INF 133: User Interaction Software: The Human

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Human Computer Interaction is a misnomer.

Rarely do people want to interact with a computer.

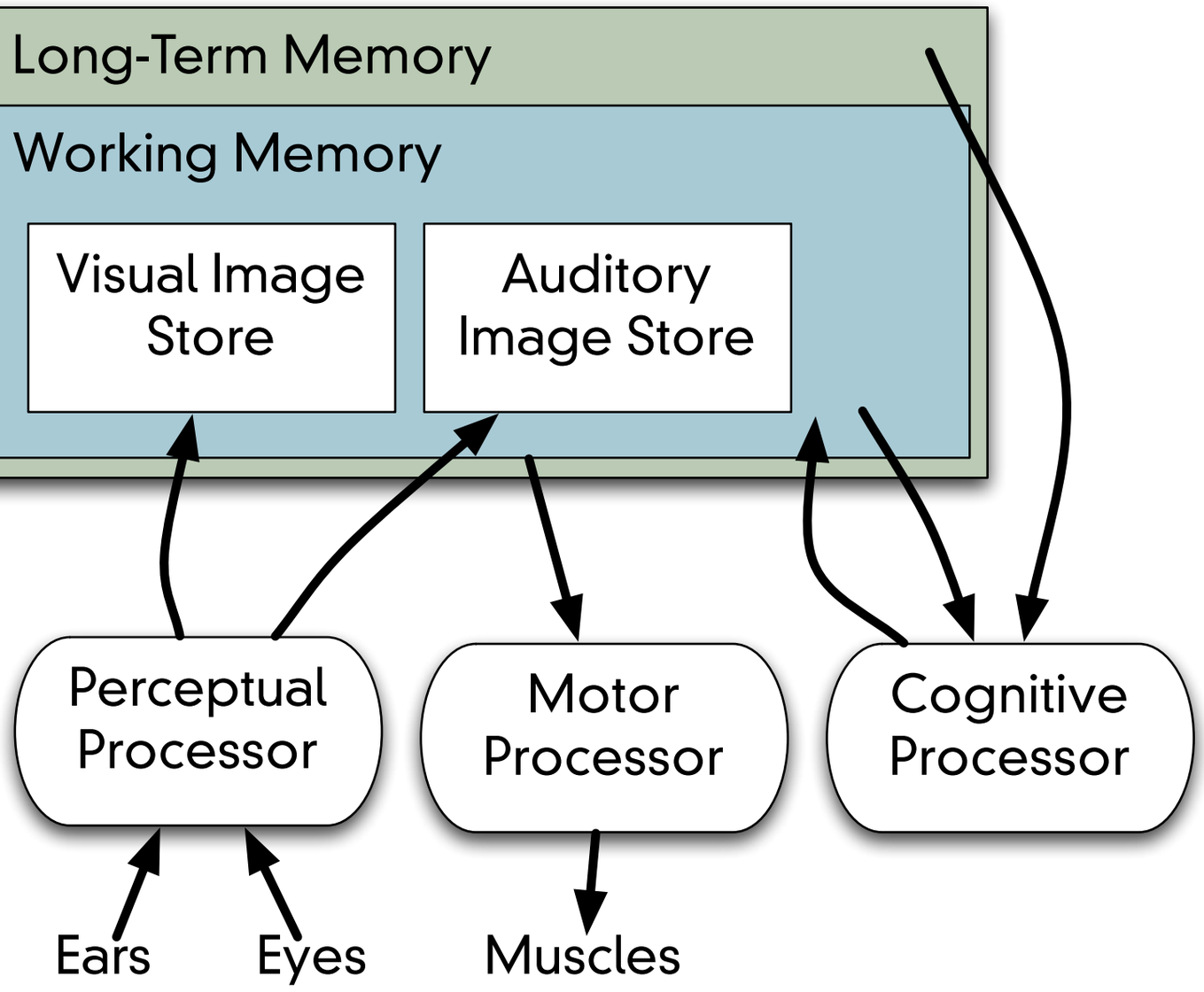
They want to interact with people, data, media.

Even gaming isn't about the computer as much as it is about having fun through a computer.

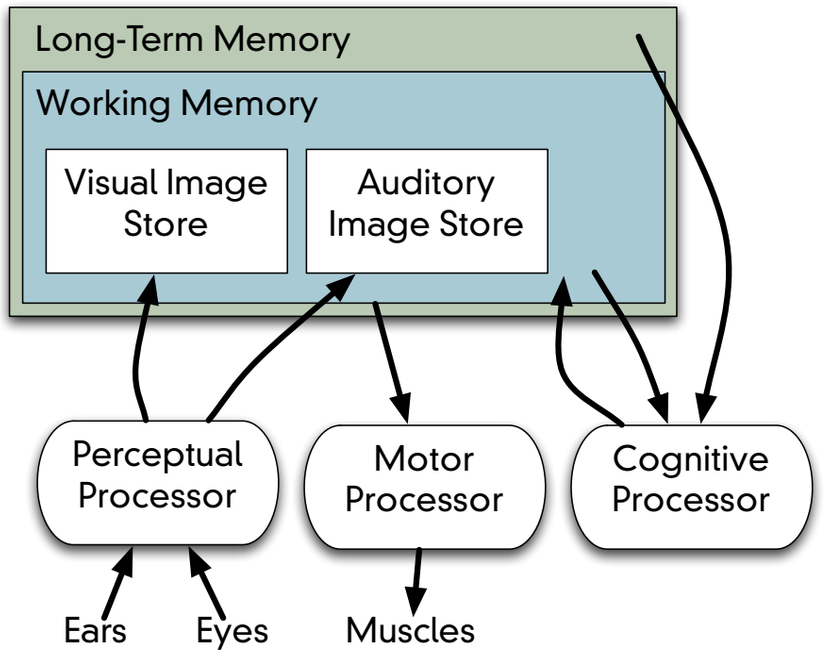
http://www.flickr.com/photos/schultzlabs/933418919

http://www.flickr.com/photos/oxborrow/51812810/

The Model Human Processor



Card, Moran, Newell (1983)



- Information Input/Output
  - visual, auditory, haptic, movement
- Information stored in memory
  - sensory, short-term, long-term
- Information processed and applied
  - reasoning, problem solving, skill, error
- Emotion influences human capabilities
- Each person is different

