The Art and Science of Depiction

Picture Organization and Gestalt

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**Summary**
- Contrast processing
- Different pathways
- Computational theory of vision
- Invariants

**Overview**
- After image-based, we only know where edges are
- Need to organize the image
  - Segment by region, find structure

**Context: Gestalt psychology**
- Early 20th century
- Inspired by field theory in physics
- Holistic philosophy of vision
  - “spontaneous” organization
  - Opposed to unconscious inference
- Has been integrated recently into modern framework
- Very popular in design

**Prägnanz**
- “Goodness”
- “Simplest” possible figure or organization
- Has recently been related to information theory (simple in terms of amount of information required to encode it)

**Some Gestalt principle**
- Continuation
Continuation and Map-Making

Some Gestalt principle
- Continuation
- Closure

Plan
- Grouping
- Figure-ground
- Completion and illusory contours

No Grouping
Grouping by proximity

Grouping by color

Grouping by size

Grouping by shape

Grouping by orientation

Grouping by synchronicity
**Grouping by symmetry**

- Grouping by parallelism

**Grouping conflict**
- Proximity is overweighed by region

**Grouping conflict**
- Proximity is overweighed by connectedness

**Grouping conflict**
- Detect repetition
- Slower when between groups (0.7 vs. 1.1s)

**Grouping conflict**
- Detect repetition
- Faster when within small oval
Grouping after lightness constancy
- If the shadow is visible as a shadow
- Grouped by lightness

Grouping after size constancy
- Grouped by 3D-proximity, not by retinal image proximity

Grouping in complex situations
- No quantitative rule yet!

Grouping in photos
Arthus-Bertrand

Grouping and photo
Edward Weston
Grouping and photo
Jean-Pierre Sudre

Grouping
Frank Horvat

Grouping and photo
• Grouping reinforces contrast

Grouping by color
Georgia O’Keeffe

Grouping
• Grouping by proximity tells story

Grouping
• Abbas
  *South African Police in Training, 1978*
  • Grouping by proximity and similarity tells story
Grouping

- Grouping by similarity

Grouping & Map Making

- Grouping provides efficient analysis

Grouping & Architecture

- Grouping by similarity

Grouping & Architecture

- Grouping and symmetry
  - Cesar Pelli
  - Petronas Towers
  - Kuala Lumpur, Malaysia
  - 1991-97

Grouping

- Lucien Clergue
  - Camargue, 1940

Grouping and repetition

- Andy Warhol
  - 30 Are Better than One
  - 1963
**Grouping and ornament**

- Repetition, rhythm

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**Closure & grouping**

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**Plan**

- Grouping
- Figure-ground
- Completion and illusory contours

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**Figure-ground**

- There has to be one figure and one ground
- Related to occlusion and thus to depth

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**Figure-ground**

- A: ambiguous
- B: relative size
- C: symmetry
  & main axis
- D: contrast

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**Figure-ground**

- A: symmetry
- B: convexity
- C: parallelism
Figure-ground & familiarity

Closure & figure-ground

Figure-ground & signal-noise ratio

- Information theory (Shannon)
- Figure-ground separation is simpler when high signal-noise ratio

Figure-ground painting

Figure-ground pun

- Rubin vase
Figure-ground transition
- grouping

Figure-ground logos

Figure-ground logos

Figure Ground in design
- Sharon Gresh, Michael Mc Ginn

Figure ground: empty ground

Figure ground simplification

Hopper
**Figure-ground simplification**
- Egon Schiele
- Contrast enhancement

**Figure-ground simplification**

**Figure-ground and map-making**

**Figure ground – not so easy**
- Monet

**Figure ground – not so easy**
- Picasso

**Figure ground – stage of vision**
- Note that Impressionism and cubism were not classified surface-based
- In contrast, in this Raphael, figure-ground separation is easy
Figure ground – stage of vision

- Note that Impressionism and cubism were not classified surface-based
- But in this Picasso, figure-ground separation is easy

Negative space

- The ground defines the negative space
- Usually overlooked
- Fundamental for balance
  - Typography

Negative space

- George Seurat

Closure & Negative space

- Negative space are enclosed in the picture frame

Negative space in Architecture

- Michael Graves, 1969
Plan

- Grouping
- Figure-ground
- Completion and illusory contours

Illusory contours

- Kanisza

Illusory contours

Image-based (primary sketch)

- Contrast, edge detection
- Not so easy

Illusory contour

- Can be more effective

Illusory contour
Illusory contour

- William Anders
  *Earthshine*
  1969
- Prägnanz:
  a circle is “simpler”

Illusory contour

- Familiarity helps

Visual completion

- We complete the occluded part

Visual completion

- We complete the occluded part with the simplest shape

Visual completion

- With no context
- With context
**Relatable edges**

![Image of relatable edges](image)

- Both “see” a figure from incomplete information

**Illusory contour & completion**

![Image of illusory contour & completion](image)

**Visual completion**

- Clarence Lee, 1977

**Completion**

- Magritte
- Degas
- Framing
### Completion
- Marc Riboud
- Completion is challenged

### Summary
- Grouping
- Figure-ground
- Completion
  - As usual pictures can
    - Simplify
    - Challenge

### Assignments
- Piranesi
  - Tutorial 1 to 4
- Reading
  - Art and Illusion, Gombrich
  - Summary 1 to 2 pages
  - 2 Discussion issues
- Feedback + 1 picture

### Talks
- Start in 2 weeks
- 20-30 minutes
- Discuss your subject with me if not done

### Discussion
- *The Man Who Mistook his Wife for a Hat*
- *The Colorblind Painter*
- Oliver Sacks

### The Colorblind Painter
The Colorblind Painter

Figure ground simplification

• Isaac D. Fletcher

Figure-ground in design

• Shigeo Fukuda
  1986
• Poster for a one-man exhibition

Grouping

Andy Warhol