

The Art and Science of Depiction

Picture Organization and Gestalt

Fredo Durand
MIT-Lab for Computer Science

Summary

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

Picture Organization & Gestalt 2

Overview

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

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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

Picture Organization & Gestalt 4

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)

Picture Organization & Gestalt 5

Some Gestalt principle

- Continuation

Picture Organization & Gestalt 6

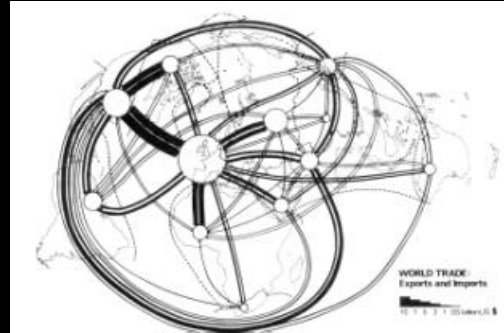
Continuation and Map-Making



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7

Continuation and Map-Making



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Continuation and design

- El Lissitzky, *Self Portrait: The Constructor* 1924

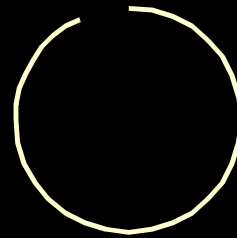


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9

Some Gestalt principle

- Continuation
- Closure



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10

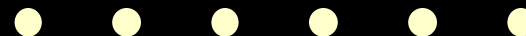
Plan

- Grouping
- Figure-ground
- Completion and illusory contours

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11

No Grouping



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12

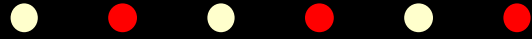
Grouping by proximity



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13

Grouping by color



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14

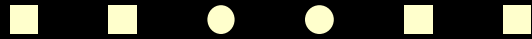
Grouping by size



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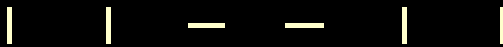
Grouping by shape



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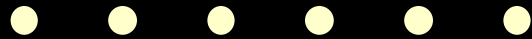
Grouping by orientation



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17

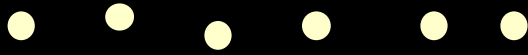
Grouping by synchronicity



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18

Grouping by synchronicity



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19

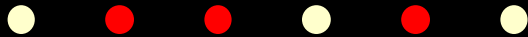
Grouping by synchronicity



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20

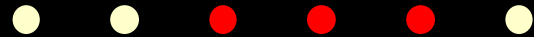
Grouping by synchronicity II



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21

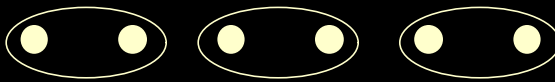
Grouping by synchronicity II



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Grouping by region



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23

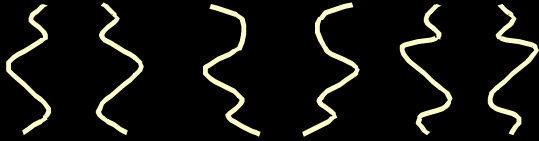
Grouping by connectedness



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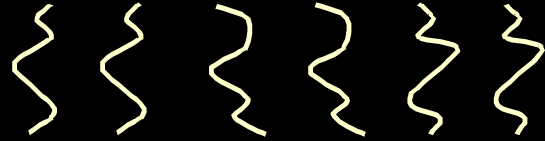
Grouping by symmetry



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Grouping by parallelism



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26

Grouping conflict

- Proximity is outweighed by region



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Grouping conflict

- Proximity is outweighed by connectedness

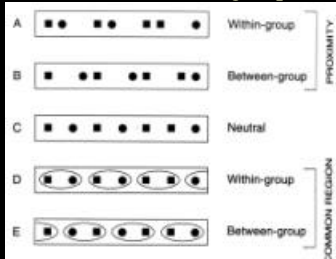


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Grouping conflict

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

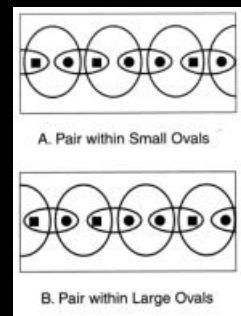


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Grouping conflict

- Detect repetition
- Faster when within small oval



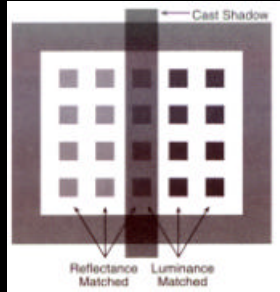
B. Pair within Large Ovals

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Grouping after lightness constancy

- If the shadow is visible as a shadow
- Grouped by lightness

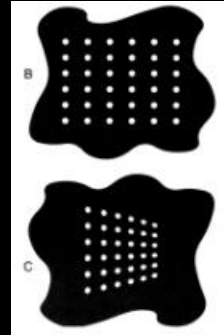


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Grouping after size constancy

- Grouped by 3D –proximity, not by retinal image proximity



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Grouping in complex situations

- No quantitative rule yet!

