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How many senses/perceptions do (healthy) humans have?

- A. 1
- B. 3
- C. 5
- D. 7
- E. 9

	Percept	Sense Organ
1	Sight	Eyes
2	Hearing	Ears
3	Touch	Skin
4	Taste	Tongue
5	Smell	Nose

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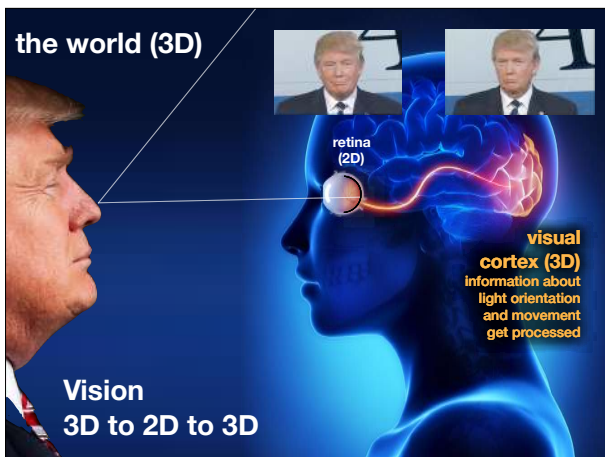
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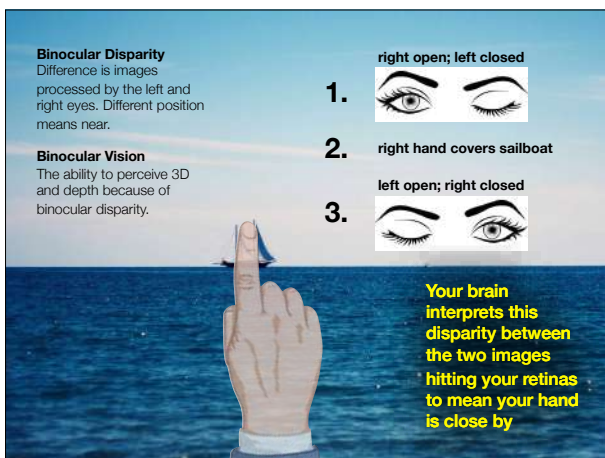
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# Depth Perception

the ability to perceive a 3D world from 2D images (on the retina)

## Binocular Disparity

Difference in images processed by the left and right eyes. Different position means near.

## Binocular Vision

The ability to perceive 3D and depth because of binocular disparity.

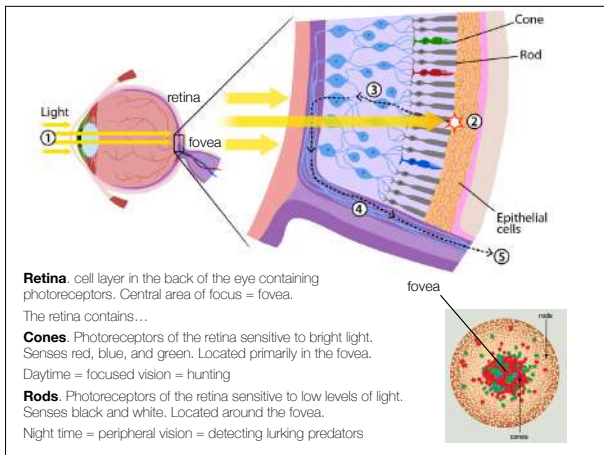
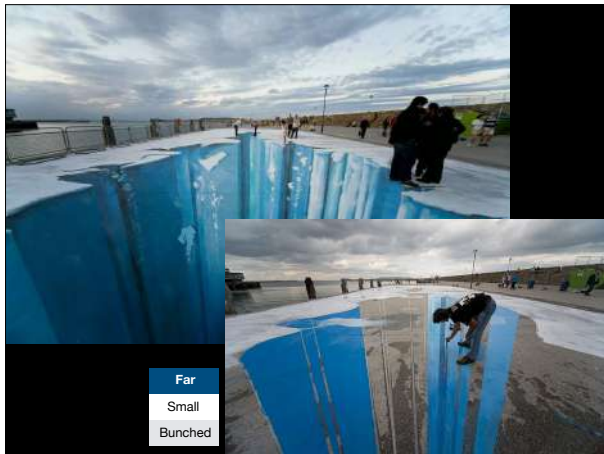
## Perspective

Lines that are actually parallel **appear** to converge at infinity. Things that are spaced out appear to be close, whereas things that are bunched together appear to be far.