The Eye - Physical Reception

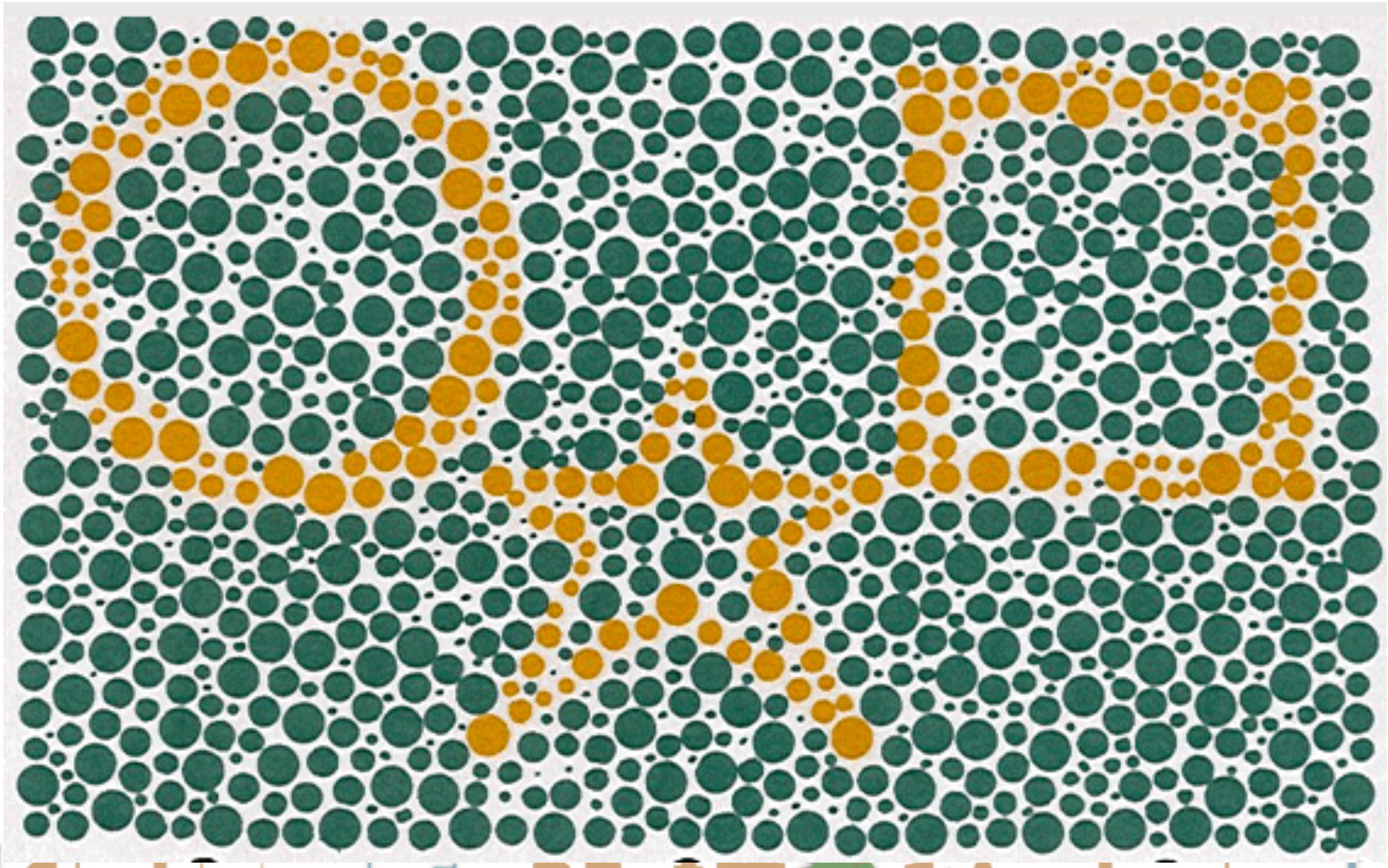
- mechanism for receiving light and transforming it into electrical energy
- light reflects from objects
- images are focused upside-down on retina
- retina contains rods for low light vision and cones for color vision
- ganglion cells (brain!) detect pattern and movement

The Eye - Interpreting the signal

- Brightness
  - subjective reaction to levels of light
  - affected by luminance of object
  - measured by just noticeable difference
  - visual acuity increases with luminance as does flicker
- Color
  - made up of hue, intensity, saturation
  - cones sensitive to color wavelengths
  - blue acuity is lowest
  - 8% males and 1% females color blind

The Human

http://colorvisiontesting.com/



The Human

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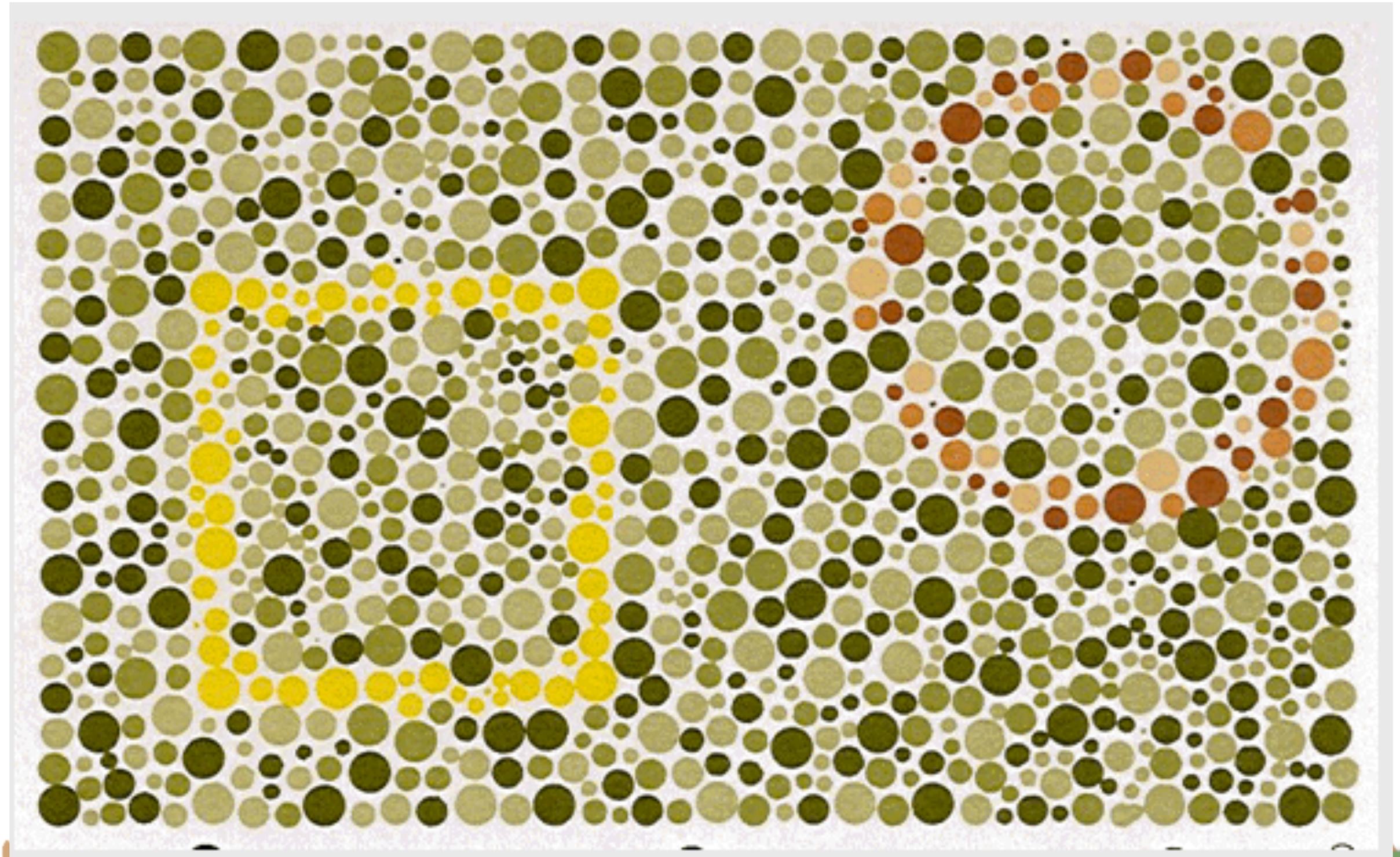

