The Art and Science of Depiction

Tone and color system

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Representation systems

- Drawing and projection
- Denotation
- Tone & color

Tone & color system

- (Often a mix)
  - Extrinsic
  - Intrinsic
  - Symbolic

Extrinsic color

- Renzo Piano
  - Tjibaou cultural center
  - 1991-98

Extrinsic black and white

- Gordon Park,
  - Red Jackson
  - Gang Leader
**Optical intrinsic**

- Boticelli *Primavera* 1482

**Pure intrinsic colors**

- Jawlensky
  - *Girl with Peonies*
  - *symbolic+harmony*

**Plan**

- Intro
- Shading
- Shadows
- Atmospheric perspective
- Light transfers
- Photography

**Why a separate system?**

- Willats discusses it only/mainly for the optical denotation system
- But historically it is the major issue with drawing
- It is clearly a different problem from that of dimension and denotation
- Relevant as well for other denotation systems

**Denotation system and tone & color**

- Silhouette: color of the regions
- Line drawing
  - Line color
  - Line thickness
- Optical
  - Point color & tone
  - Texture
- More an “attribute system” than just tone & color
Denotation system and tone & color

- Tone & color system

Denotation system and tone & color

- Braque Un Poeme Dans Chaque Livre

Denotation system and tone & color

- Amedeo Modigliani
  *Tete et buste de profil avec boucle d'oreille*  
  1912

Denotation system and tone & color

- Tone
- Hue
- Saturation
- Simultaneous contrast
- Texture

Beyond color

- Material properties
- Painting
- Gold
- Etc.
**Color origin**

- Physical extrinsic
- Physical intrinsic
- Symbolic/importance
- Color harmony
- Limitation compensation (or accentuation)

**Issues**

- 2D/3D
  - 2D color composition
  - Color linked to the 3D scene
- Per mark/per primitive
  - Is the color constant on a mark?
  - Is it constant on a primitive?
  - Does it vary in the mark

**Example**

- Paul Klee
  *Hoffmanneske Szene*
  1921

**Palette and medium**

- Different media permit different ranges of colors
  - E.g. pastels, pencil, watercolor, b/w photo
- The medium can be chosen for the palette
Color and aging

Restoration

• Michelangelo The Creation of Adam 1508-1512

Church and color

Church and color

Light in the scene

• Intrinsic reflectance
• Different light sources
• Outgoing light
• Shadows
  – Self shadows
  – Cast shadows
• Shading
• Inter-reflection
• Atmospheric perspective

Constancy and scene analysis

• Segmentation into layers
  – Illumination
  – Reflectance
  – Transparency


**Light**
- Point light source
- Directional light source (sun)
- Extended light source
- Hemispherical light source (sky)
- Ambient light
- Global illumination

**Light**
- Fall-off
- Attenuation

**Light in CG**

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**Light and shape depiction**
- Shading
- Highlight
- Shadow
- Inter-reflection

**Shading & BRDF**
- Bi-Directional Reflectance distribution function
- Ratio of light arriving from one direction bouncing in another direction
- 4D function (2*2 angles)
**Shading & BRDF**
- 2 main components
  - Diffuse (omni-directional)
  - Specular (directional): highlight

**Chiaroscuro**
- Andreas Mantegna, *Madonna and Child with St John the Baptist and Mary Magdalene*, 1495

**Saturation shading**
- Andreas Mantegna, *Madonna and Child with St John the Baptist and Mary Magdalene*, 1495
Saturation shading
- Andreas Mantegna, *Madonna and Child with St John the Baptist and Mary Magdalene*, 1495

Shading and make up

Shading and corrective lighting

Lighting and shading
- Alfred Krupp photographed in 1963 by Arnold Newman
- Because Krupp had benefitted from the nazis
- Un-friendly lighting

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Shadow
**Shadow**
- Self, cast and attached shadows
  - (or primary and secondary, double shadow, etc.)
- Not local
- Can be distracting
- Have been depicted or not depending on period
- Hard/soft shadow

**Self and cast shadow**

**Soft shadow**

**Shadow**
- Pozzo

**Shadows**
- 18th century

**Shadows**
- 18th century
- Lambert
Shadow

• Raphael vs. Master of the Mornauer

Shadow

• Campin, Trinity 1427-32

Shadow

• Caravaggio The Supper at Emmaus 1601

Shadow

• Guardi 1755

Shadow

• Rembrandt
**Shadow**
- Follower of Rembrandt A Man seated reading at a table in a lofty room 1631-50

**Shadow & Trompe-l’oeil**
- Rembrandt

**Shadow & Trompe-l’oeil**

**Shadow reveal shape**

**Colored shadow**

**Shadow reveal**
Tone & color system

Shadow reveal

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Shadow reveal

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Shadow

• [Waltz 75]

Tone & color system

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Tone & color system

Atmospheric perspective

• Saturation
• Hue
• Precision

Tone & color system

Atmospheric perspective

• Leonardo

Tone & color system
Atmospheric perspective

- Titian, Bacchus

Atmospheric perspective

- R. Earlom, Pastoral Scene, 1774

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Global illumination

- Light inter-reflection
- Each surface is a secondary light source
- Crucial for indoor scenes

Global illumination
Global illumination

Global illumination

Global illumination

Global illumination & production

• Mostly unused
• Because artists want local control

Counter-example: painting with light

Global illumination & production
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Three Point Lighting
• Key light
  – Main and visible lighting
• Fill light
  – Fill-in shadows
• Back light
  – Emphasize silhouette
  – Make subject stand out
• Independent lighting

Portait lighting

Filter for black and white

Dodging and Burning
• Clearing Winter Storm

Haze filtering
• Haze is bluish

No filter  Blue filter  Red filter
Example

- Edgar Degas
  *Ballet Dancer in Position facing 3/4 front*
  1872

Example

- Tom Purvis 1935

*EAST COAST*
*by LNER*