## Relative Size

Large objects appear to be near and small objects appear to be far.

(there are many more)



## Trichromatic theory

Theory proposing colour vision as influenced by three different cones responding preferentially to red, green and blue.



stare at the + for 20s



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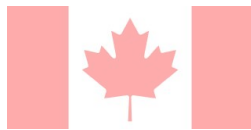
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**Why did some people see**



**when the screen was actually blank?**

- 1. Differential threshold**
- 2. Sensory adaptation**
- 3. Opponent process theory**

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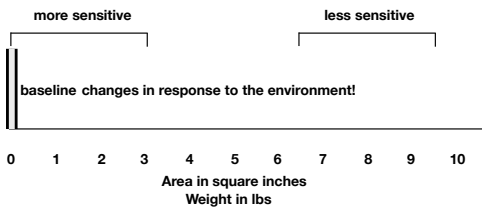
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**Just-Noticeable Difference:**

The smallest difference needed to differentiate two stimuli. AKA "Differential Threshold"

**Weber's Law:**

Just noticeable differences are proportional to the **magnitude** of the initial stimulus



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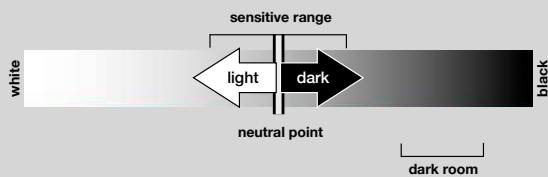
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**sensory adaptation**

Decrease in sensitivity of a receptor to a stimulus after constant stimulation.

The resetting of neutral.

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# visual adaptation

## • Dark Adaptation

- Adjustment of the eyes to low levels of light
- Dark still dark; grey becomes bright
- Slow process

## • Light Adaptation

- Adjustment of the eyes to high levels of light.
- Light still bright; grey becomes dark
- Fast process

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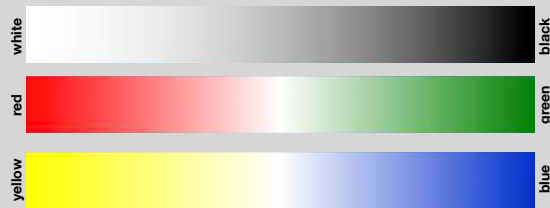
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## Opponent-process theory

Theory proposing colour vision as influenced by cells responsive to **three** pairs of colours.



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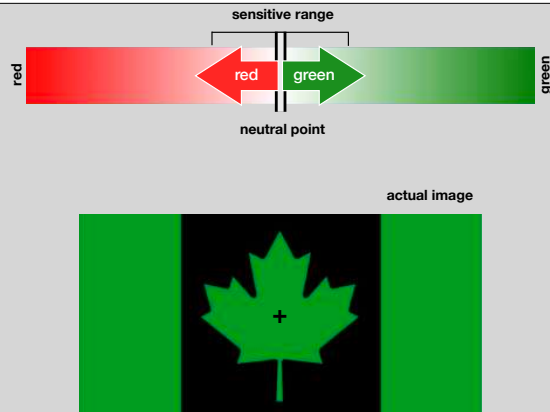
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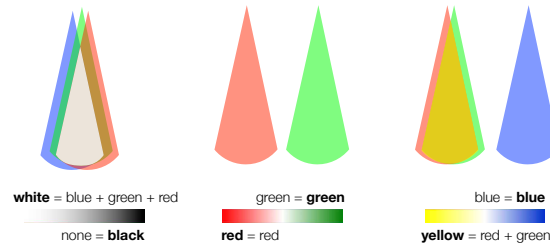
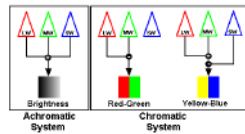
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## How do opponent process emerge from red, green, and blue cones?