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33

Grouping in photos

Arthus-Bertrand



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34

Grouping in photos

Arthus-Bertrand



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35

Grouping and photo

Edward Weston



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36

Grouping and photo

Jean-Pierre Sudre



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37

Grouping

Frank Horvat



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38

Grouping and photo

- Grouping reinforces contrast



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39

Grouping by color

Georgia O'Keeffe



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40

Grouping

- Grouping by proximity tells story



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41

Grouping

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

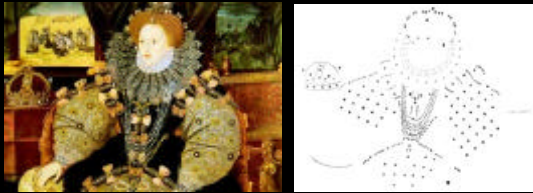


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42

Grouping

- Grouping by similarity



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43

Grouping & Map Making

- Grouping provides efficient analysis



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44

Grouping & Architecture

- Grouping by similarity



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45

Grouping & Architecture

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



Picture Organization & Gestalt

46

Grouping

- Lucien Clergue
Camargue, 1940



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47

Grouping and repetition

- Andy Warhol
30 Are Better than One
1963



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48

Grouping and ornament

- Repetition, rhythm



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49

Closure & grouping



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50

Plan

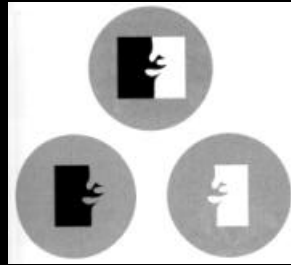
- Grouping
- Figure-ground
- Completion and illusory contours

