

*The Art and Science of Depiction*  
**Tone and color system**

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**Color and Tone System**

Tone & color system

**Representation systems**

- Drawing and projection
- Denotation
- Tone & color

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**Tone & color system**

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

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**Extrinsic color**

- Renzo Piano  
 Tjibaou cultural center  
 1991-98

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**Extrinsic black and white**

- Gordon Park,  
 Red Jackson  
 Gang Leader

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## Optical intrinsic

- Botticelli *Primavera* 1482

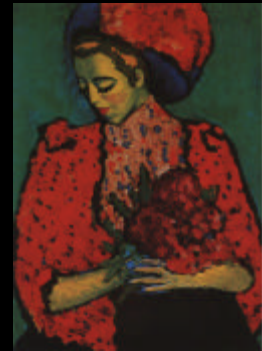


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## Pure intrinsic colors

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



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## Plan

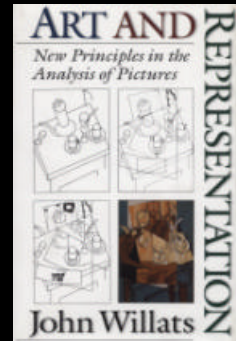
- Intro
- Shading
- Shadows
- Atmospheric perspective
- Light transfers
- Photography

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## 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



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## 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

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## Denotation system and tone & color



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*Denotation system and tone & color*



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*Denotation system and tone & color*

- Braque Un Poeme Dans Chaque Livre



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*Denotation system and tone & color*

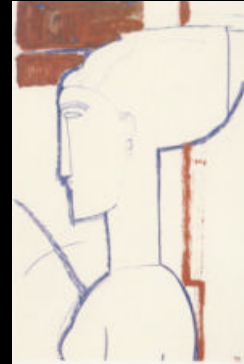


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*Denotation system and tone & color*

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

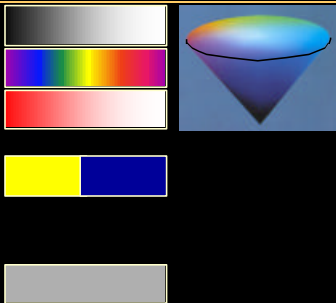


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*Picture color dimensions*

- Tone
- Hue
- Saturation
  
- Simultaneous contrast
  
- Texture



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*Beyond color*

- Material properties
- Painting
- Gold
- Etc.

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## Color origin

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

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## Color and symbol



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## 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

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## Example

- Paul Klee  
*Hoffmanneske Szene*  
1921



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## Example

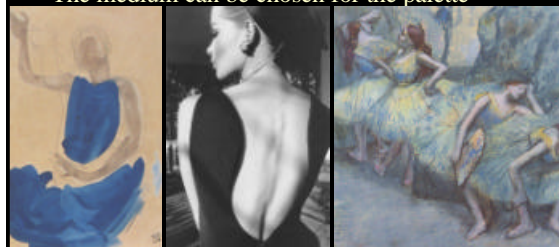


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## Palette and medium

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



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## Color and aging



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## Restoration

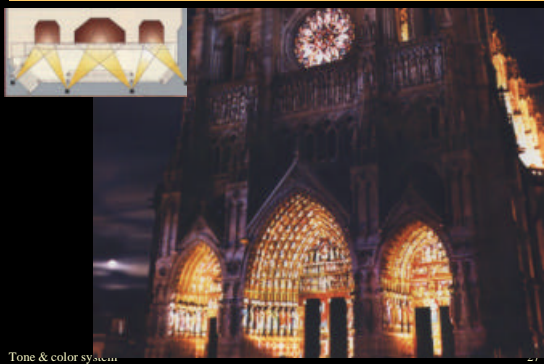
- Michelangelo The Creation of Adam 1508-1512



