Lecture 6:
Introduction to Humans

Logistics

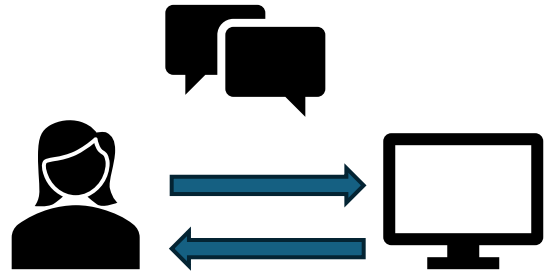
- Graded quiz to be handed out next week
- Make-up quiz → To be held on Saturday (1 Feb)
- Last day to contact TA about this is today (28 Jan)

Recap

- Importance of good design
- Good vs. bad design
- Basic sketching and fonts

- Today:
  - Basics of humans

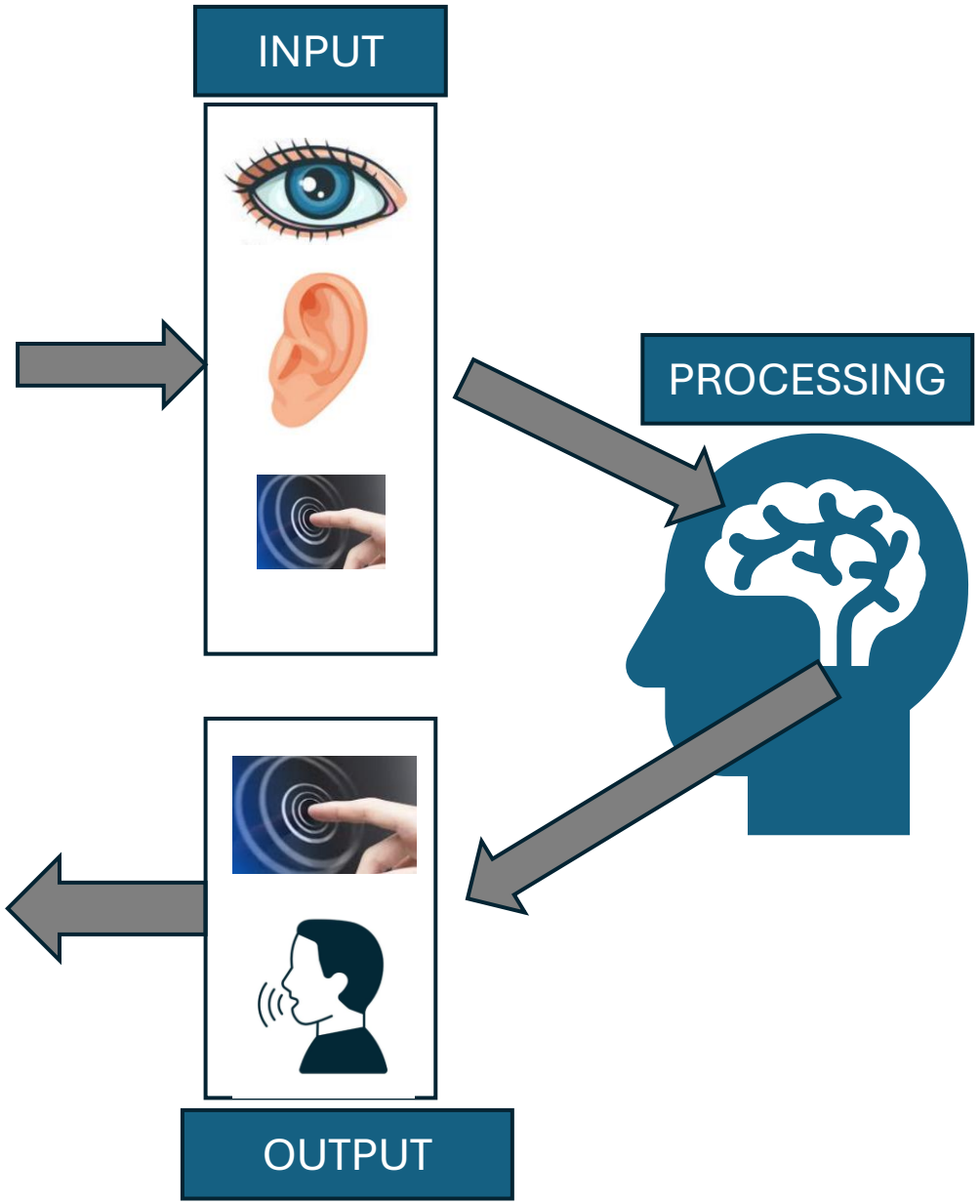
Why care about humans?