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51

Figure-ground

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

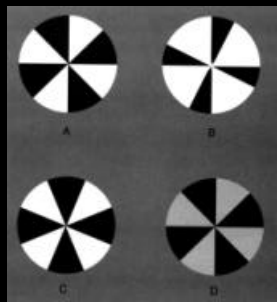


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Figure-ground

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

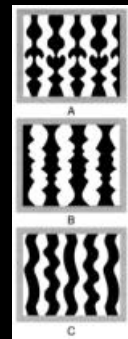


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Figure-ground

- A: symmetry
- B: convexity
- C: parallelism



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54

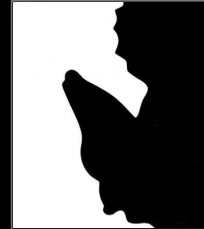
Figure-ground & familiarity



Picture Organization & Gestalt

55

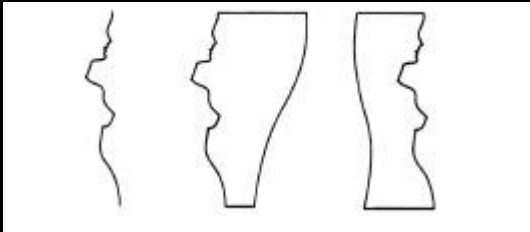
Figure-ground & familiarity



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56

Closure & figure-ground



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57

Figure-ground & signal-noise ratio

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



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58

Figure-ground painting



Picture Organization & Gestalt

59

Figure-ground pun

- Rubin vase



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60

Figure-ground transition

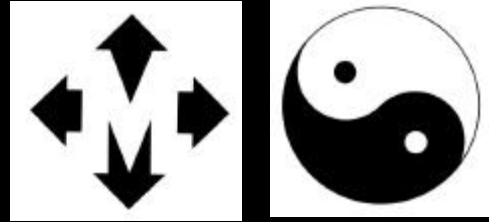
- +grouping



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61

Figure-ground logos



Picture Organization & Gestalt

62

Figure-ground logos



Picture Organization & Gestalt

63

Figure Ground in design

- Sharon Gresh,
Michael Mc Ginn



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64

Figure ground: empty ground



Hopper

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65

Figure ground simplification

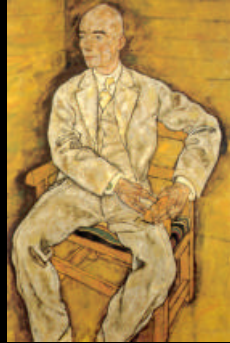


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66

Figure-ground simplification

- Egon Schiele
- Contrast enhancement



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67

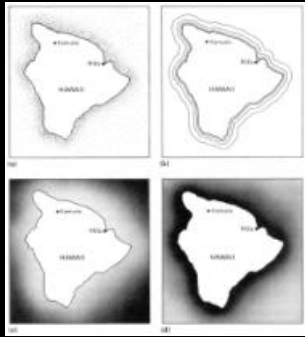
Figure-ground simplification



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68

Figure-ground and map-making

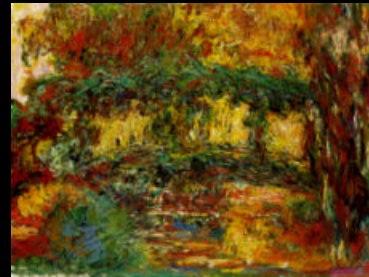


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69

Figure ground – not so easy

- Monet

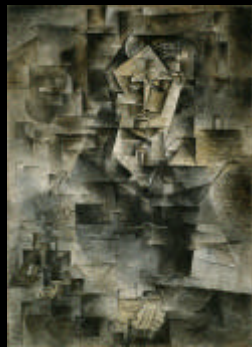


Picture Organization & Gestalt

70

Figure ground – not so easy

- Picasso

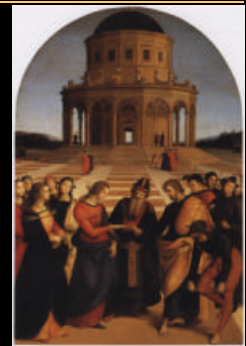


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71

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



Picture Organization & Gestalt

72

Figure ground – stage of vision

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

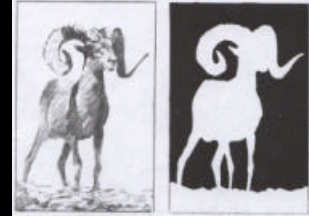


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73

Negative space

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



From *Drawing with the Right Side of the Brain*, Edwards

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74

Negative space

- George Seurat



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75

Negative space

- George Seurat



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76



Closure & Negative space

- Negative space are enclosed in the picture frame



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77



Negative space in Architecture

- Michael Graves, 1969



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78

Plan

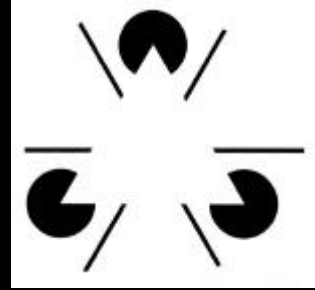
- Grouping
- Figure-ground
- Completion and illusory contours

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79

Illusory contours

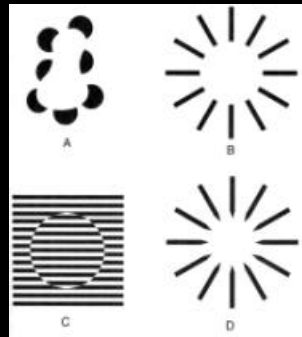
- Kanisza



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80

Illusory contours

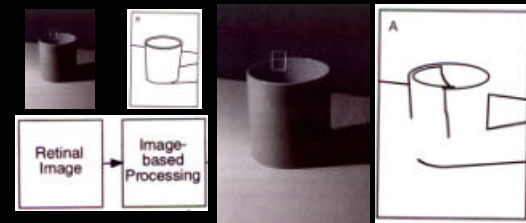


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81

Image-based (primary sketch)

