# Visualization 2014
# Lecture 9:
# Hello World from 3D Molecule Viewer Update 1
# Human Perception

Mario Romero
2014/05/09

**Visualization in Numerical Relativity -** Hege et al.

KTH VETENSKAP OCH KONST

VICSTHLM VISUALISATION INTERACTION COLLABORATION

# Prelude Videos

# Schedule

| | | | | |
|---|---|---|---|---|
| L1 | Tue | 25 mar 08:00-10:00 | Introduction | |
| L2 | Thu | 27 mar 15:00-17:00 | Why Visualization, Visualization Pipeline | |
| L3 | Tue | 1 apr 08:00-10:00 | VisIt Pipeline, Scientific Visual Storytelling | P1 |
| L4 | Tue | 8 apr 08:00-10:00 | VMD Pipeline, Group formations | P2 |
| L5 | Tue | 15 apr 08:00-10:00 | Volume Rendering and P3 progress | P3-1 |
| L6 | Tue | 22 apr 08:00-10:00 | Presenting Project 3 | P3-2 |
| L7 | Tue | 29 apr 15:00-17:00 | Proposals | P4.1 |
| L8 | Tue | 6 may 08:00-10:00 | “Hello World!” Demos | P4.2 |
| **L9** | **Fri** | **9 may 15:00-17:00** | **Update 1 & Perception** | **P4.3** |
| L10 | Tue | 13 may 08:00-10:00 | Update 2 | P4.3 |
| L11 | Thu | 15 may 15:00-17:00 | Final Demo | P4.4 |
| | Thu | 22 may 23:59 | Webpage Report | P4.5 |

# Outline

- Hello World Demo
- Update 1
- Perception
- VIC Tour

# Hello World Demos!

# Proposal for 3DMolecularViewer*

*WIP name

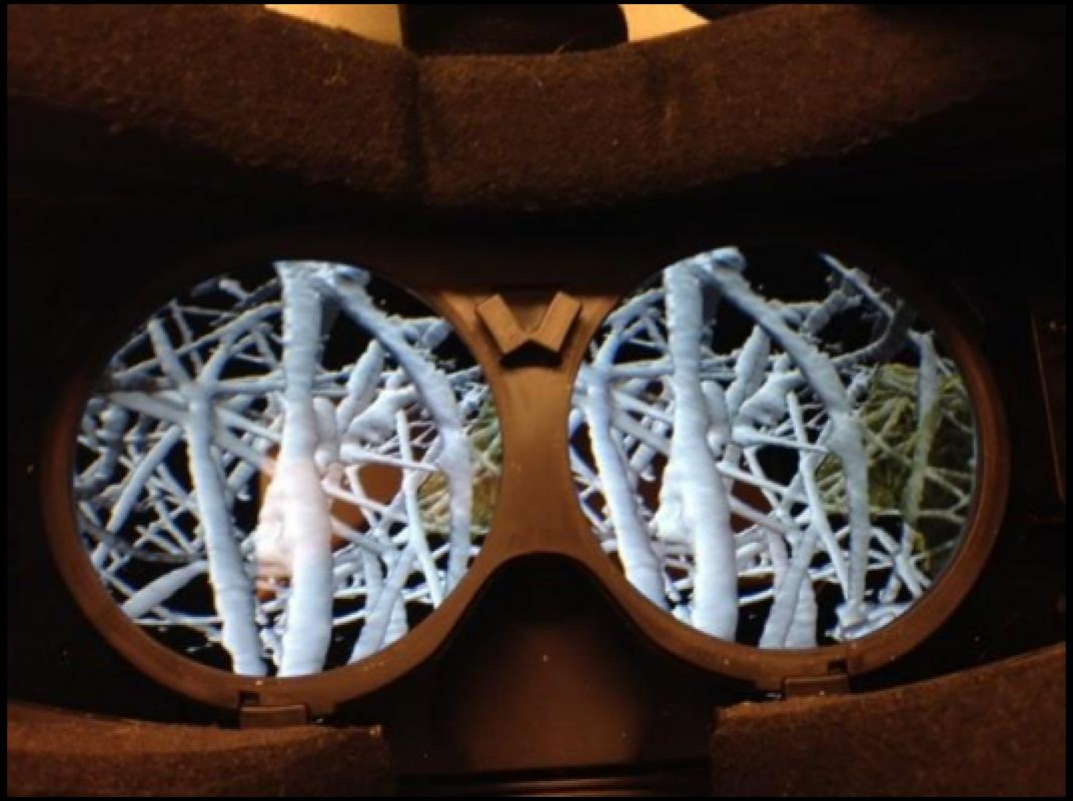
Rasmus Ansin
ransin@kth.se

Sandro Affentranger
asandros@kth.se

Giovanna Orisaka
orisaka@kth.se

Visualization 2014
VIS14
2014-04-29

# 3DMolecularViewer



# Suggestions

- Unity rocks!
  - No it sucks – no linux
  - No all pdb files follow specs
- Game pad
- Extra information about
  - Content
  - Navigation (up, down, NEWS)
  - Loading mechanisms
  - Connections to chemistry
    - Invite domain experts
  - TIME – control it
  - KINECT – future work