- Human-Computer Interactions
- Should be in a way that is understandable to humans
  - E.g., Humans talking to humans → language, audio levels

- Fundamental human capabilities and limitations
- Studies of humans (psychology, sociology, etc.) are science of HCI
  - Just like physics is to buildings!

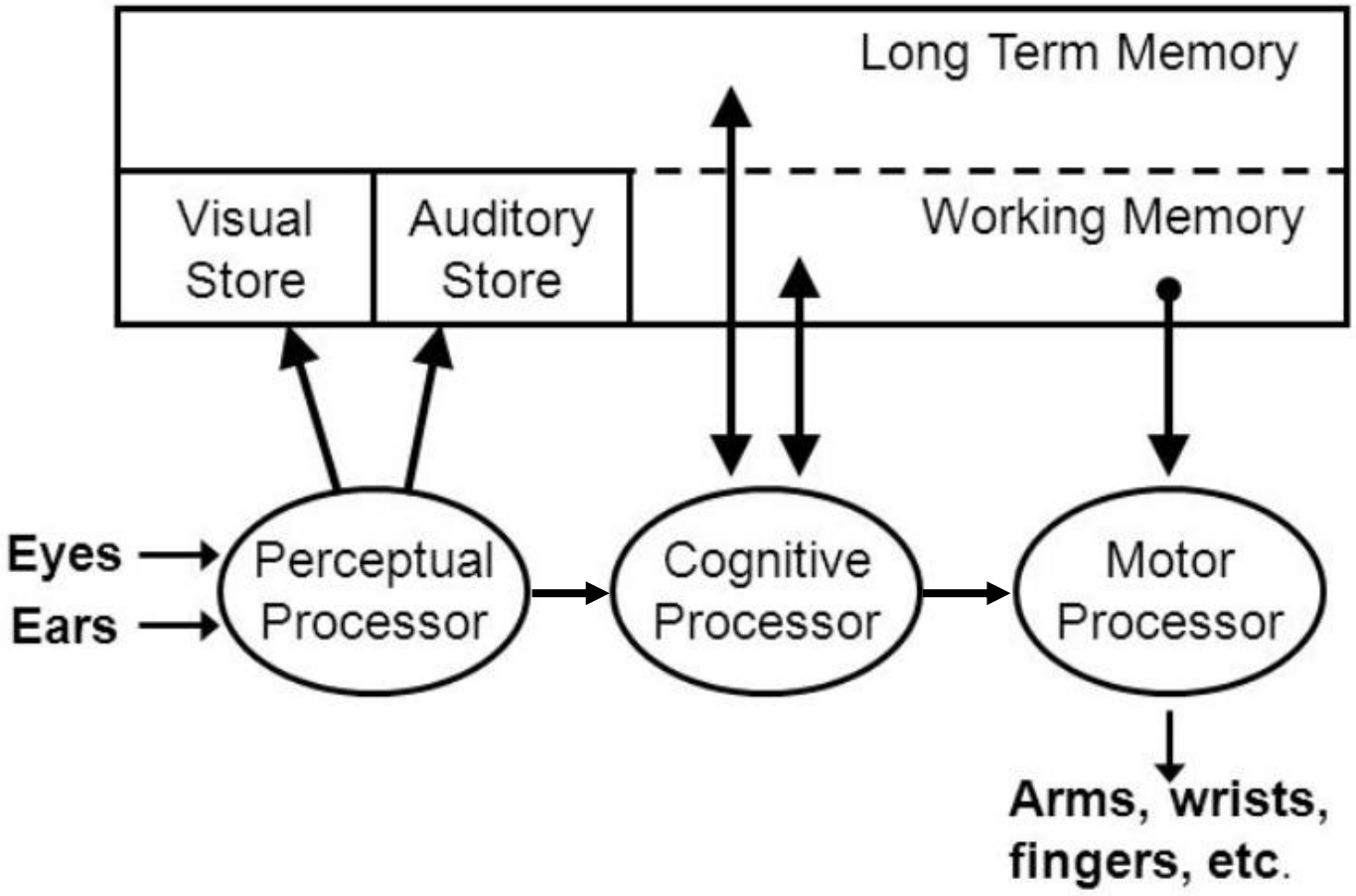
Basics of humans



Human Input-Processing-Output Systems

- Inputs:
  - Sensory stimuli
  - Five in humans – vision, hearing, touch, smell, taste
  - Three prominent in HCI -- Vision, hearing, touch
- Processing:
  - Attention, Memory, Understanding, Decision Making, Learning
  - Emotional experiences
- Outputs:
  - Motor (move hands), Audio (speech), Gaze (occasionally!)
  - Electrochemical / Physiological (heart beat, sweat, EEG, etc.)