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## Church and color



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## Church and color



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## Light in the scene

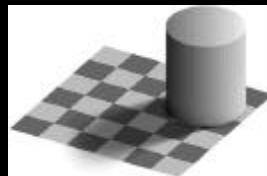
- Intrinsic reflectance
- Different light sources
- Outgoing light
- Shadows
  - Self shadows
  - Cast shadows
- Shading
- Inter-reflection
- Atmospheric perspective

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## Constancy and scene analysis

- Segmentation into layers
  - Illumination
  - Reflectance
  - Transparency



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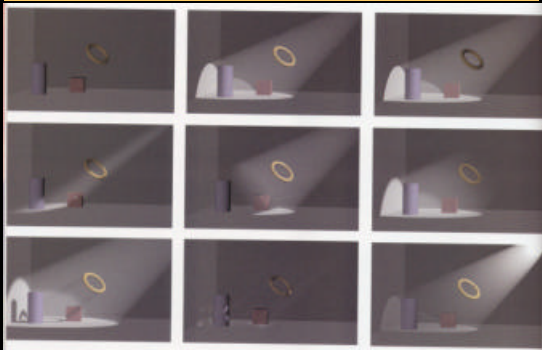
## Light

- 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



## Plan

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

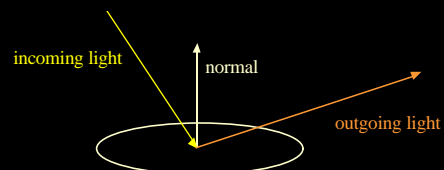
## Light and shape depiction

- Shading
- Highlight
- Shadow
- Inter-reflection



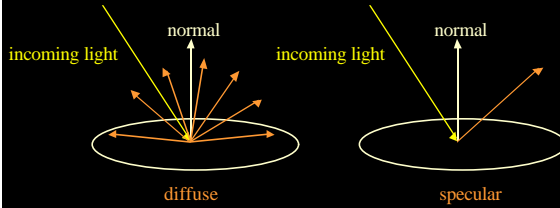
## Shading & BRDF

- 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

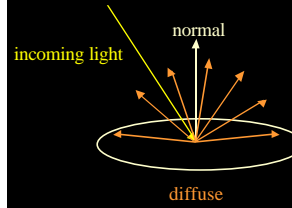


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## Shading & BRDF

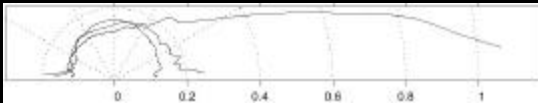
- Diffuse
  - Depends on angle between light and normal



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## Shading & BRDF



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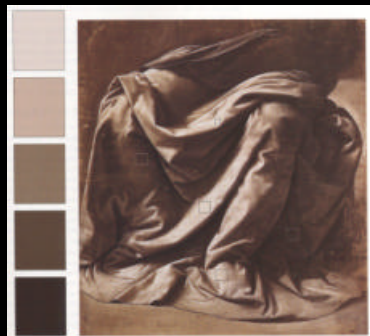
## Shading & BRDF



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## Chiaroscuro



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## Saturation shading

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



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## Saturation shading

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



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## Shading and make up

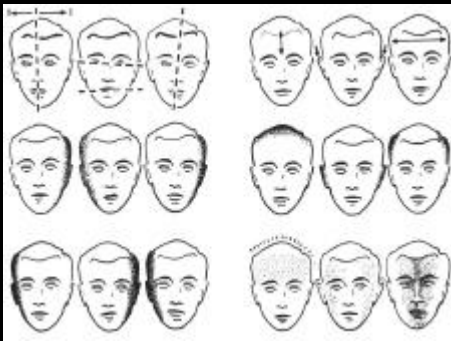


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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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## Shading and corrective lighting



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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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## Lighting and shading

- Alfred Krupp photographed in 1963 by Arnold Newman
- Because Krupp had benefited from the nazis
- Un-friendly lighting