The Human

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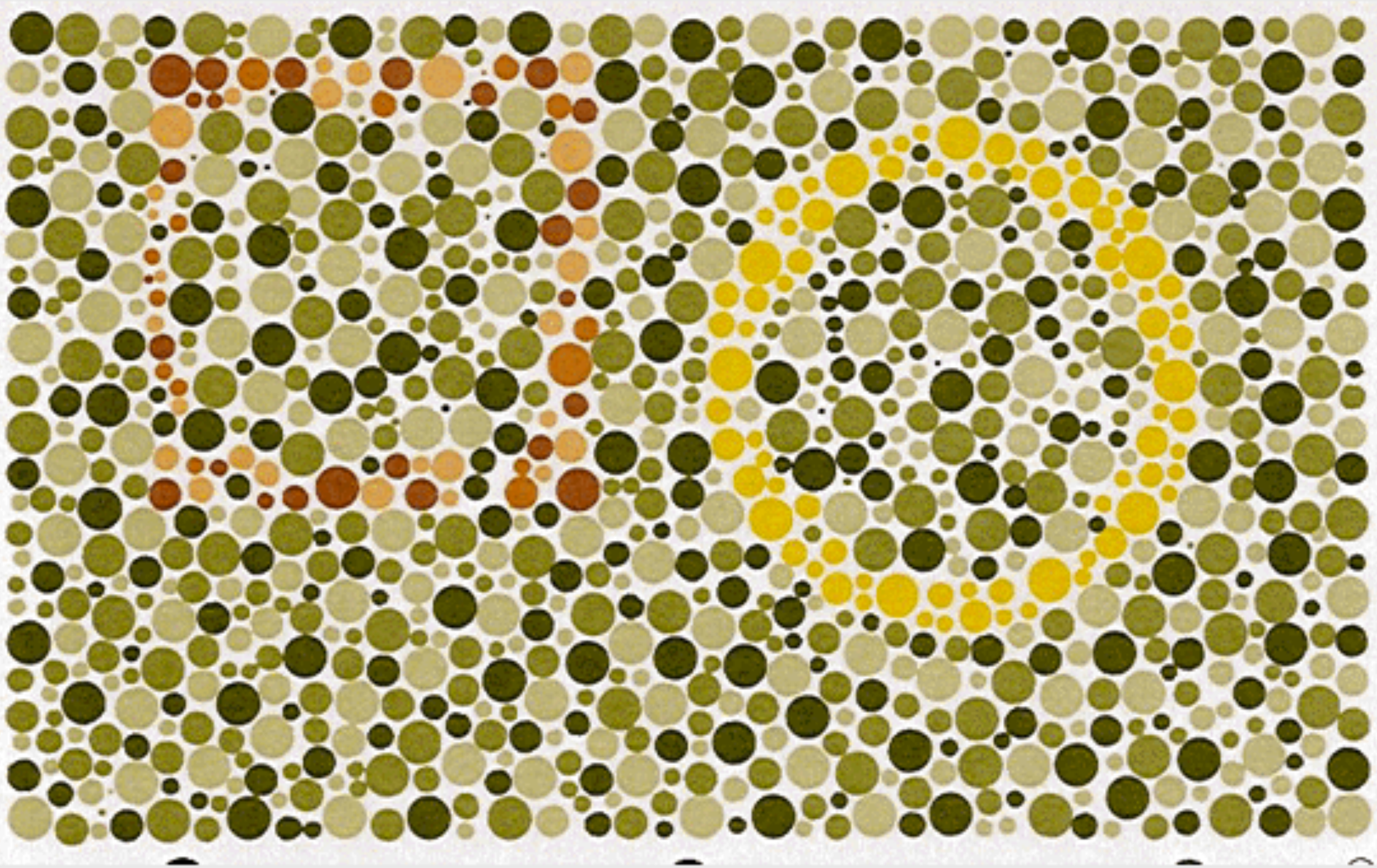