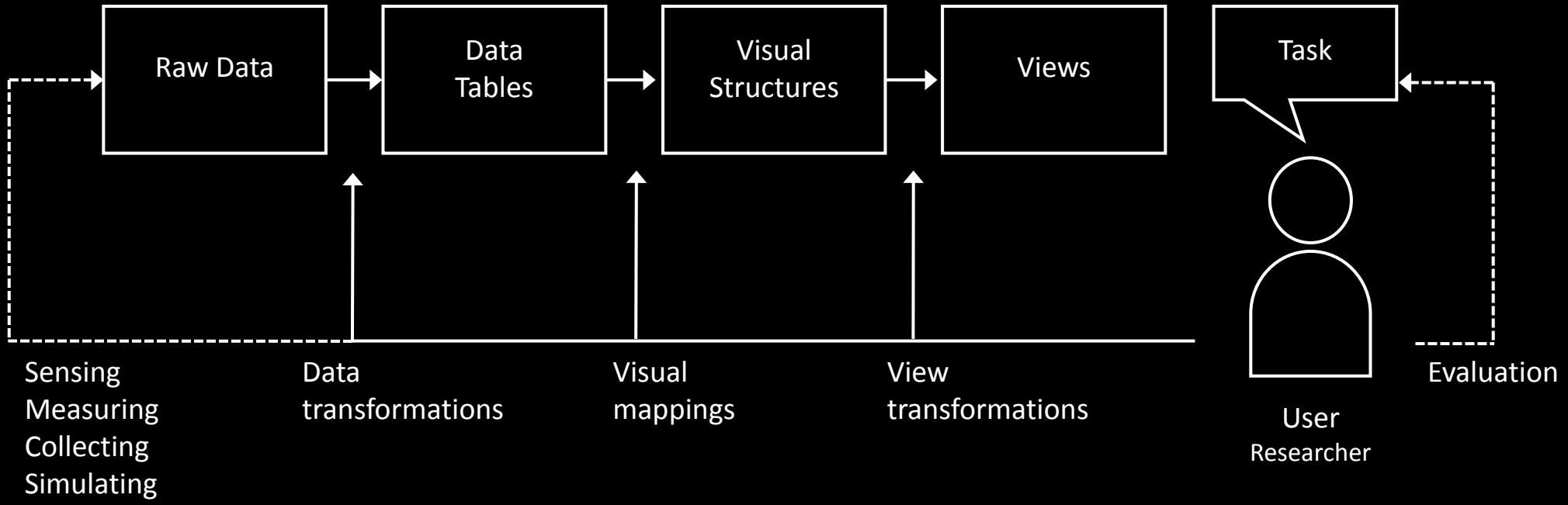
# Update


EmoArt

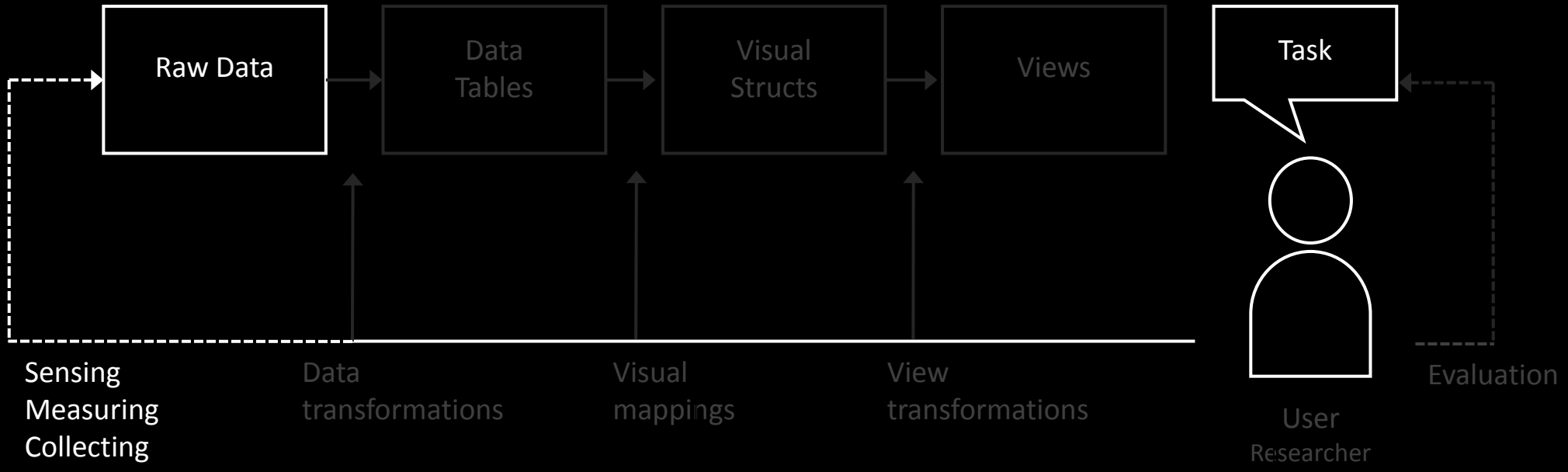
# Perception

# Information Visualization Pipeline

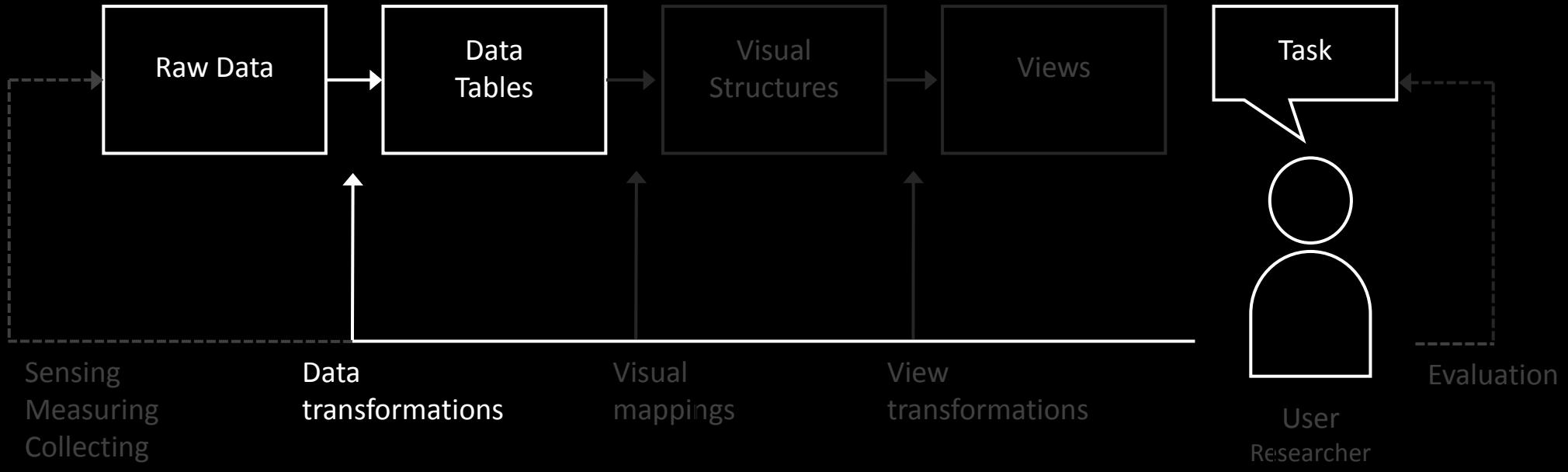
expanded from **Readings in Information Visualization: Using Vision to Think**
By Stuart K. Card, Jock D. Mackinlay, Ben Shneiderman, 1999



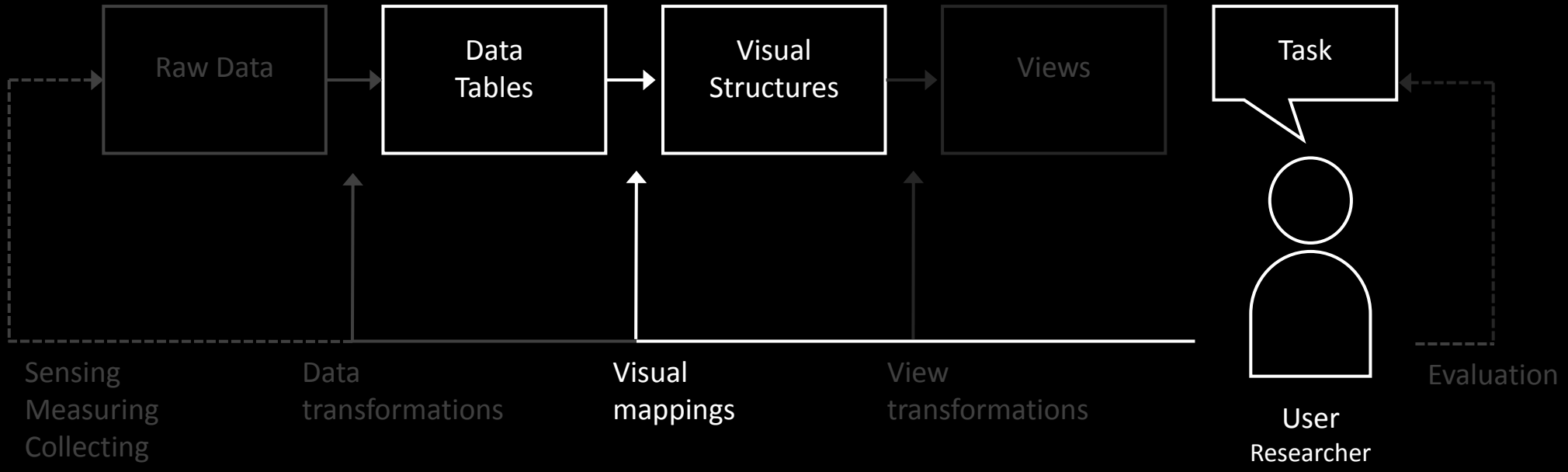
# Data


Raw Data
Data Tables
Visual Structs
Views
Task
Sensing
Measuring
Collecting
Data transformations
Visual mappings
View transformations
User
Researcher
Evaluation

# Data Tables and Data Transformations



# Visual Perception and Visual Structures



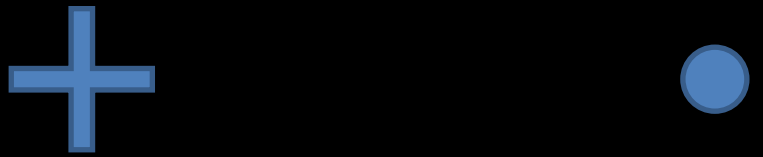
# A Question about Human Perception

The human blind spot is:

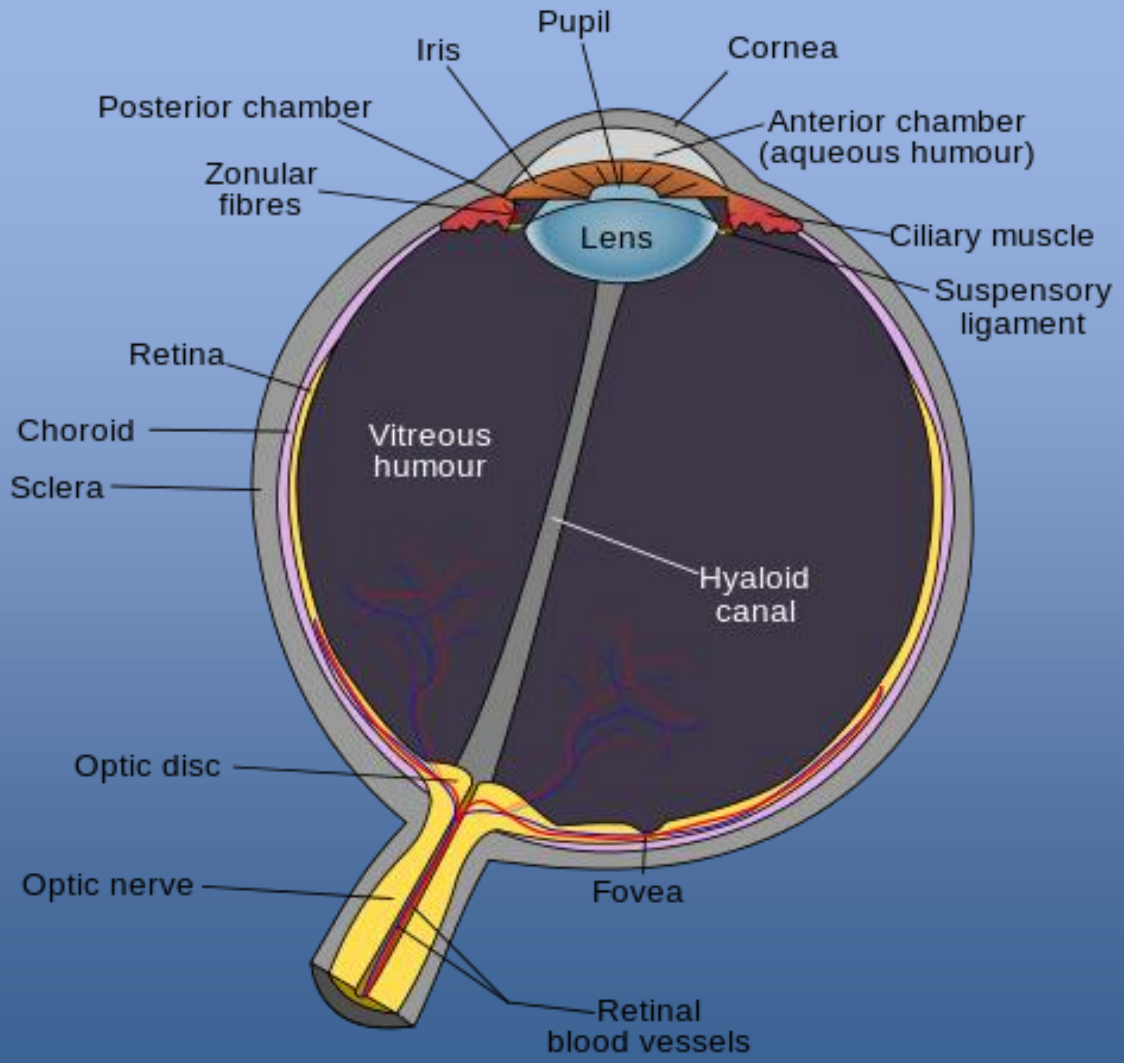
1. a myth.
2. a metaphor to explain our inability to see everything.
3. the area that is outside your field of vision that is approximately 175˚
4. your brain fooling you into thinking you see in an area where you actually can’t see.
5. the space between what you see in your rear-view mirror and your peripheral vision when driving.

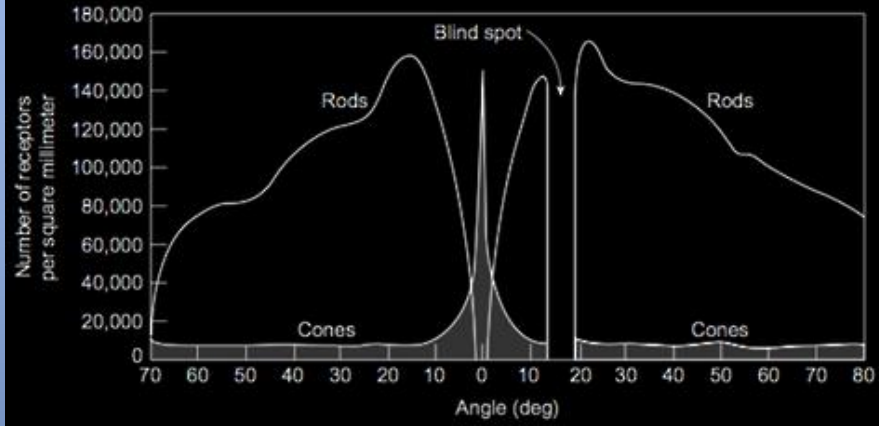
# Try this out!

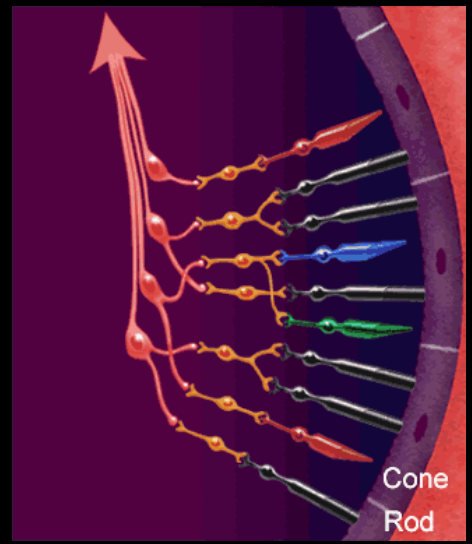
- Draw a cross and a circle about 5 cm apart
- Close left eye and look only at cross
- Place paper about 15 cm from nose



# The Human Eye



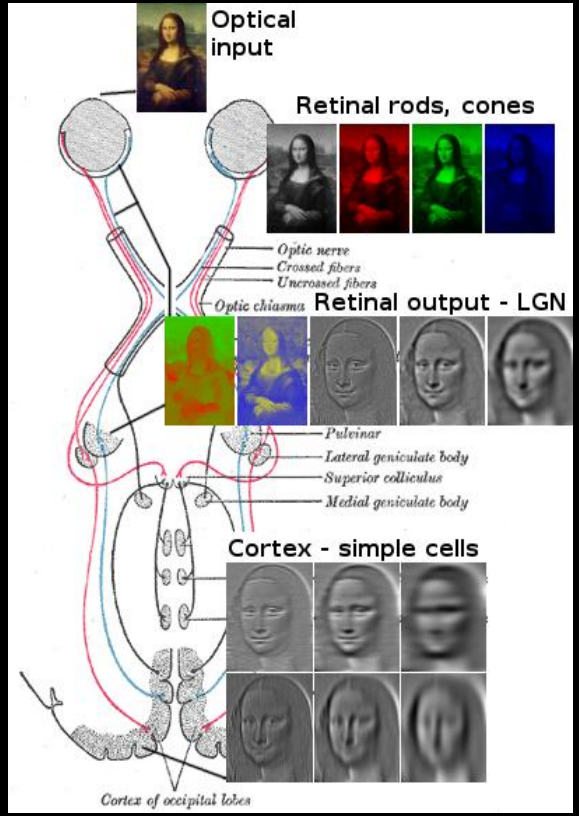



# Human Vision

- Highest bandwidth
- Fast, parallel
- Pattern Recognition
- Pre-attentive
- Extends memory and cognitive capacity
- People think visually
- Brain: 30% vision, 8% touch, 3% hearing

# Visual Processing

video



# Preattentive Processing

- No need for focused attention
- Parallel
- Fast: 200-250 msecs

# Attentive Processing

How many 3s?

12817687561389765469845069856049828267629809858458224509856458945098450980943585909103020990595959577256467505067890456788457898098216776548763649085609129496 86

# Preattentive Processing

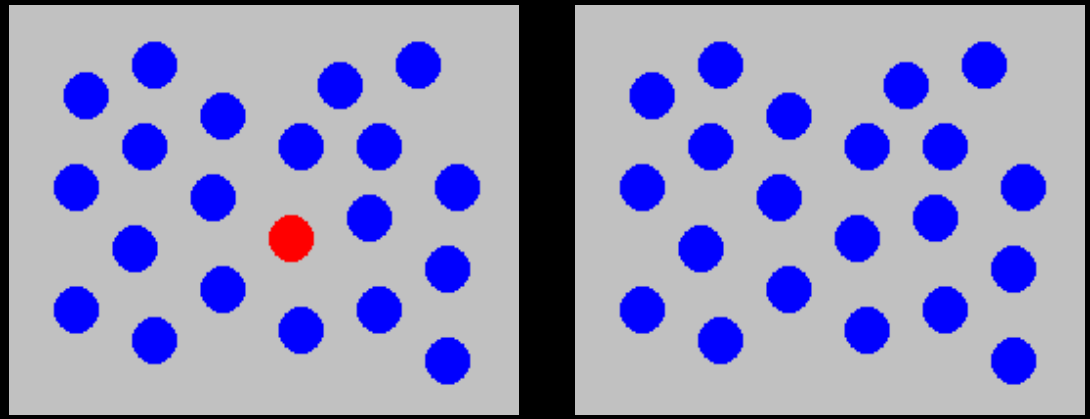
How many 3s?