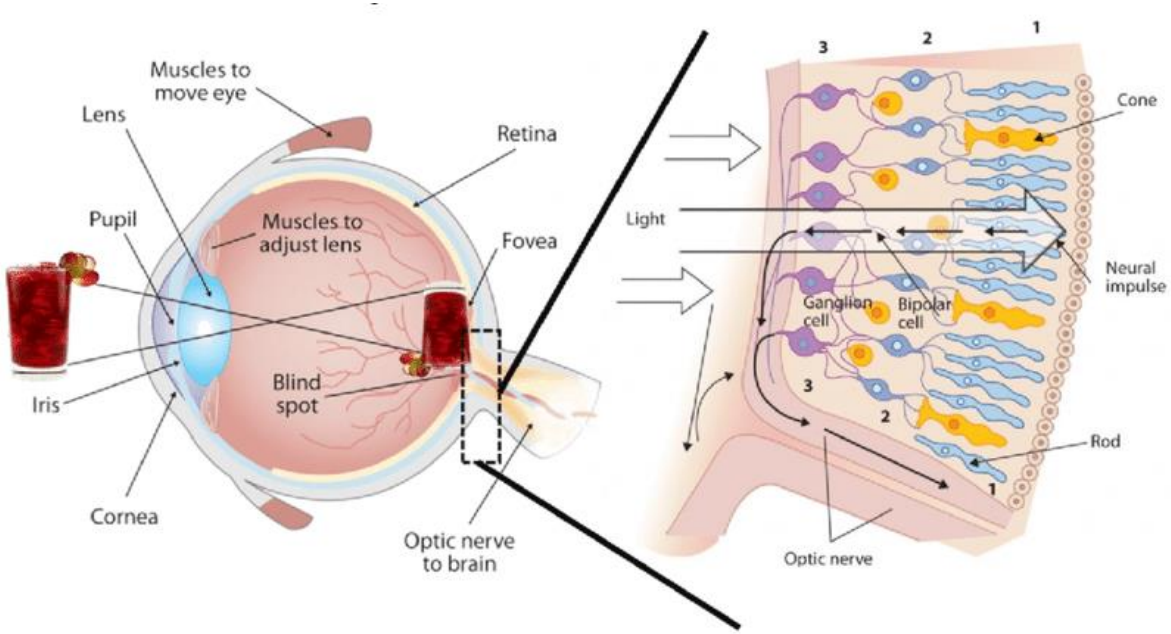
The Model Human Processor



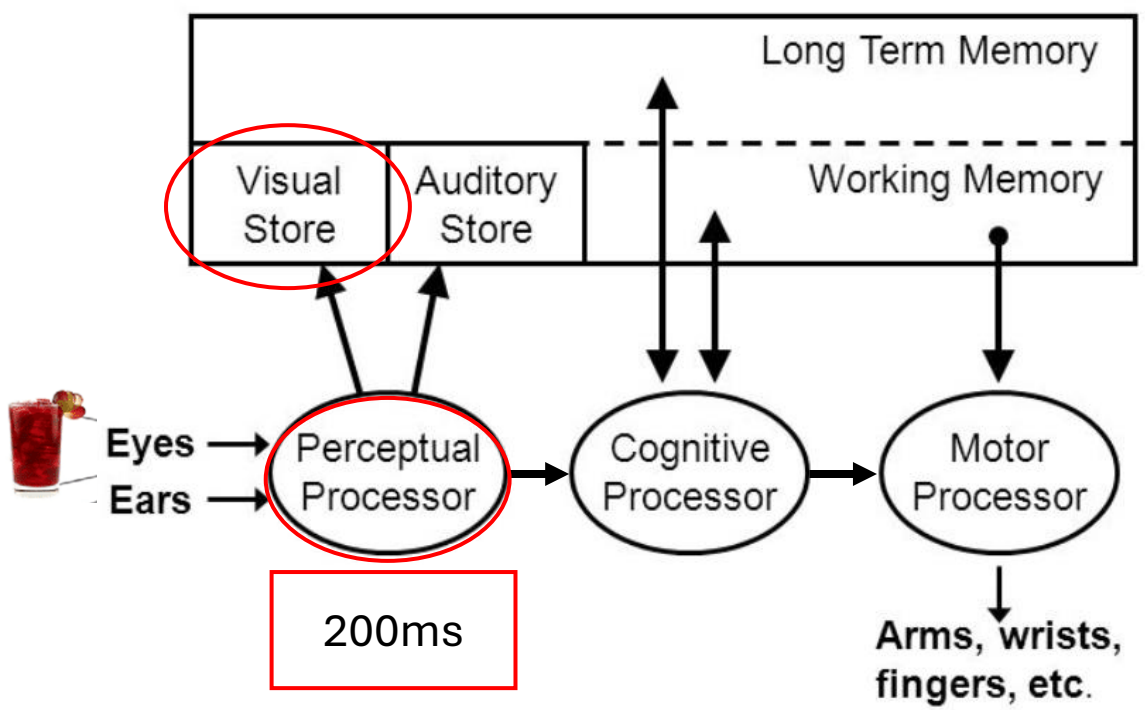
Alan Newell's MHP illustration as adapted by Prof. Brian P Bailey @ UIUC.

Visual Perception

- Eye works like a camera
- Reflection of light from objects
- Light hits retina
  - Rods => Low illumination vision
  - Cones => Colour perception
  - X cells => Early pattern recognition
  - Y cells => movement detection

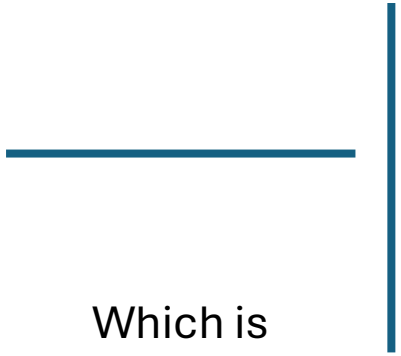


Visual Perception

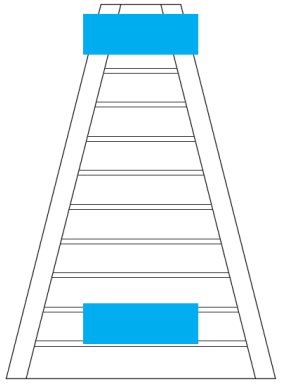


1. Recognize Objects
2. Animations – illusion (50Hz)
3. Fine detail – Acuity (0.5 deg arc)
4. Size / depth of objects
   - “Cues”
   - Relative, overlap/hiding, familiarity, shadows (UI buttons)
5. Contrast and brightness
6. Color