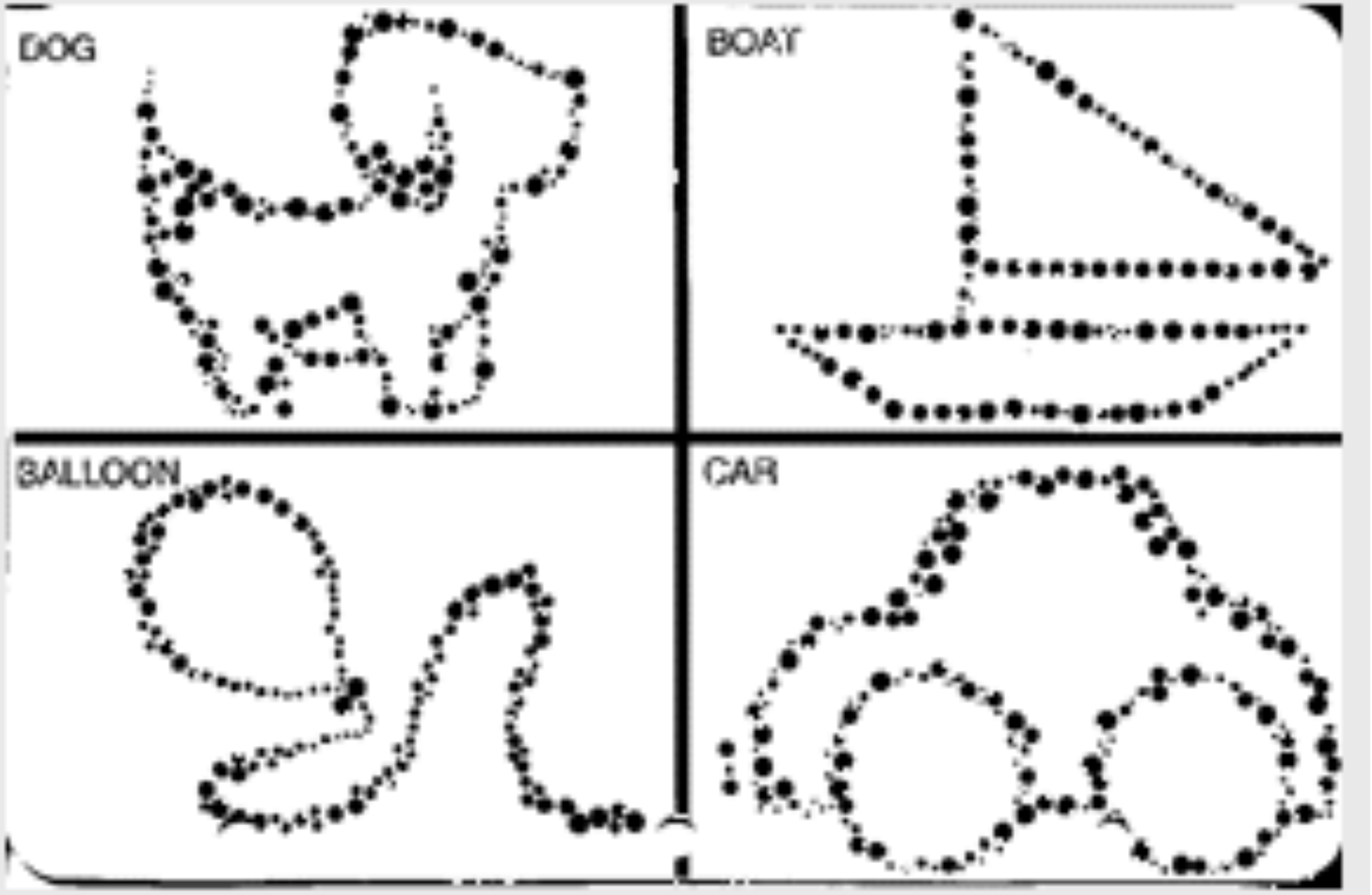
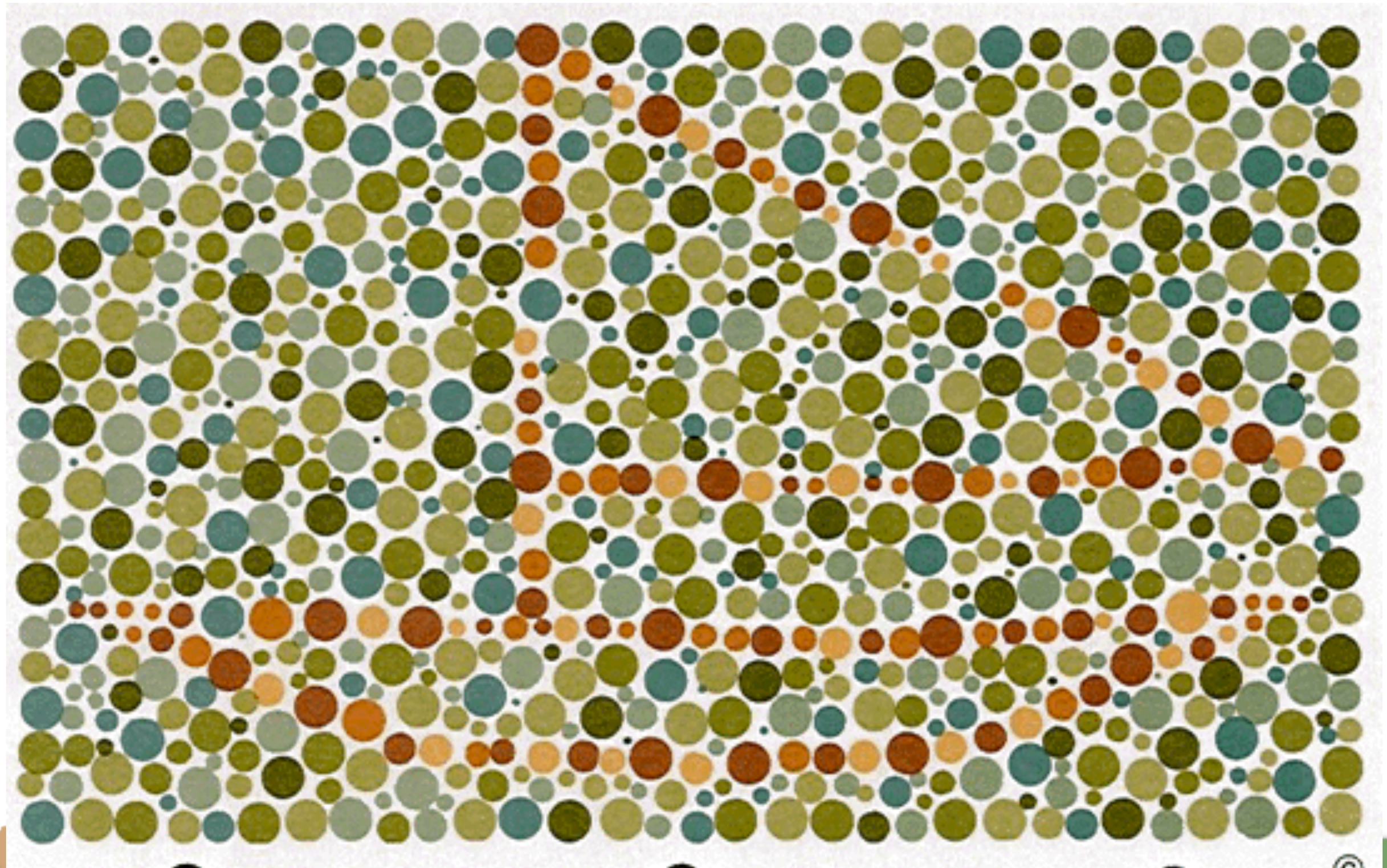


