Announcements

- Work in groups - groups of 2 for MPs, groups of 2-4 for the final project.
- Final project ideas?
VR System: Hardware, Software and Perceptual Psychology
What is Reality?

The Matrix: Prison for your Mind - The Rabbit Hole

https://www.youtube.com/watch?v=O4zICmyuNvs
What is Reality? Sensation and Perception

How do we perceive how far things are?

Depth perception

Cues: ________________________________
Depth Perception

Both views are merged in the brain to form a single image.
What is Reality? Sensation and Perception

How do we perceive X?

X is

- depth
- color
- sound
- taste
- comfort
- presence
- yourself
- reality
What is Reality? Sensation and Perception

Instructions
Count how many times the players wearing white pass the basketball.

https://www.youtube.com/watch?v=vJG698U2Mvo
Perception Process

For average adult
“The average number of neocortical neurons was 19 billion in female brains and 23 billion in male brains.”

### Perception Process

<table>
<thead>
<tr>
<th>Sensory System</th>
<th>Modality</th>
<th>Stimulus Energy</th>
<th>Receptor Class</th>
<th>Receptor Cell Types</th>
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<td>Somatosensory</td>
<td>Touch</td>
<td>Tap, flutter 5–40 Hz</td>
<td>Cutaneous mechanoreceptor</td>
<td>Meissner corpuscles</td>
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<tr>
<td>Somatosensory</td>
<td>Touch</td>
<td>Motion</td>
<td>Cutaneous mechanoreceptor</td>
<td>Hair follicle receptors</td>
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<tr>
<td>Somatosensory</td>
<td>Touch</td>
<td>Deep pressure, vibration 60–300 Hz</td>
<td>Cutaneous mechanoreceptor</td>
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<tr>
<td>Somatosensory</td>
<td>Touch</td>
<td>Touch, pressure</td>
<td>Cutaneous mechanoreceptor</td>
<td>Merkel cells</td>
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<td>Somatosensory</td>
<td>Touch</td>
<td>Sustained pressure</td>
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<td>Ruffini corpuscles</td>
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<tr>
<td>Somatosensory</td>
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<td>Stretch</td>
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<td>Somatosensory</td>
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<td>Tension</td>
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<td>Golgi tendon organ</td>
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<tr>
<td>Somatosensory</td>
<td>Temperature</td>
<td>Thermal</td>
<td>Thermoreceptor</td>
<td>Cold and warm receptors</td>
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<tr>
<td>Somatosensory</td>
<td>Pain</td>
<td>Chemical, thermal, and mechanical</td>
<td>Chemoreceptor, thermoreceptor, and mechanoreceptor</td>
<td>Polymodal receptors or chemical, thermal, and mechanical nociceptors</td>
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<tr>
<td>Somatosensory</td>
<td>Itch</td>
<td>Chemical</td>
<td>Chemoreceptor</td>
<td>Chemical nociceptor</td>
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<tr>
<td>Visual</td>
<td>Vision</td>
<td>Light</td>
<td>Photoreceptor</td>
<td>Rods, cones</td>
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<td>Auditory</td>
<td>Hearing</td>
<td>Sound</td>
<td>Mechanoreceptor</td>
<td>Hair cells (cochlea)</td>
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<td>Vestibular</td>
<td>Balance</td>
<td>Angular acceleration</td>
<td>Mechanoreceptor</td>
<td>Hair cells (semicircular canals)</td>
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<td>Vestibular</td>
<td>Balance</td>
<td>Linear acceleration, gravity</td>
<td>Mechanoreceptor</td>
<td>Hair cells (otolith organs)</td>
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<tr>
<td>Olfactory</td>
<td>Smell</td>
<td>Chemical</td>
<td>Chemoreceptor</td>
<td>Olfactory sensory neuron</td>
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<tr>
<td>Gustatory</td>
<td>Taste</td>
<td>Chemical</td>
<td>Chemoreceptor</td>
<td>Taste buds</td>
</tr>
</tbody>
</table>
Stimuli Fusion

Vection

Vestibulo-ocular reflex (VOR)

https://www.youtube.com/watch?v=RbOQF1o3g44

https://www.youtube.com/watch?v=mlbyNq8KedQ
Stimuli Hierarchical Processing

https://www.youtube.com/watch?v=5cJRe9iDDjs
Do You Trust Your Vision?

"visible" light
Do You Trust Your Vision?

blind spot in each eye
Psychophysics

Stevens' Power Law

Difference Threshold

The smallest amount of change in a physical stimulus that a person can detect 50% of the time. This is also called the "just noticeable difference."

- If someone turns the music up slowly, at what point do you notice it has become louder?
- If you hold a handful of sand, and someone adds one grain at a time to the pile, when do you notice it has become heavier?
- If your best friend trims a half inch off of their hair, will you notice the difference?
Adaptation