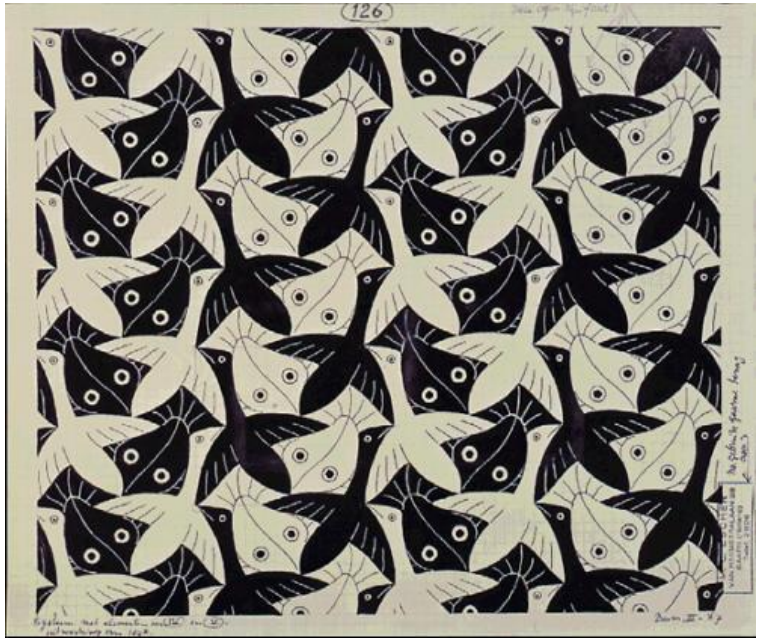
Visual Perception is Imperfect



Which is longer?



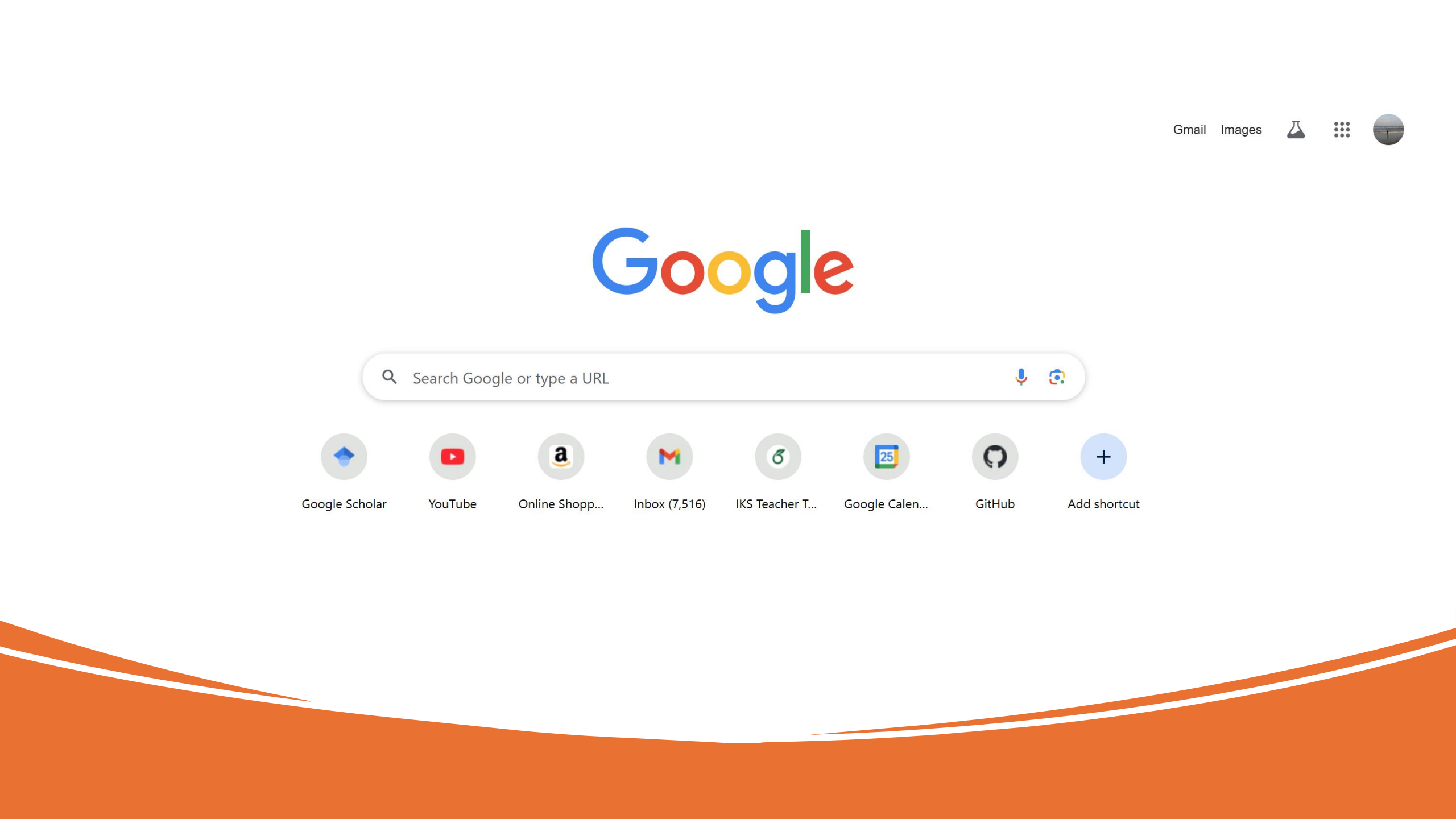
Which blue patch is longer?