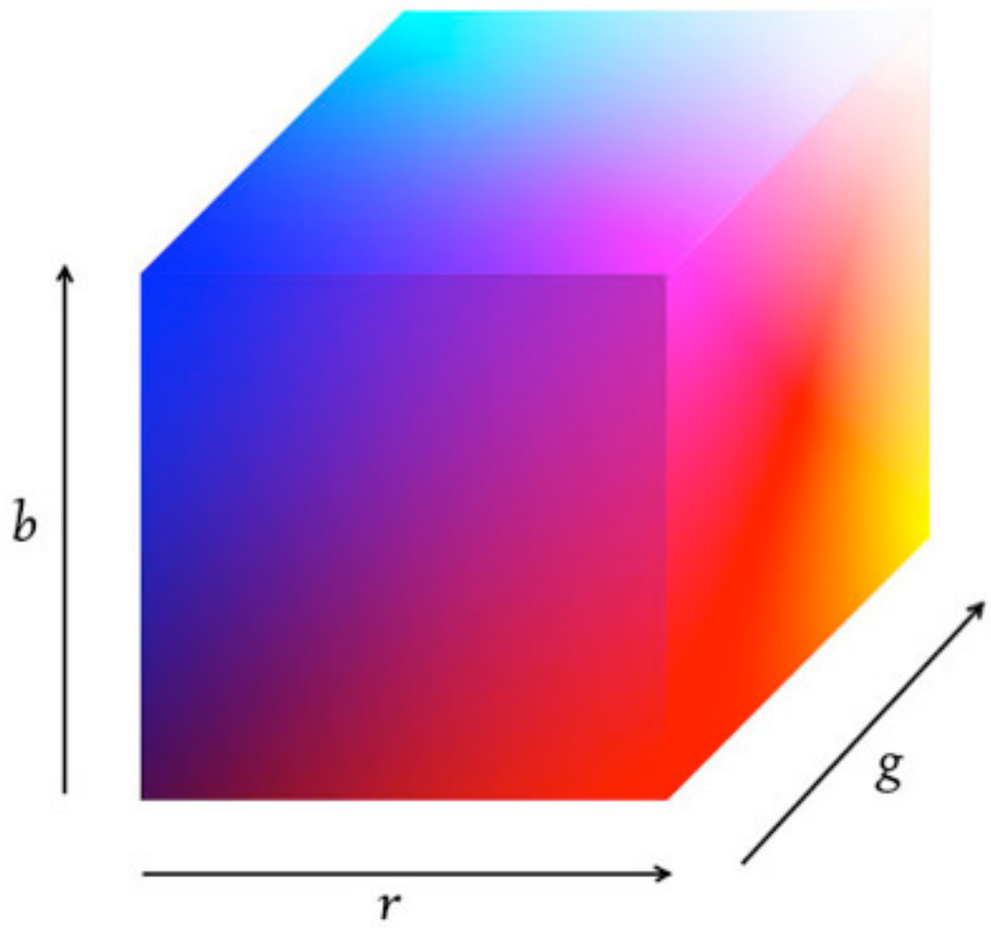

DOG
BOAT
BALLOON
CAR

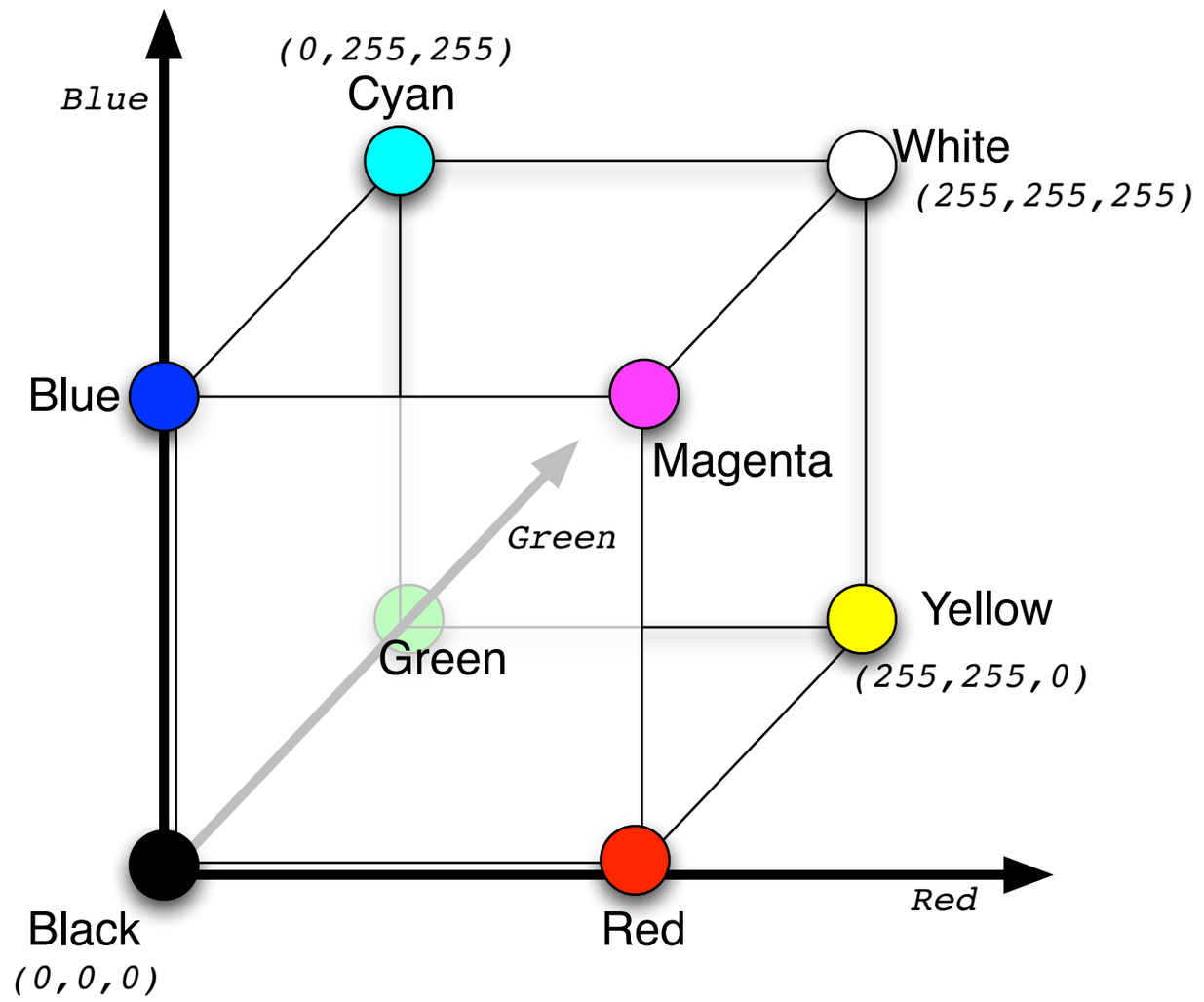
The Human

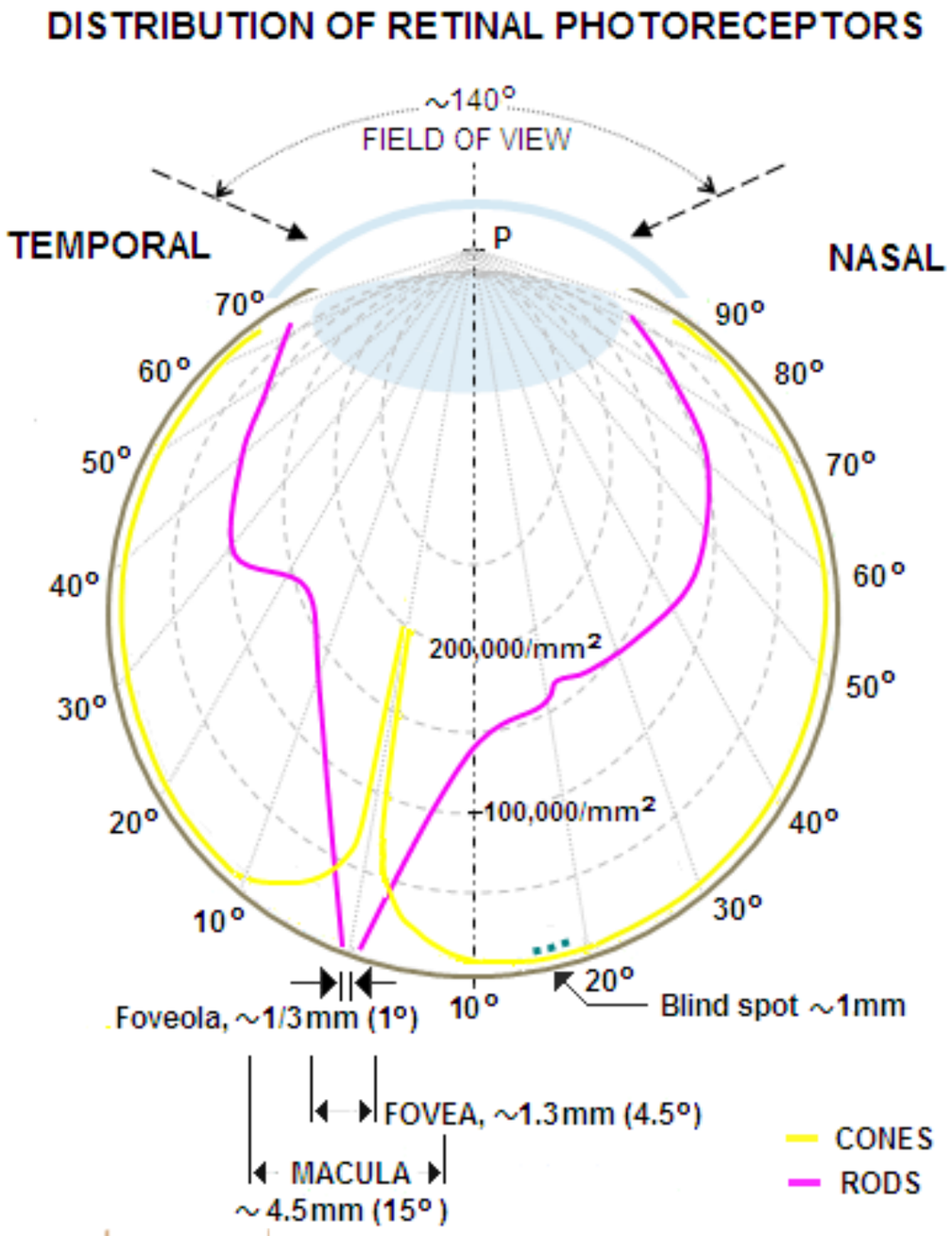
http://colorvisiontesting.com/

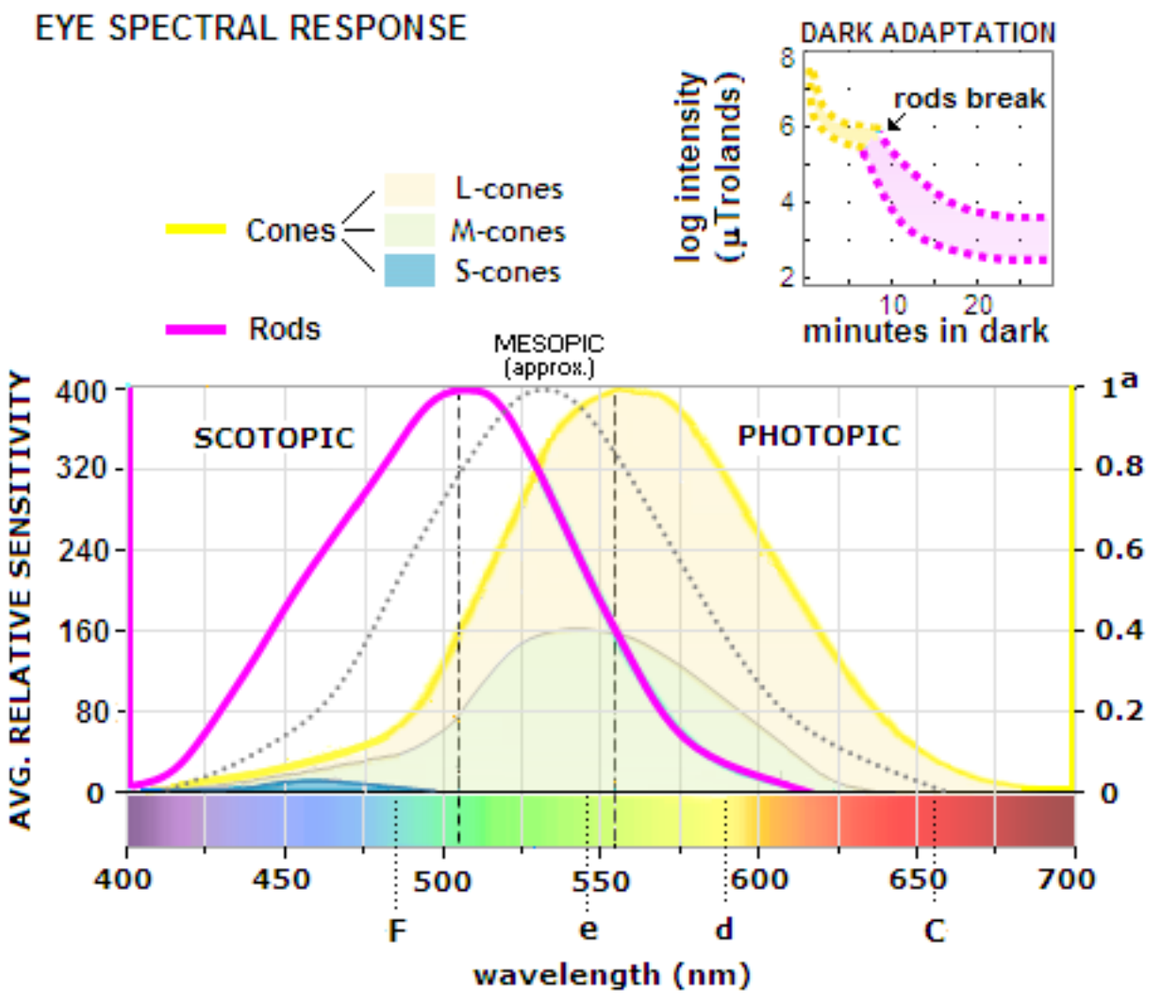


rgb


b
r
g


Blue
(0,255,255)
Cyan
White
(255,255,255)
Blue
Magenta
Green
Green
Yellow
(255,255,0)
Black
(0,0,0)
Red
Red


DISTRIBUTION OF RETINAL PHOTORECEPTORS
~140°
FIELD OF VIEW
TEMPORAL
NASAL
P
70°
60°
50°
40°
30°
20°
10°
90°
80°
70°
60°
50°
40°
20°
10°
200,000/mm²
100,000/mm²