- Contrast, edge detection
- Not so easy



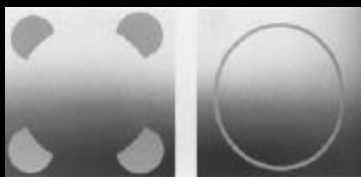
Raw edge detection

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Illusory contour

- Can be more effective



Picture Organization & Gestalt

83

Illusory contour



Picture Organization & Gestalt

84

Illusory contour

- Cocteau



Picture Organization & Gestalt

85

Illusory contour

- Matisse



Picture Organization & Gestalt

86

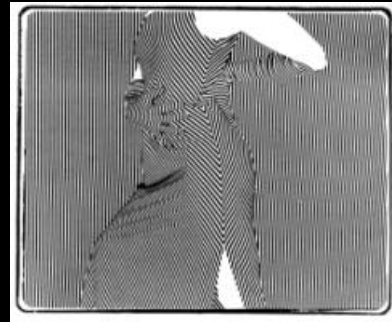
Figure-ground and illusory contour



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87

Figure-ground puzzle



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88

Illusory contour

- From [Ramachandran 1995]

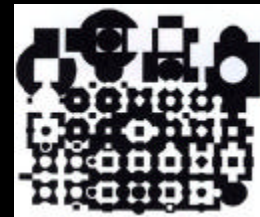


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89

Illusory contours

Vasarely, *Helios*



Picture Organization & Gestalt

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Illusory contour

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



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91

Illusory contour

- Familiarity helps



Picture Organization & Gestalt

92

Illusory contour

- Familiarity helps

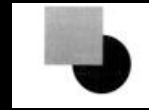


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93

Visual completion

- We complete the occluded part

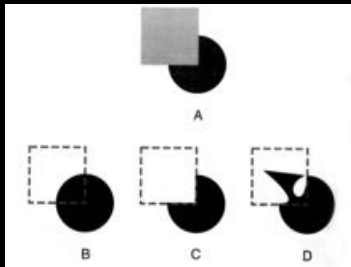


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94

Visual completion

- We complete the occluded part
with the simplest shape

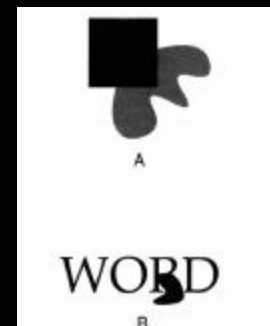


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95

Visual completion

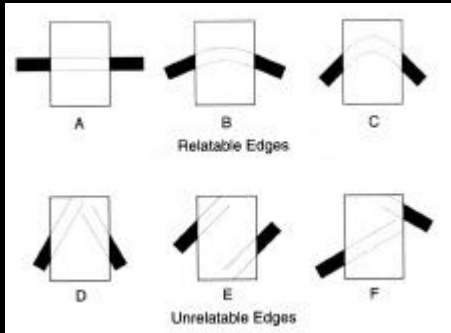
- With no context
- With context



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96

Relatable edges

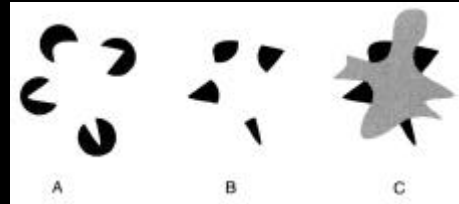


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97

Illusory contour & completion

- Both "see" a figure from incomplete information



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Visual completion

- Clarence Lee, 1977



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99

Visual completion

- Greg Brown (mural)

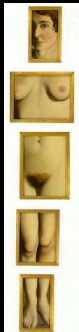


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100

Completion

- Magritte



Picture Organization & Gestalt

101

Completion

- Degas
- Framing



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102

Completion

- Marc Riboud
- Completion is challenged



Summary

- Grouping
- Figure-ground
- Completion

- As usual pictures can
 - Simplify
 - Challenge

Assignments

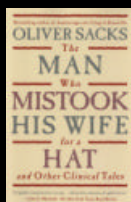
- Piranesi
 - Tutorial 1 to 4
- Reading
 - Art and Illusion, Gombrich
 - Summary 1 to 2 pages
 - 2 Discussion issues
- Feedback + 1 picture

Talks

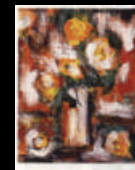
- Start in 2 weeks
- 20-30 minutes
- Discuss your subject with me if not done

Discussion

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



The Colorblind Painter



The Colorblind Painter



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109

Figure ground simplification

- Isaac D. Fletcher

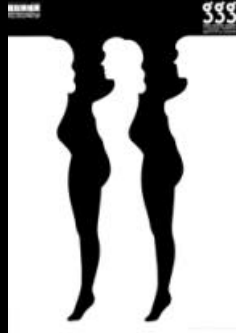


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110

Figure-ground in design

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



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111

Grouping

Andy Warhol



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112