1281768756138976546984506985604982826762
9809858458224509856458945098450980943585
9091030209905959595772564675050678904567
8845789809821677654876364908560912949686

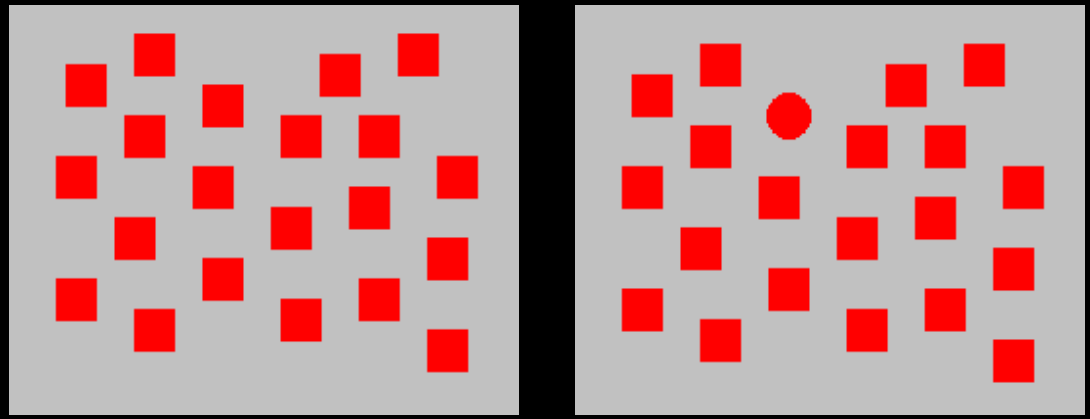
# Tasks

- Target detection
  - is something there?
- Boundary detection
  - Can the elements be grouped?
- Counting
  - How many elements of a certain type are present?

# Which side has a red circle?

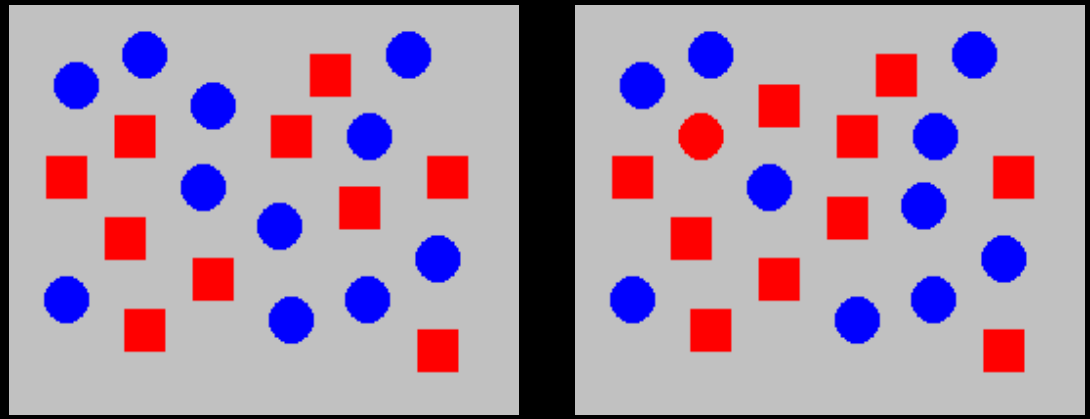


# Which side has a red circle?



# Which side has a red circle?

link



# Potential Pre-attentive Features

Position
length
width
size
curvature
number
terminators

intersection
closure
hue
intensity
flicker
direction of motion

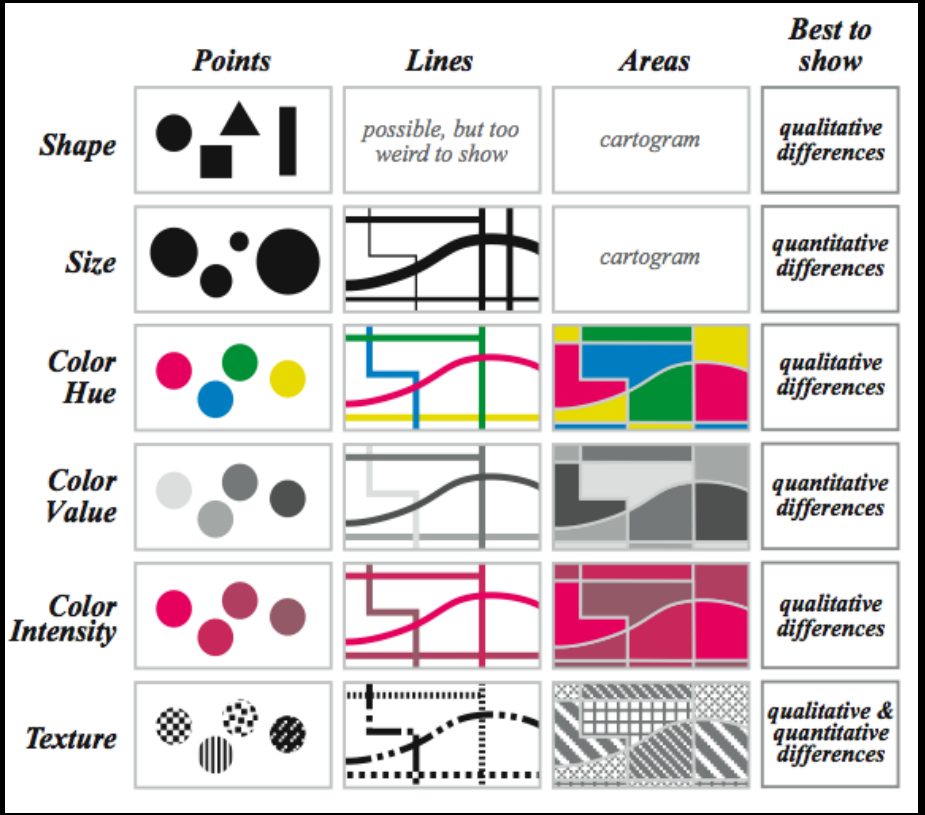
binocular lustre
Stereoscopic depth
3-D depth cues
lighting direction

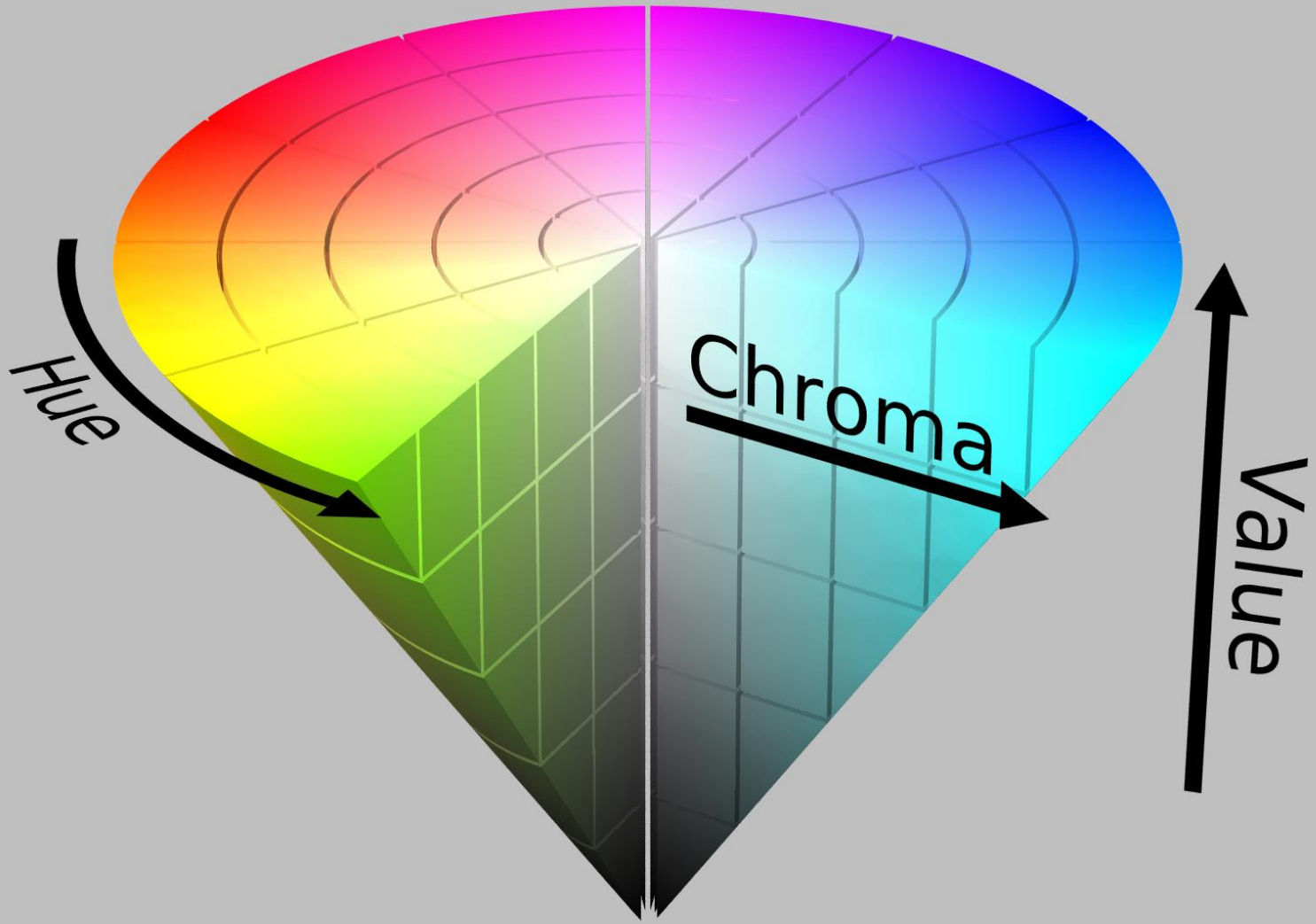
# Discussion

- What role does/should pre-attentive processing play in information visualization?

