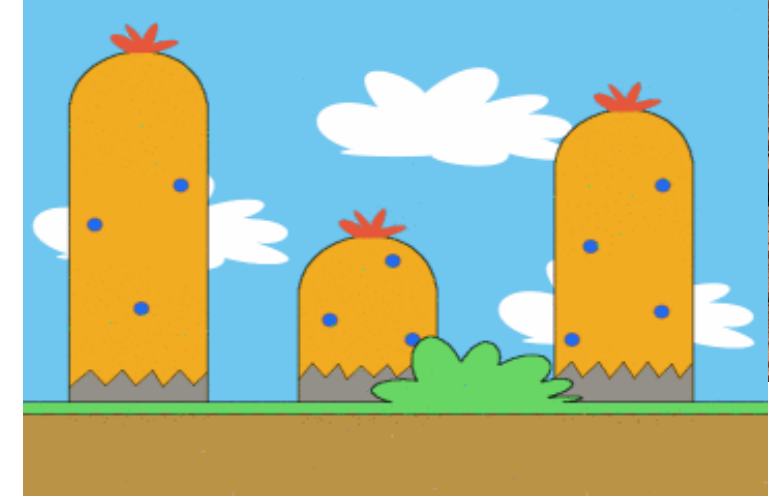
## Depth perception

- Binocular disparity
- Vergence
- Accommodation
- Shadows
- Atmospheric Lighting
- Perspectives
- Texture gradient (distortion over distance)

## Depth cues

- Size  $\leftrightarrow$  distance
- Occlusion
- Blue / sharpness
- Motion parallax

Source <https://www.flickr.com/photos/cadampol/2297308960> by Carlos Adampol Galindo & [https://de.wikipedia.org/wiki/Datei:Parallax\\_scrolling\\_example\\_scene.gif](https://de.wikipedia.org/wiki/Datei:Parallax_scrolling_example_scene.gif) by OhSqueezy



# Visual information processing

- Perception:  
sensors and signal processing in the eye and brain
- Cognition:  
“understanding” in the brain

Tendency to see what is known, wanted, anticipated

# Visual information processing

- Perception:  
sensors and signal processing in the eye and brain
- Cognition:  
“understanding” in the brain

Tendency to see what is known, wanted, anticipated

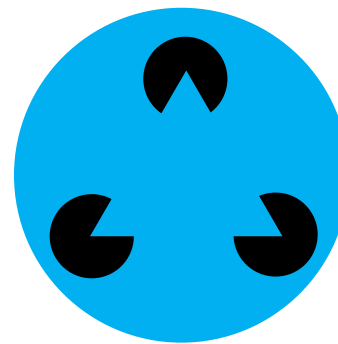
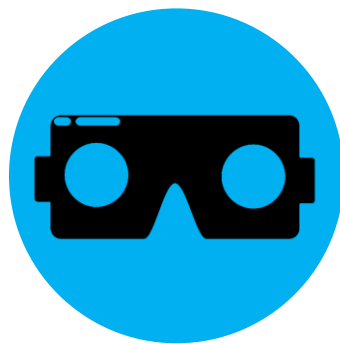
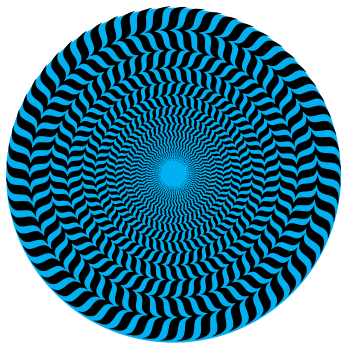


Image Source <https://pixabay.com/de/illustrations/vr-virtuelle-realit%C3%A4t-brille-4530602/> & <https://svgsilh.com/image/3199441.html>

This file is licensed under the Creative Commons Attribution-Share Alike 4.0 (CC BY-SA) license:

<https://creativecommons.org/licenses/by-sa/4.0>

Attribution: Katrin Wolf

For more content see: <https://hci-lecture.de>