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## Plan

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## Shadow

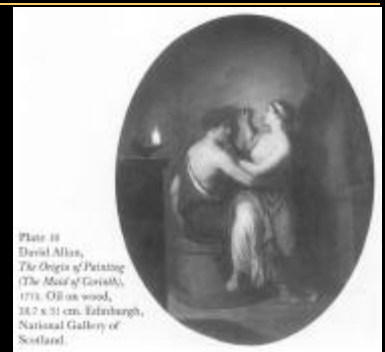


Plate 10  
David Allan,  
*The Origin of Painting  
(The Man of Goveish)*,  
1718. Oil on wood,  
36.2 x 31 cm. Edinburgh,  
National Gallery of  
Scotland.

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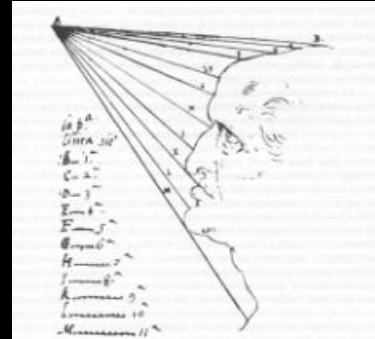
## Shadow

- 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

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## Self and cast shadow



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## Soft shadow



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## Shadow

- Pozzo

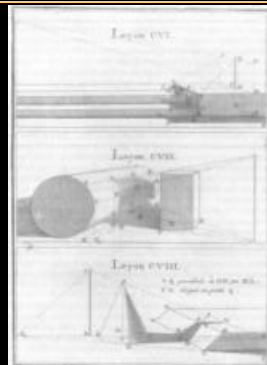


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## Shadows

- 18<sup>th</sup> century

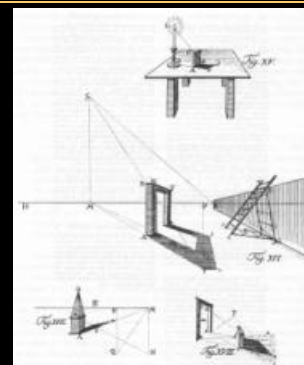


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## Shadows

- 18<sup>th</sup> century
- Lambert



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## Shadow

- Raphael vs. Master of the Mornauer



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## Shadow

- Campin, *Trinity* 1427-32



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## Shadow

- Caravaggio *The Supper at Emmaus* 1601



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## Shadow

- Guardi 1755



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## Shadow



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## Shadow

- Rembrandt



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## Shadow

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



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## Shadow & Trompe-l'oeil

- Rembrandt



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## Shadow & Trompe-l'oeil



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## Shadow reveal shape



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## Colored shadow



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## Shadow reveal



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## Shadow reveal



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## Shadow reveal



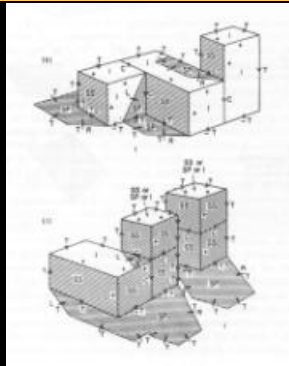
Plate 32 Grandville, *The Shadows (The French Cabinet)* from *La Caricature*, 1830.

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## Shadow

- [Waltz 75]



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## Plan

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## Atmospheric perspective

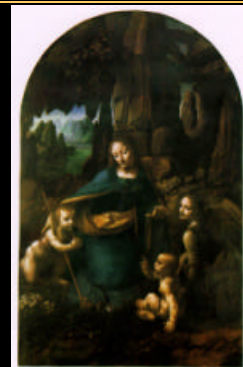
- Saturation
- Hue
- Precision

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## Atmospheric perspective

- Leonardo



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## Atmospheric perspective

- Titian, *Bacchus*



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## Atmospheric perspective

- R. Earlom, *Pastoral Scene*, 1774



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## Plan

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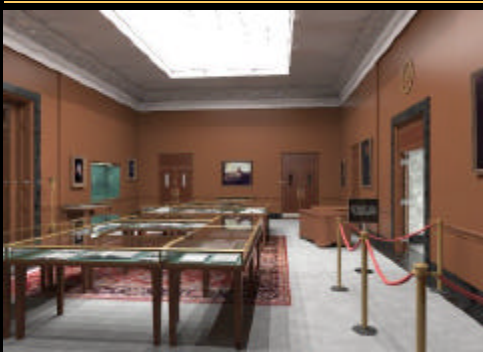
## Global illumination