# Visual Types

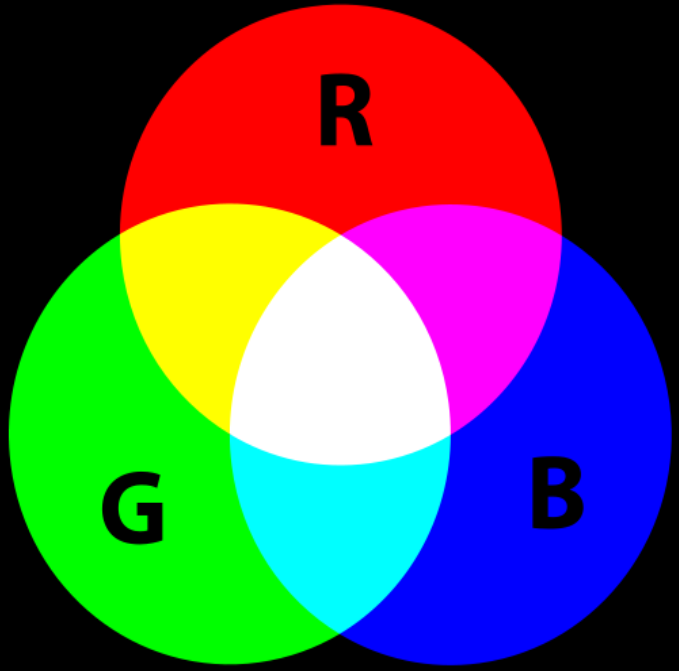
Jacques Bertin, Sémiologie Graphique, 1967



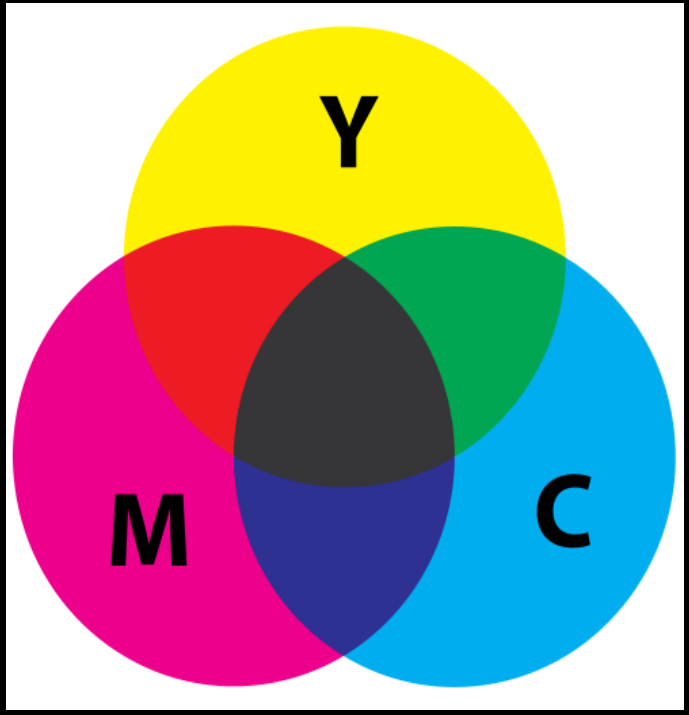

Hue
Chroma
Value

# Additive vs. Subtractive Color

**Additive**

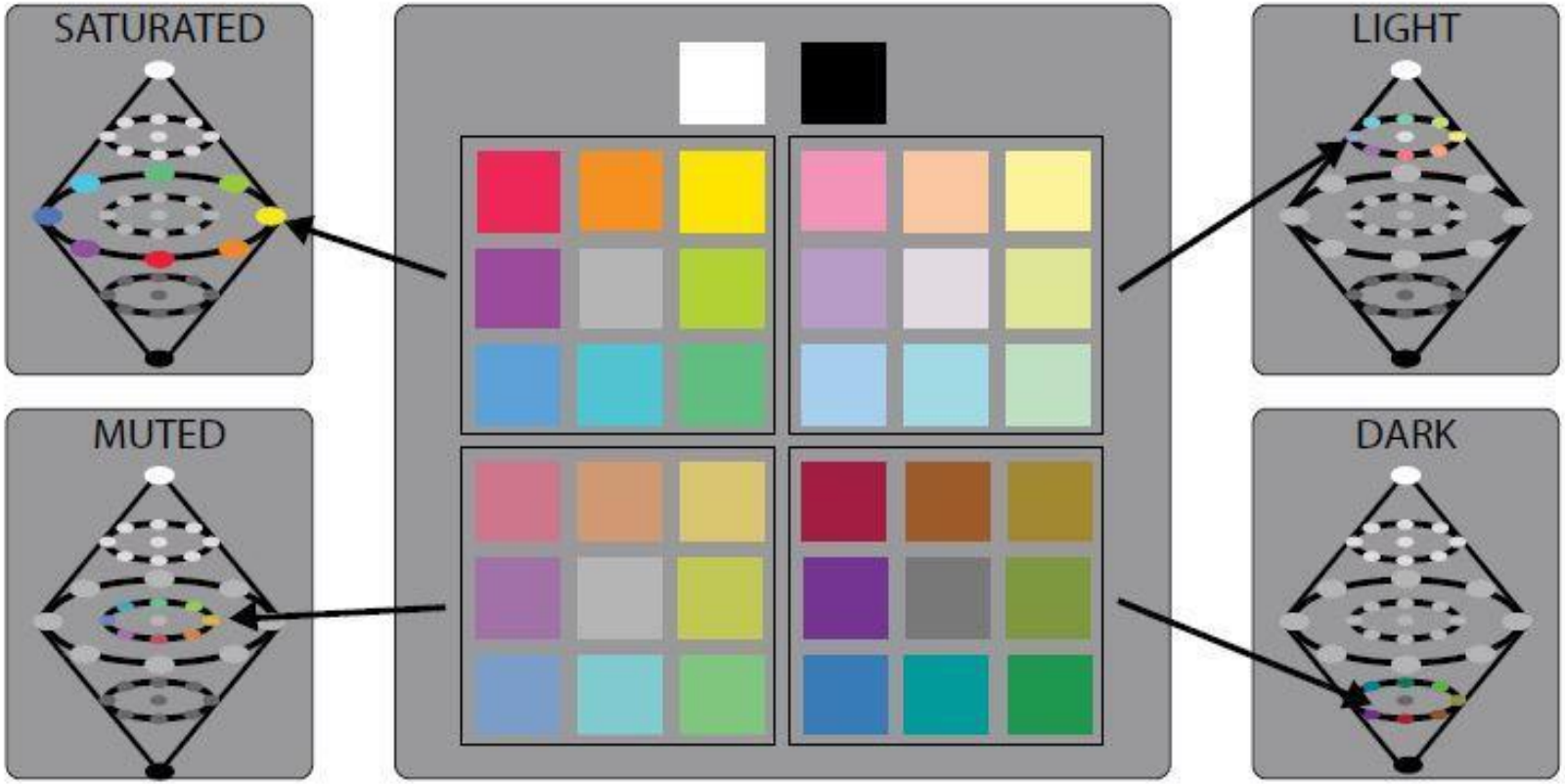



**Subtractive**




COLOR EMOTION GUIDE
OPTIMISM CLARITY WARMTH
FRIENDLY CHEERFUL CONFIDENCE
EXCITEMENT YOUTHFUL BOLD
CREATIVE IMAGINITIVE WISE
TRUST DEPENDABLE STRENGTH
PEACEFUL GROWTH HEALTH
BALANCE NEUTRAL CALM
DIVERSITY