Foveola, ~1/3mm (1°)
Blind spot ~1mm
FOVEA, ~1.3mm (4.5°)
MACULA
~4.5mm (15°)
CONES
RODS


EYE SPECTRAL RESPONSE
Cones
L-cones
M-cones
S-cones
Rods
DARK ADAPTATION
log intensity (μTrolands)
rods break
minutes in dark
MESOPIC (approx.)
SCOTOPIC
PHOTOPIC
AVG. RELATIVE SENSITIVITY
wavelength (nm)
F
e
d
C

rgb

The Eye - Interpreting the signal

- Size and depth
  - visual angle indicates how much of view an object occupies
    - (relates to size and distance from eye)
  - visual acuity is ability to perceive detail (limited)
  - familiar objects perceived as constant size
    - (in spite of changes in visual angle when far away)
- cues like overlapping help perception of size and depth
- thumbnail at arms length is equivalent to 640x480 pixels
  - resolution demo

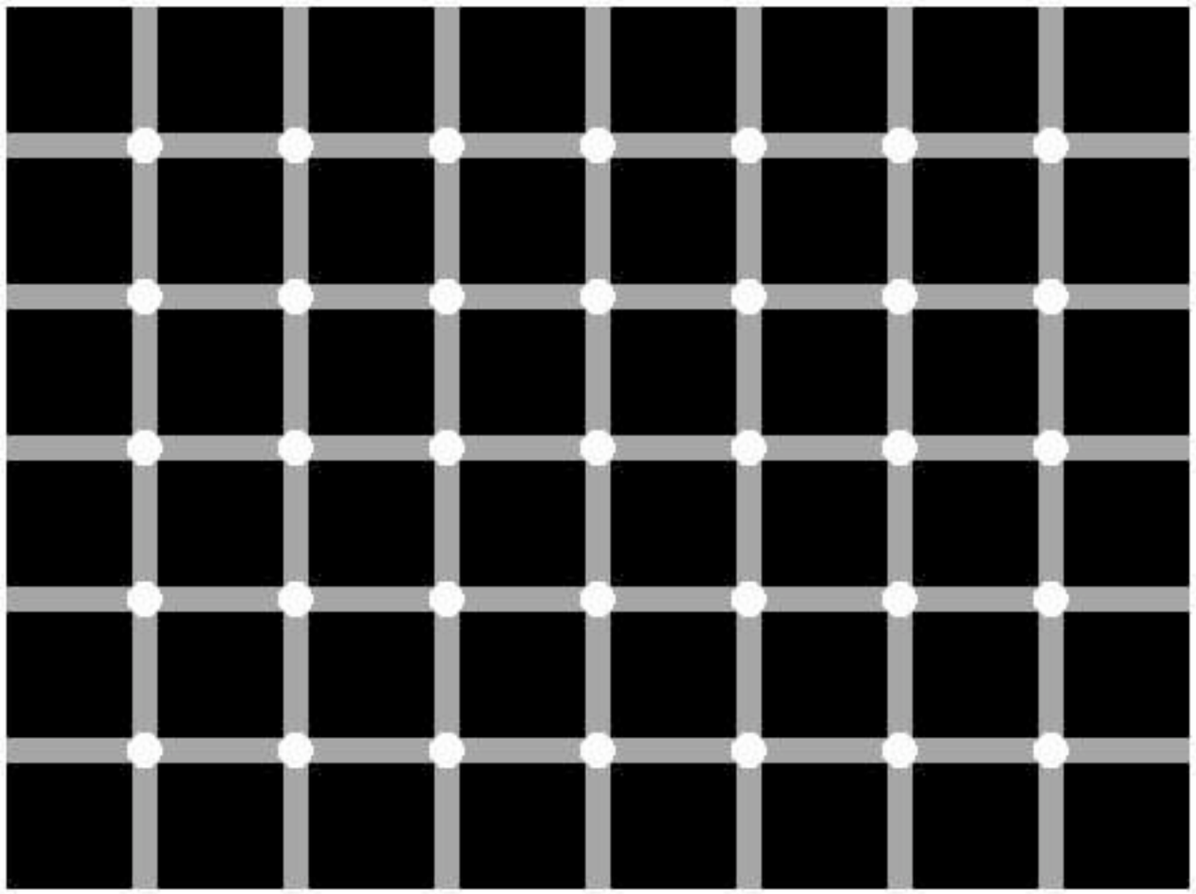
The Eye - Interpreting the signal

- The visual system compensates for:
  - movement
  - changes in luminance.
- Context is used to resolve ambiguity
- Optical illusions sometimes occur due to over compensation