Red, green, and blue cones fire in tandem and against other sets of cones to set up polar opposites



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# adaptation is surprisingly general

- **senses**
  - vision (dark room)
  - sound (car radio left on)
  - touch (clothes)
- **physiology**
  - drug tolerance
    - addicted people need the drug to feel ok (withdrawal if not)
    - need more and more to feel high
  - weight gain is caused by **insulin** adaptation
    - need more and more food to feel satiated
    - solution is intermittent fasting (see "The Obesity Code" but Jason Fung)
- **emotions**
  - happiness
    - losing side of U.S. Presidential election is sad... but only for a few days
    - After a few months, lottery winners and paraplegics are similarly happy (Brickman, 1978)

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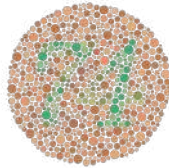
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What do you see?

OpenEnded iClicker

- Ishihara colour blindness test**
- normal vision people see **74**
  - green-red colourblind people see **21**
  - total colourblind people do not see any numbers

- Types of colour-blindness**  
**Can't see the difference between:**
1. **red and green** (most common = 8% of males, 0.5% of females)
  2. **yellow and blue** (less common = 1% of people)
  3. **any colours** (least common, very rare)

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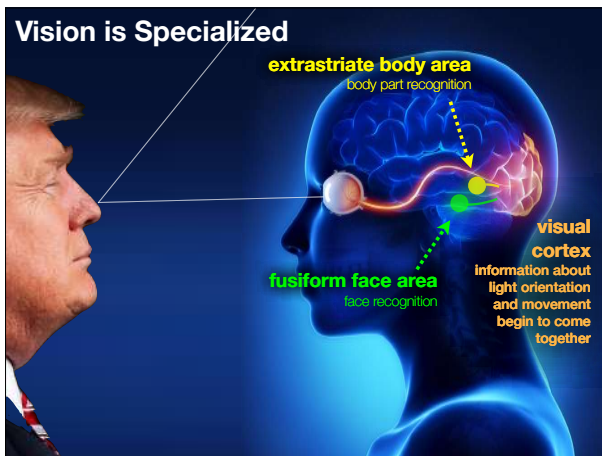
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**Perception is Multi-Sensory!**

	Percept	Sense Organ
1	Sight	Eyes
2	Hearing	Ears & Eyes & Skin
3	Touch	Skin & Eyes
4	Taste	Tongue & Nose
5	Smell	Nose
6	Balance	Inner Ear
7	Proprioception	Muscles & Tendons

**McGurk Effect**  
sight can override sound to cause people to hear things that are not actually there

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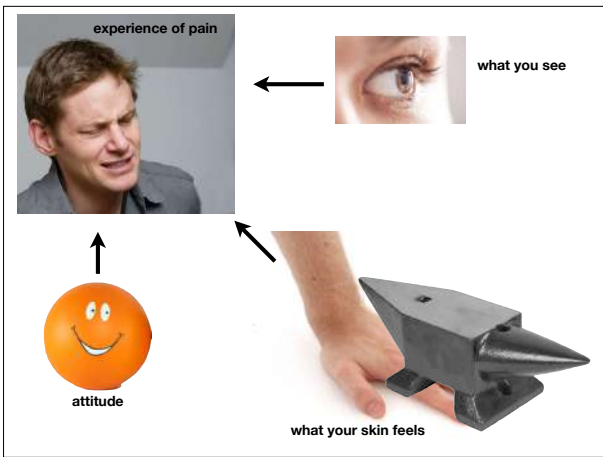
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and then it's getting mapped onto a vest that's covered in vibratory motors,

[https://www.ted.com/talks/david\\_eagleman\\_can\\_we\\_create\\_new\\_senses\\_for\\_humans?](https://www.ted.com/talks/david_eagleman_can_we_create_new_senses_for_humans?)

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