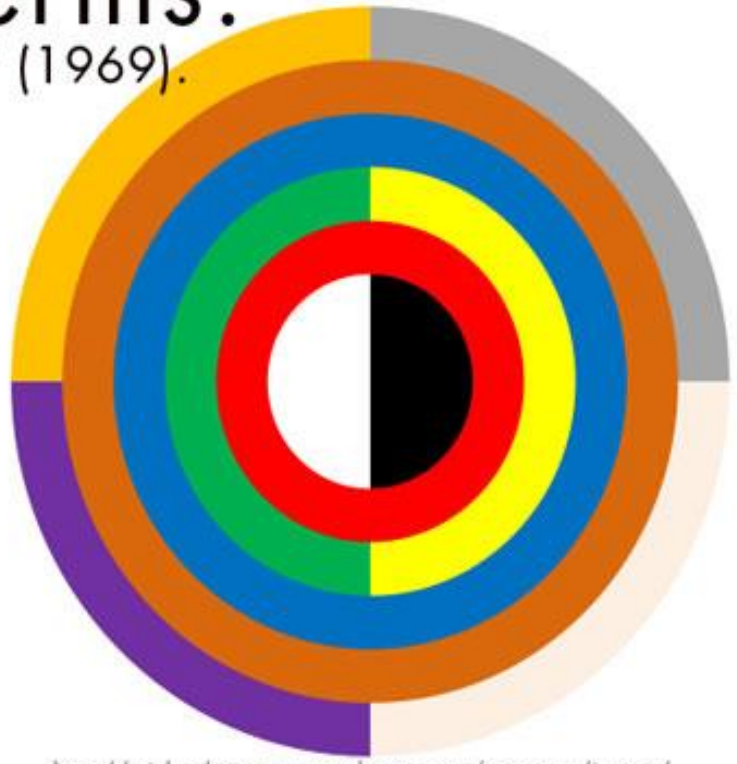
# Berkeley Color Project (BCP) 37 Colors



# Basic Color Terms:

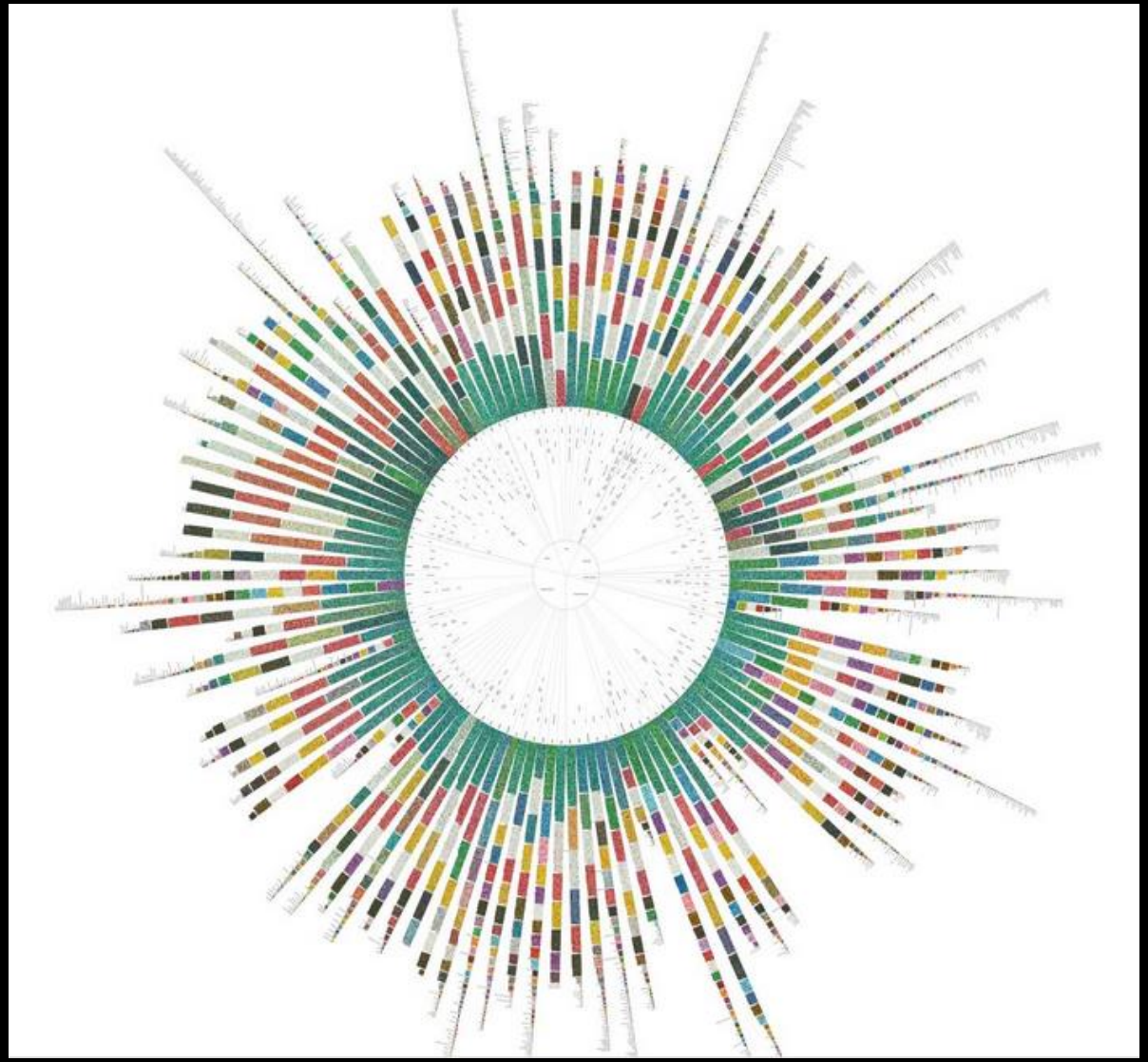
Their Universality and Evolution" (1969).