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

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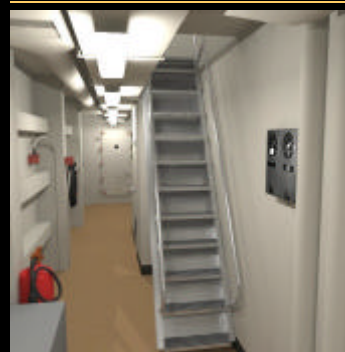
## Global illumination



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## Global illumination



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### Global illumination



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### Global illumination



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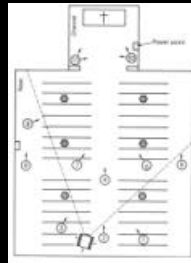
### Global illumination



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### Counter-example: painting with light



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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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### Global illumination & production

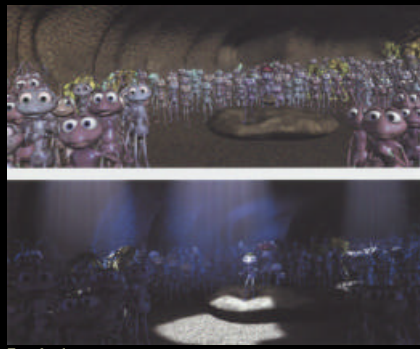
- Mostly unused
- Because artists want local control



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### Global illumination & production



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## Plan

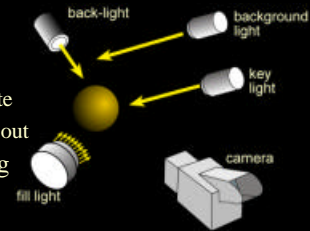
- Intro
- Shading
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## Three Point Lighting

- Key light
  - Main and visible lighting
- Fill light
  - Fill-in shadows
- Back light
  - Emphasize silhouette
  - Make subject stand out
- Independent lighting



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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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## Portrait lighting



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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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## Filter for black and white



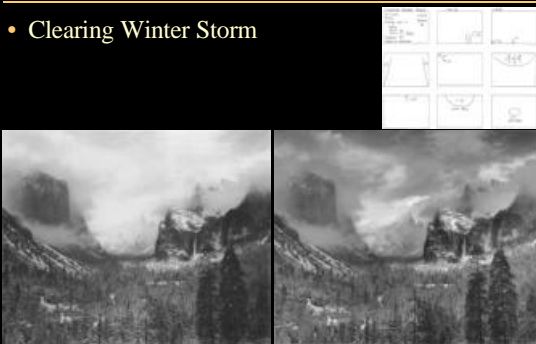
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## Dodging and Burning

- Clearing Winter Storm



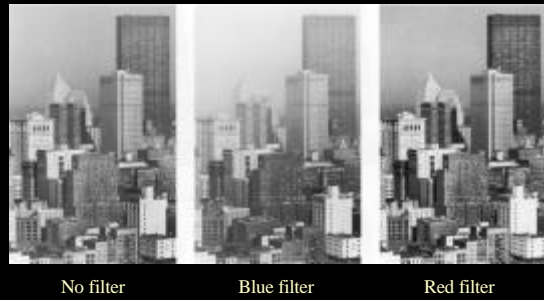
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## Haze filtering

- Haze is bluish



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Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

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*Example*

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



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*Example*

- Tom Purvis 1935



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