Today's Topics

Perception – general topics
Visual perception
Physiology of vision
Perception theories
  Gestalt principles
  Brunswick's lens model
  Gibson's affordance model
  Berlyne's collative properties
Cognitive Processes

Higher level
- Thinking
- Language

Symbolic
- Imagery
- (Memory, Attention)

Lower level
- Sensation
- Perception
Perception Modalities

Sight
Hearing
Taste
Smell
Touch
Kinesthetic senses
Pain
Balance and acceleration

...
Visual Perception

Most studied one

Considered the most important one
Eye Anatomy

Credit: constabul21ary-20.co.gp
Human Eye Anatomy

- Suspensory ligaments
- Anterior chamber containing aqueous humour
- Conjunctiva
- Sclera (white of eye)
- Choroid
- Retina
- Fovea
- Vitreous humour
- Lens
- Pupil
- Cornea
- Iris (coloured part of eye)
- Posterior chamber
- Ciliary body (containing ciliary muscle)
- Blind spot
- Optic nerve
- Tendon of rectus muscle

Credit: visionsofjoy.com
Vision Physiology
Rods and Cones

Rods (130 million)
- Monochromatic vision (rhodopsin)
- Low light conditions
- Peripheral distribution

Cones (7 million)
- Color vision
- Bright light
- Types: red, green, blue
- Central distribution
Central Foveal / Parafoveal / Peripheral Vision
Visual Sensation

Fovea – eye movement – peripheral sight
Merged from plenty of disconnected sensations
But continuous
Partial processing starts at retina nerves
Visual Sensation

Highly goal-oriented

There are more nerves heading from brain to eye, than from eye to brain

Impact of motivation, expectations and attention level
Vision Is Subjective
Vision Is Subjective
Previous Experience & Expectation
Previous Experience & Expectation

FAT GHOST
Visual Sensation

Part of the sensation is fabulated / illusion
A Picture Worth of a Thousand Words

Graphical representation is more efficient (quick insight, instant understanding of mutual relations)

External memory
A Picture Worth of a Thousand Words

But what if:

If halibut is more than ten dollars at Good Food, go to the fish market at 10th street (by Colin Ware)
Search for “p”

dsfjdsofidsaqdwdqwfisdo
afisddqwoafisansamnpqq
oiweioplkůdqwkdjklasdj
skljsakljdewipcjdoivjspcj
xnysapdfúpas
Search for “p”

dsfjdsofidsaqdwpdqwfdis
doafisddqwoafisansamnp
qqoiweioplkůdqwkdjklasd
jaskljdskljdewipcjdoivjsp
cjxynsapdfúpas
Look for “p”

dsfjdsofidsaqdwpdfisd

p

qqoiweioplkůdqwkdjkla

p

djaskljdskljdewipcjdovj

p

spcjaxnysapdfúpas
How Do We Process Visual Sensations

Various brain centers analyze various features and qualities in parallel

- Shape
- Size
- Color
- Movement
How to Get from Asakusa to Shinjuku?
Previous Experience & Expectation

Do you know expectations of your users?

Study them

– Know their tasks
– Previous experience
– Mental models
– Terminology

Follow basic design rules
Perceptual constancy

Size
Shape
Visual Attention Attractors

Static stimuli > moving stimuli > suddenly arising stimuli

Adaptation
Aging Worsens Sight, a11y

Majority of 45+ years old have troubles with vision

Think about size of your font
Gestalt Psychology

1920s
Berlin school
Leipzig school

Most influential theory for:
Design
Architecture
Urbanism

Kurt Z. Lewin
Max Wertheimer
Gestalt Principles / Laws

We tend to see structures...
Proximity

Objects or shapes that are close to one another appear to form groups
Closure

Completing figure without sensing some of its parts
Closure
Similarity

Similar elements appear to be grouped
Continuity

Continuing visual patterns

People tend to mentally form a continuous line.
Figure and Ground
Brunswik's Lens Model

Probabilistic functionalism
Perceiver and environment = system
Active searching for meaningful cues
No single cue is perfectly reliable
Brunswik's Lens Model

Distal and proximal cues
Weighting cues

Diagram:

- CUES (Narratives about a restorative built environment)
  - Distal cue 1
  - Distal cue 2
  - Distal cue n
  - Proximal cue 1
  - Proximal cue 2
  - Proximal cue n

- Ecological validity
- Inter-rater reliability
- Cue utilization
  - Achievement / Synthesis
Affordance Theory (J. J. Gibson)

Focus on environment itself
Direct, immediate perceptions given by certain arrangements
substance + layout -> affordance (invariant and instantly detectable functions of the environment)
Affordance Theory (J. J. Gibson)

We do not perceive shapes and forms, but affordances.
Do not design shapes and forms, but affordances.
Actively provide affordances.
Collative Properties (Berlyne)

What do we pay attention to?

Novelty
Incongruity
Complexity
Suprisingness
Fittingness (Wohlwill)

Dimensions

Hedonic tone
Uncertainty arousal

Moderate levels found more beautiful than low or high
Perception – Top-down

Features
1,000,000

Patterns

Objects
1-3

cognition bottleneck

bottom-up information drives pattern building

top-down attentional processes reinforce relevant information

Credit: Zdenek Mikovec
Literature

Colin Ware: Visual thinking
Robert Gifford: Environmental psychology
Robert Sternberg: Kognitivní psychologie
Parkin, A. J.: Essential Cognitive Psychology
Lidwel et al: Universal Principles of design
Milan Nakonečný: Encyklopedie obecné psychologie
Stephen Anderson: Seductive Interaction Design