LANGUAGE OF COLOR



Berlin and Kay

http://michaelpetersen.wordpress.com/category/image/

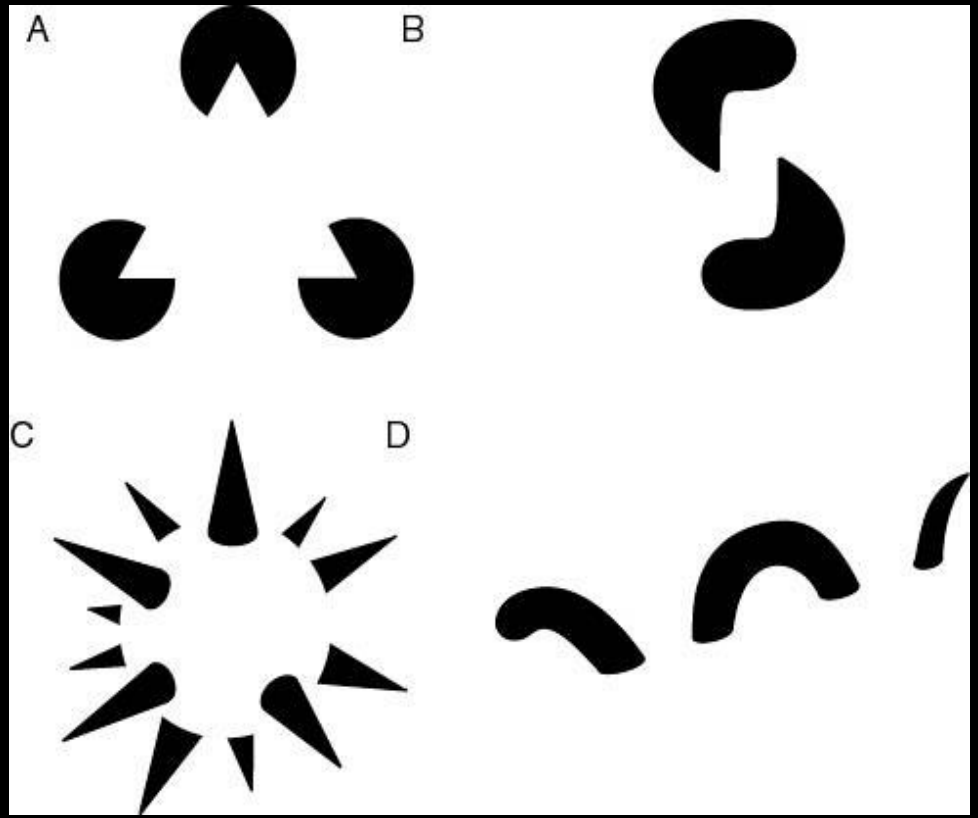


# Gestalt Laws of Pattern Perception

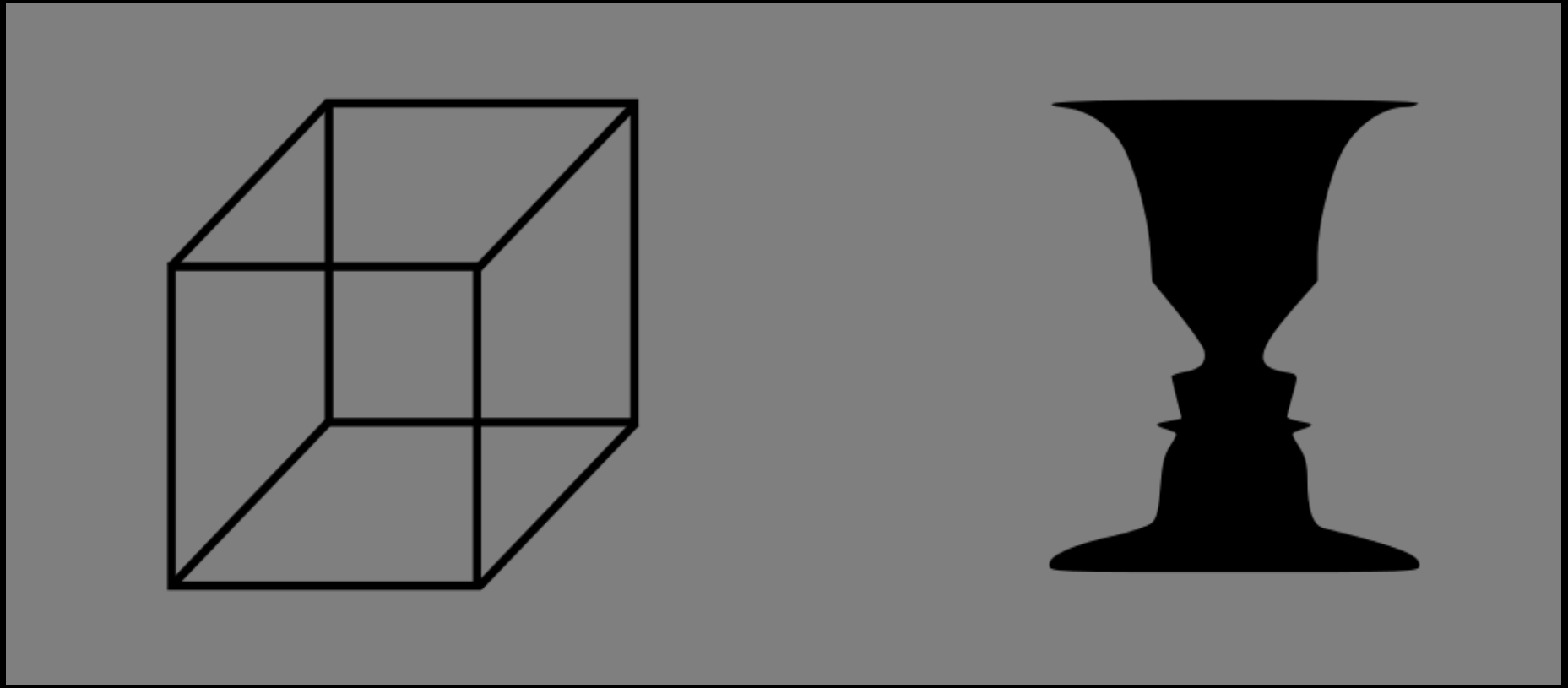
- German psychologists 1920s
- Understand perception
- Principles
  - Emergence
  - Reification
  - Multistability
  - Invariance
  - Grouping