Your brain heavily compensates for effects of your biology

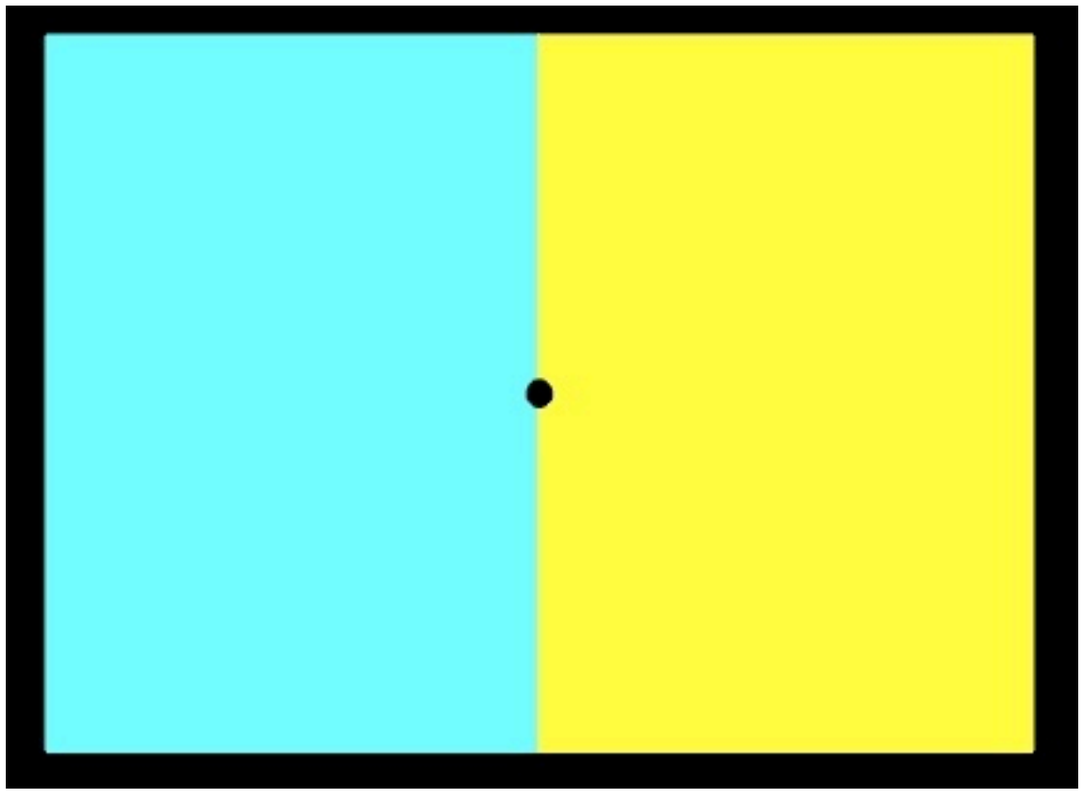
The Eye - Interpreting the signal
Optical Illusions

The Eye - Interpreting the signal
Optical Illusions



The Eye - Interpreting the signal
Optical Illusions - Chromatic Adaptation

The Eye - Interpreting the signal
Optical Illusions - Chromatic Adaptation



The Eye - Interpreting the signal
Optical Illusions - Chromatic Adaptation

Your brain heavily compensates for effects of your biology

Rubin, N., Nakayama, K. and Shapley, R. (2002), The role of insight in perceptual learning: evidence from illusory contour perception. In: Perceptual Learning, Fahle, M. and Poggio,

- There are similar effects for other input and output
  - Hearing
    - Pitch, Loudness, Timbre
    - Frequency and Processing
      - MP3s
  - Touch
    - Heat, Pain, Pressure
    - Adaptation
  - Movement
    - Reaction Time, Fidelity

Phantom Words

Rubin, N., Nakayama, K. and Shapley, R. (2002), The role of insight in perceptual learning: evidence from illusory contour perception. In: Perceptual Learning, Fahle, M. and Poggio,

"People appear to hear words and phrases that reflect what is on their minds – rather as in a Rorschach test, though it's my impression that the present effect is stronger. I can bet who is likely to be on a diet, as they report words like 'I'm hungry'. 'diet coke' or 'feel fat'. And students who are stressed tend to report words that are related to stress – if I play these sounds close to exam time, some students may well hear phrases like 'I'm tired', 'no brain', or 'no time'. Interestingly, female students often report the word 'love', while male students are more likely to report sexually explicit words and phrases."

-Diana Deutsch

http://www.psychologytoday.com/blog/illusions-and-curiosities/200906/phantom-words

Sine Wave Speech

http://www.mrc-cbu.cam.ac.uk/people/matt.davis/sine-wave-speech/

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Memory

- Three types of memory which build on each other
  - Sensory Memory
  - Short-Term or Working Memory
  - Long-Term Memory

Sensory Memory

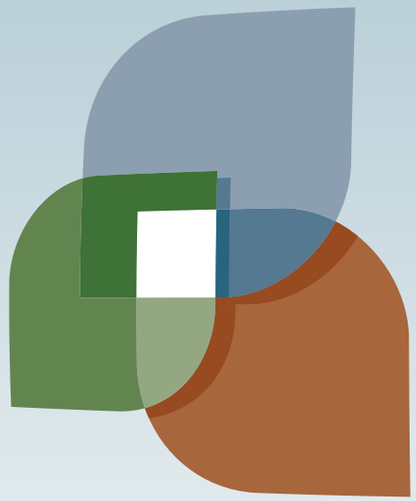
- Buffers for stimuli received through senses
  - iconic memory: visual stimuli
  - echoic memory: aural stimuli
  - haptic memory: tactile stimuli
- Examples
  - non cognitive recall
- Continuously overwritten

http://www.snopes.com/language/apocryph/cambridge.asp

Sensory Memory

Aoccdrnig to rscheearch at Cmabrigde uinervtisy, it deosn't mttaer waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteres are at the rghit pclae. The rset can be a tatol mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae we do not raed ervey lteter by itslef but the wrod as a wlohe.

Note: The meaning is probably not accurate



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