This sentence has an error. Let us see if you can find out what has happenned that has caused the error. Okay, I lied! This sentence has no error. Sorry! It was fun while it lasted.

Gestalt principles

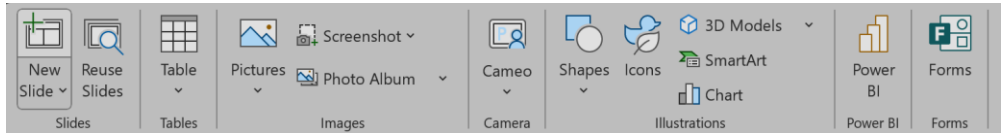
- Foreground vs. Background
- Similarity => Similar looking things are similar in meaning
- Proximity => Things closer to each other are related
- Common region => Put boundary, contents inside are related.
- Continuity => Elements on same line/curve are related
- Closure => Patterns in the boundaries
- Focal point => what you notice first makes a difference


Gmail
Images
Google
Search Google or type a URL
Google Scholar
YouTube
Online Shopp...
Inbox (7,516)
IKS Teacher T...
Google Calen...
GitHub
Add shortcut

Secure, smart, and easy to use email

Get more done with Gmail. Now integrated with Google Chat, Google Meet, and more, all in one place.

Create an account | For work



Vision and Reading

- Reading words → recognize patterns, match with prior knowledge
- Easier to recognize patterns → faster, less strain in reading
- Choice of fonts; font sizes; colors; etc.

A quick brown fox jumps over the lazy dog is what everyone uses, but I like longer text just to test out other things than just how each character looks.