# Emergence

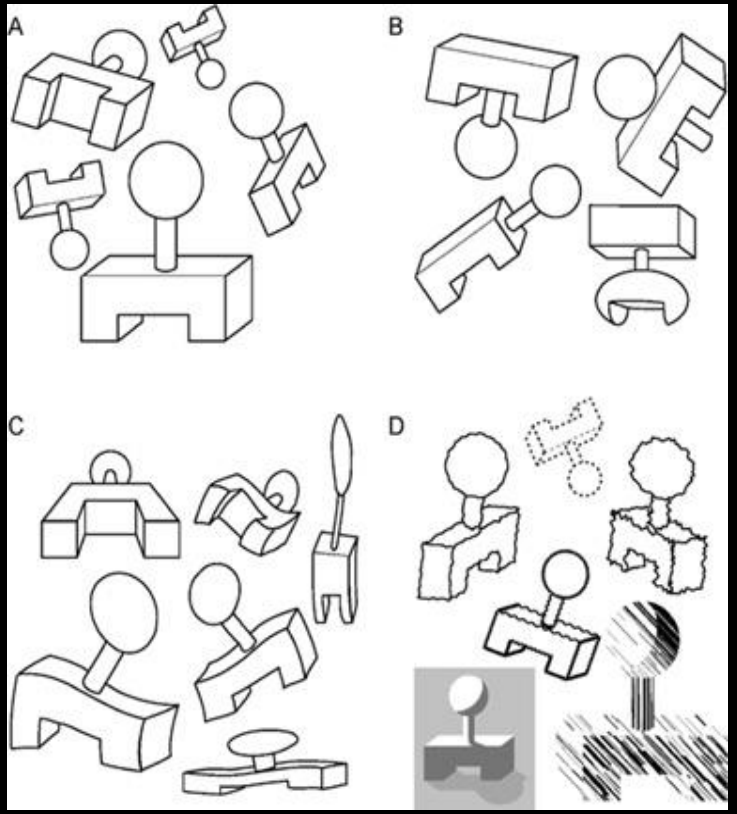
# Reification



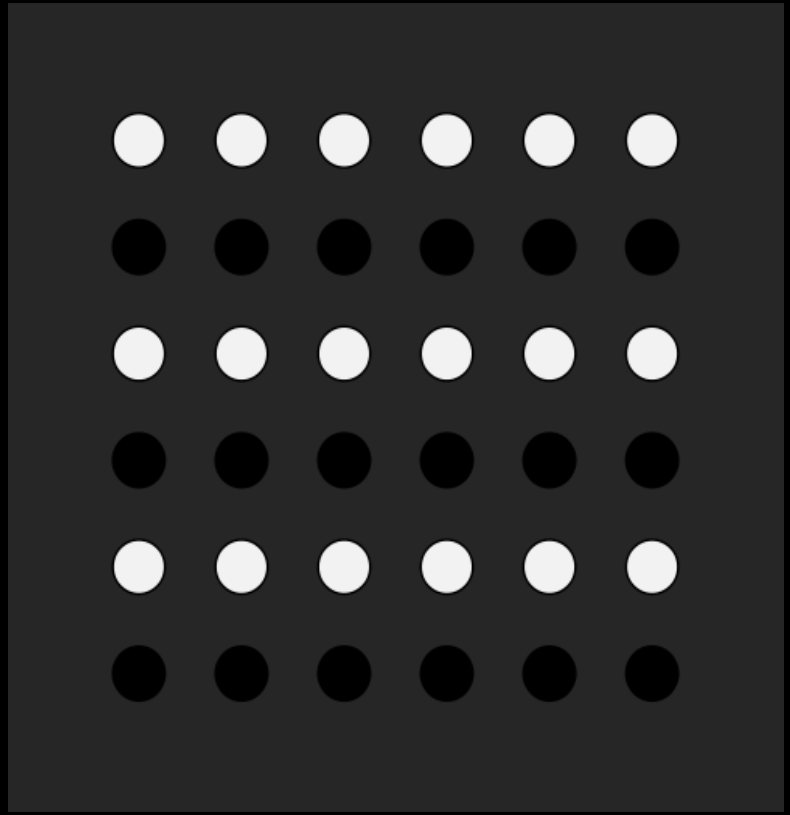
# Multistability



# Invariance

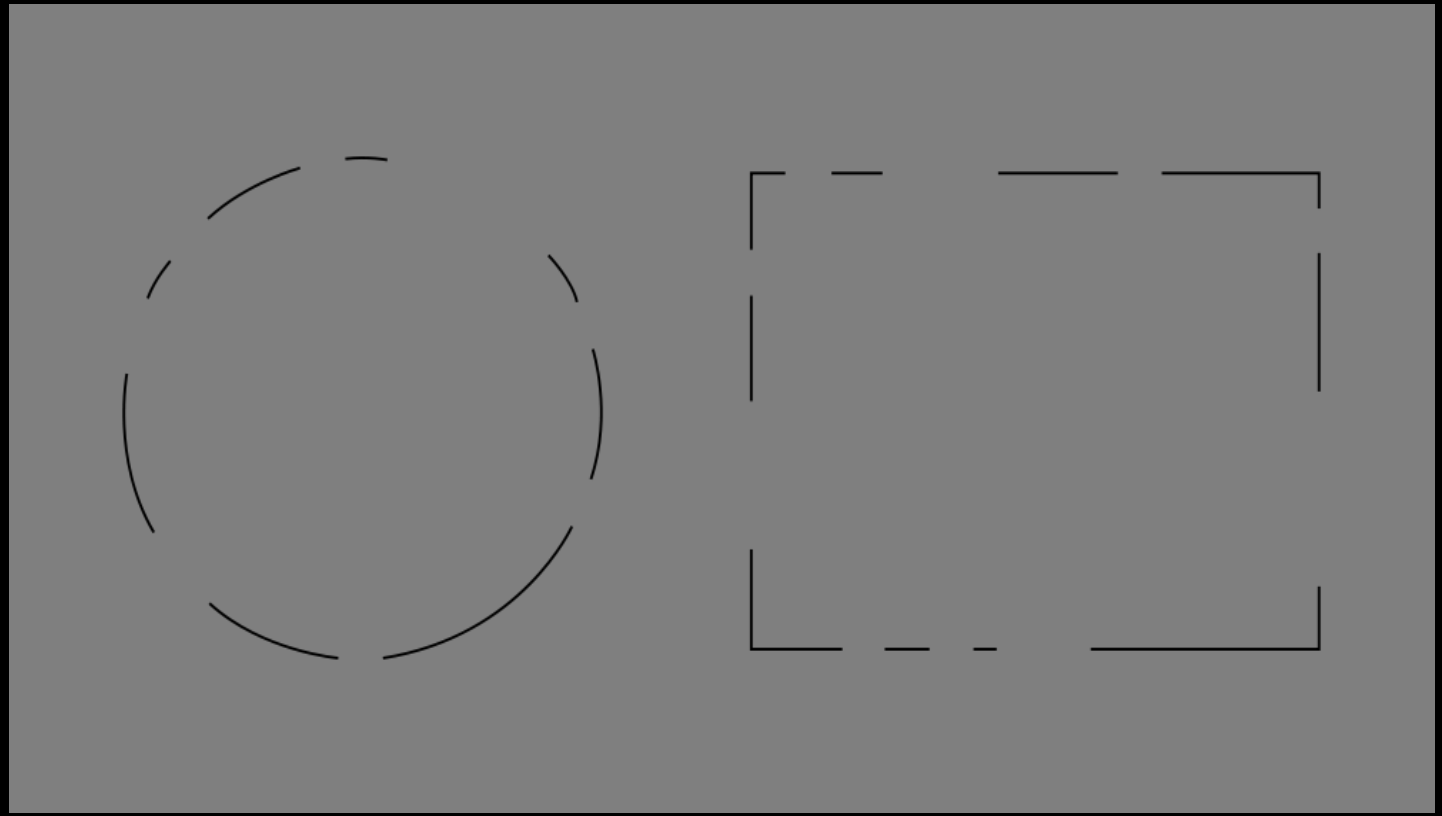


# Group: Similarity



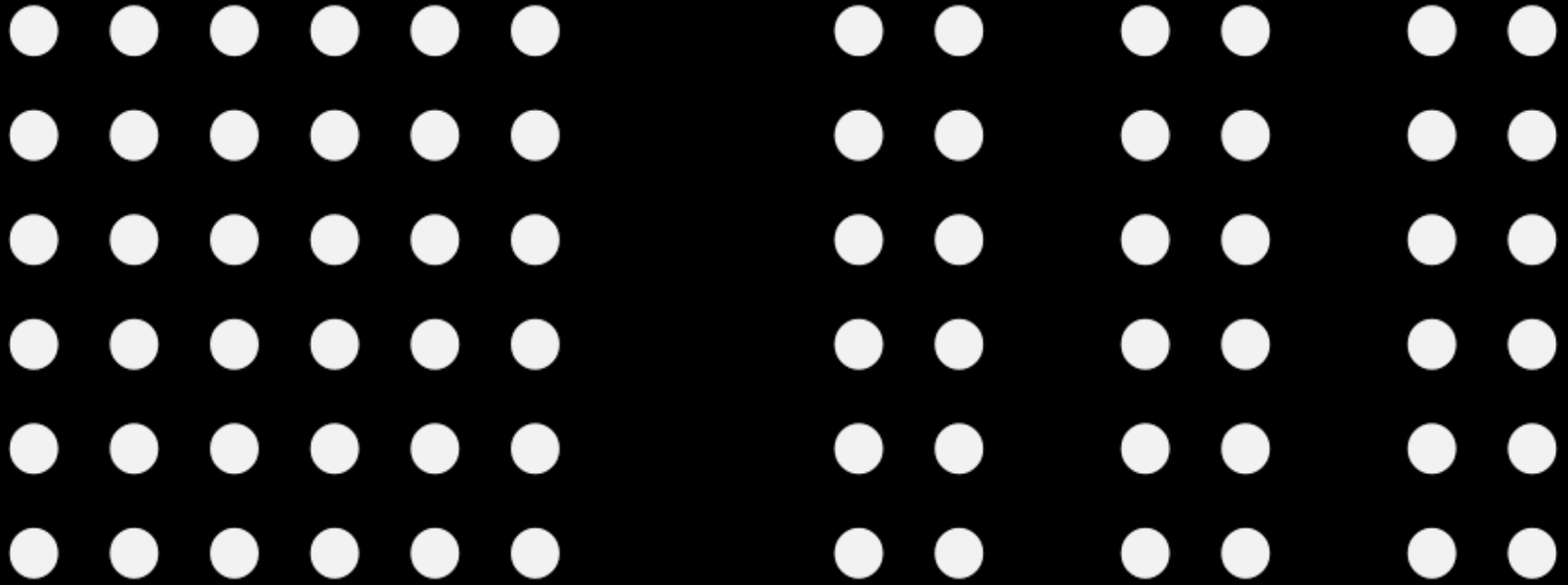
# Similarity

# Group: closure

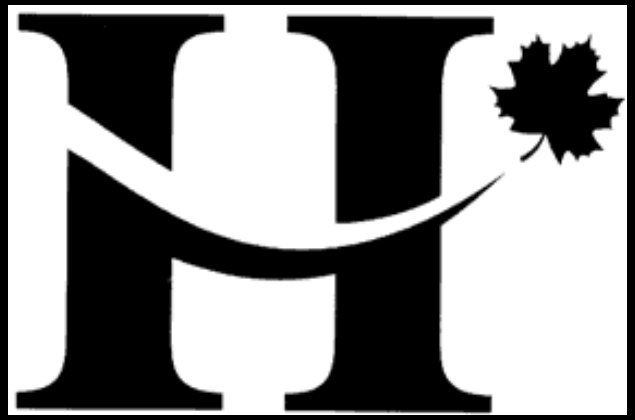


# Group: Closure

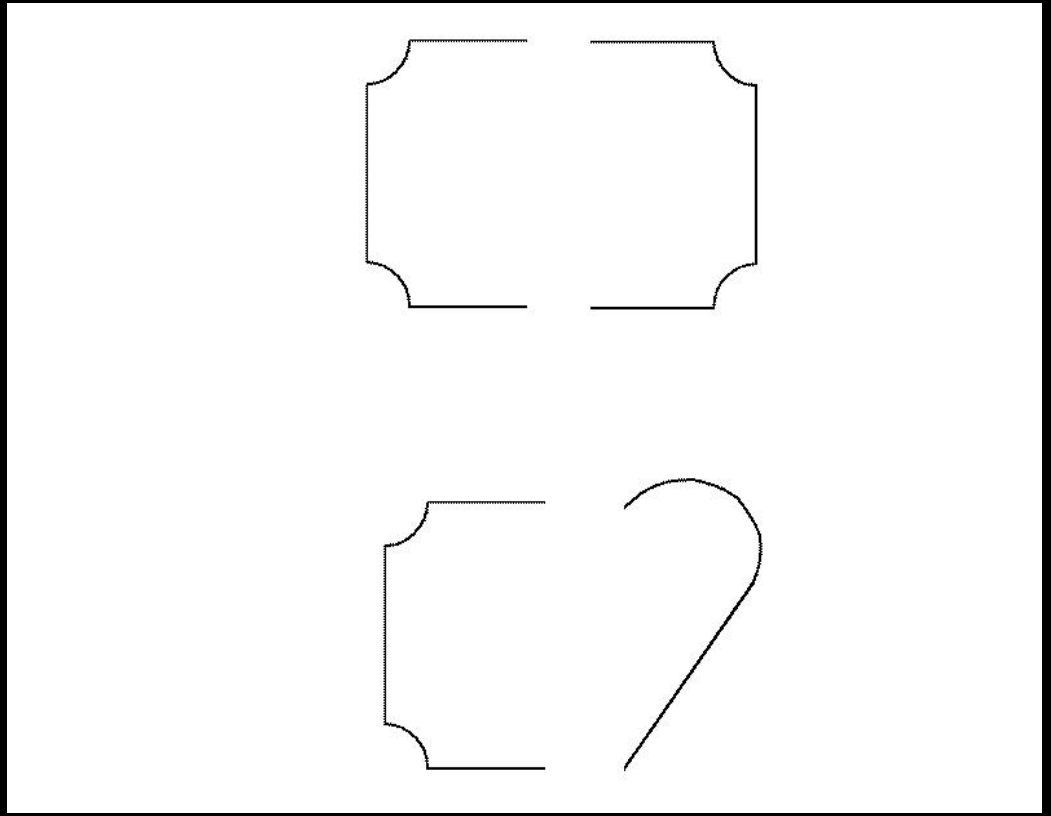
# Group: Proximity



# Group: continuity



# Group: symmetry



# Reading

- Two related work papers (how to do related work search and review?)
- Turn in 100 word summaries for each
- Before Tuesday's Lecture

# Thank you!

marior@kth.se