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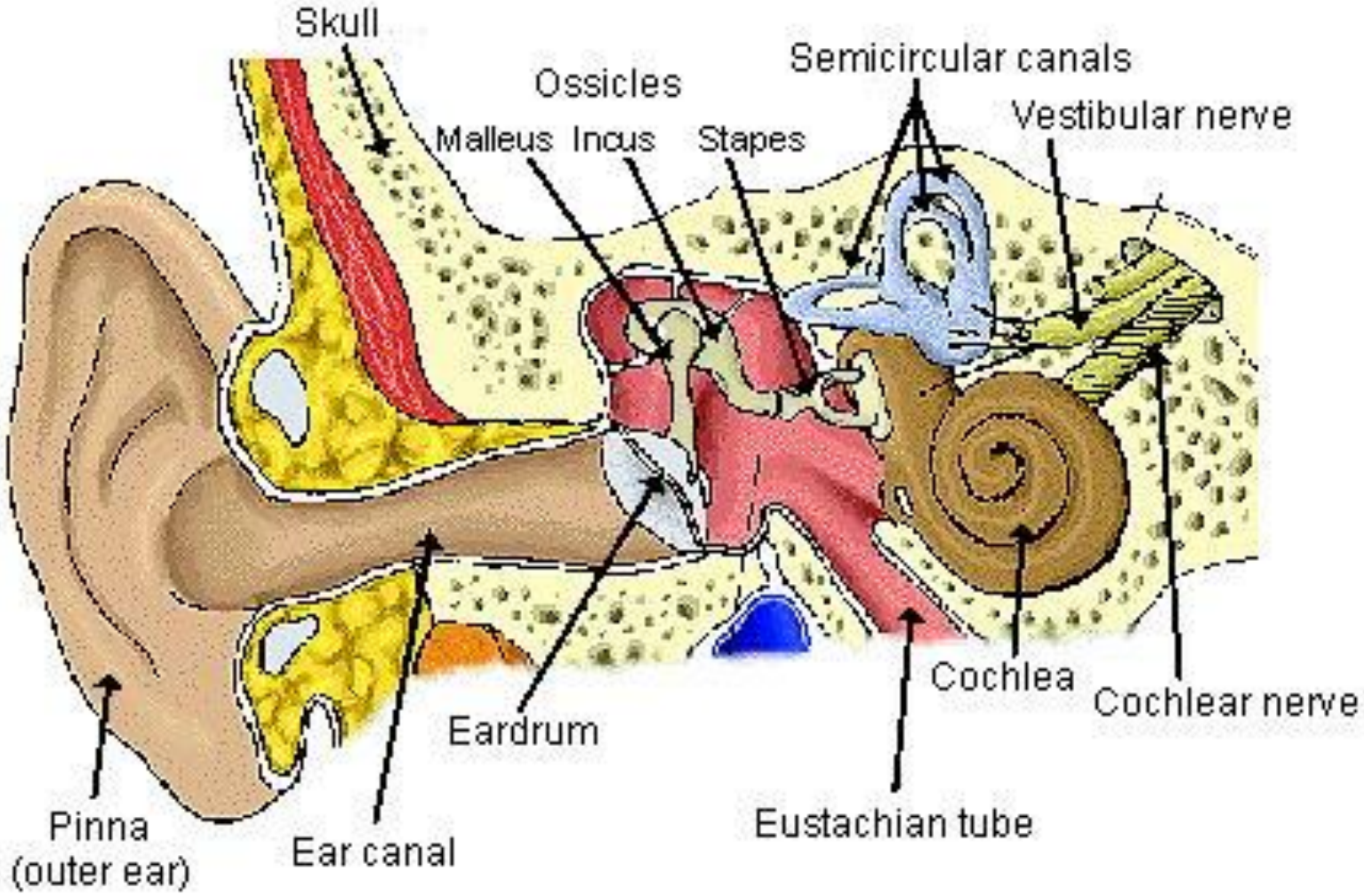
A QUICK BROWN FOX JUMPS OVER THE LAZY DOG IS WHAT EVERYONE USES, BUT I LIKE LONGER TEXT JUST TO TEST OUT OTHER THINGS THAN JUST HOW EACH CHARACTER LOOKS.

A quick brown fox jumps over the lazy dog is what everyone uses, but I like longer text just to test out other things than just how each character looks.

Vision and Reading

- Reading words → recognize patterns, match with prior knowledge
- Easier to recognize patterns → faster, less strain in reading
- Choice of fonts
  - Be able to see shapes / structures
  - All caps, fonts with similar looking shapes is hard to read
  - Fonts for reading on paper, different than computer
  - Different fonts are suited for different font sizes
  - Black font on white background or white font on black background?

Auditory perception (Hearing)



Characteristics of sound

- Pitch / Frequency, Amplitude, Timbre
- Direction & distance
- Also imperfect → filtering (of “noise”), cocktail party effect
- Respects Gestalt principles
  - Similarity, Proximity

- Less used for interface, but can be better used
  - Pain for privacy and disturbances!

- Fun fact: Motion sickness can happen in VR environments!

Touch / Haptic perception

- Temperature, pressure, surface area, pain
- How it works?
  - Thermoreceptors
  - Mechanoreceptors
  - Noicereceptors
- Kinesthetics

- Used in haptics → feeling object as being touched
- Less used, increasingly becoming dominant

One thing to remember…

- Not all these are perceptions are available to everyone
  - Color blindness, partial blindness, temporary blindness, blindness from birth vs. not
  - Complete vs. partial loss of hearing
  - Numbness, Weather conditions, tolerance levels, etc. during touch

- Design needs to consider all these abilities!
  - Inclusive!

Reading

- Alan Dix et al., “Human Computer Interaction” (3rd ed.)
  - Chapter-1: The human