

Lessons for Scanning, Part 2:

Introduction to Scanning

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Outcomes

- What do we hope to learn?
 - Basics of hardware and software for scanning
 - Importance of and standards for use-neutral master images
 - Key terms and concepts of scanning
 - Document attributes that affect scanning decisions
 - Basics of preserving digital assets

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Basics – Workstation

- RAM, minimum 500 MB
- Check processor requirements of image software (ex. Paint vs. Photoshop)
- External drive for storage/back-ups
- Display, minimum 19", dual monitors ideal

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Scanners

- Buying a scanner
 - "Prosumer" quality
 - Not the cheapest, but not high-end either
 - Quality between models very comparable
 - Scanner bed size
 - Most letter-sized
 - Ok for letters and most photographs
 - Larger items will require larger (\$\$\$) scanner.

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Basics - Software

- Scanning software
 - Comes with scanners
- Photo-editing software
 - Photoshop
 - Paint Shop Pro
- Both will be needed
- Calibration
 - Desirable – Include color target

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Basics – Master Images

- Should be use-neutral
 - Use-neutral means that images can be repurposed for any other uses
 - Must not be altered/over-written during derivative creation
- BACK UP, BACK UP, BACK UP
 - External hard-disk(s) are cheap.
 - CD/DVD media not "archival"

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Basics – Master Images

- File format
 - Tiff or JPG2K for images
 - Tiff most common
 - 600dpi, RGB for most items
 - Color helps capture tonal qualities even in b/w
 - Grayscale for black and white negatives
 - Lossless compression (only if necessary)
 - Ca. 100mb per image 8.5x11 uncompressed
 - Ca. 50mb per image with 8.5x11 LZW compressed

Basics – Access images

- Commonly GIF (for bi-tonal) and JPEG
- Smaller files enable quicker Web delivery
- Lossy compression – not archival quality, but smaller image files

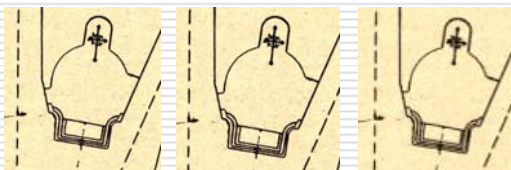
Key Terms and Concepts

- Resolution / PPI -DPI
- Screen frequency
- Bit-depth
- Threshold
- Dynamic range
- Image mode / Color space

Resolution

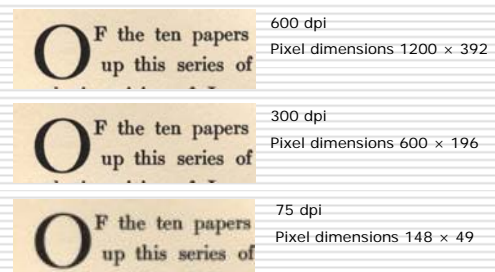
- The degree of sharpness of a computer-generated image as measured by the number of dots per linear inch in a hard-copy printout or the number of pixels across and down on a display screen.

Image Resolution



600 dpi Pixel dimensions: 1800 × 1800	300 dpi Pixel dimensions: 900 × 900	75 dpi Pixel dimensions: 225 × 228
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Character Resolution



Screen Frequency

- Resolution of a halftone. Density of dots measured in lines per inch (lpi).
 - Use half-tone screen finder and multiply lpi x 2 for minimum scanning dpi.



Scanning half-tones at lower resolutions results in moiré pattern as seen at right.

Half-tone screen finder:
<http://supportproducts.com/ProductDisplay.asp?prodID=SC139>

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Bit-depth

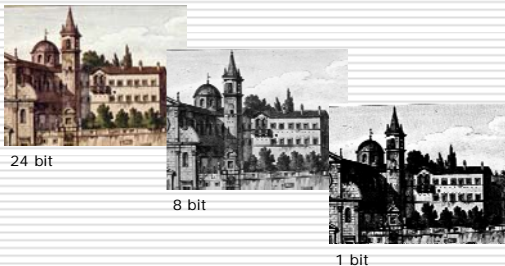
- The number of bits (1's and 0's) used to define each pixel
 - Bitonal = 1 bit per pixel (black or white)
 - Grayscale = 2-8 bits per pixel
 - Color = 24 bits per pixel

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Image bit-depth



24 bit

8 bit

1 bit

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Threshold

- In bitonal scanning, the threshold setting determines whether a value is interpreted as white or black
- May be shown as
 - 0 = black
 - 255 = white
 - Will vary with software

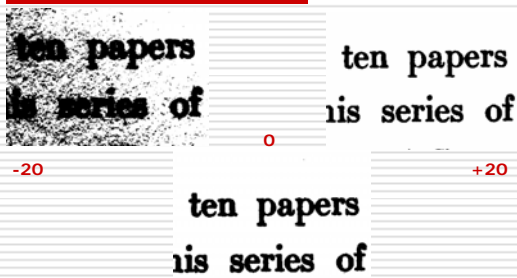


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Threshold



-20

0

+20

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Dynamic Range

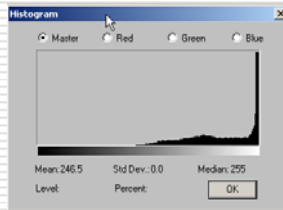
- Difference between the lightest tone and darkest tone of an image
- Illustrated by histograms
 - High-key: highlights contain the most important details
 - Low-key: shadows contain the most important details

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Dynamic Range - original

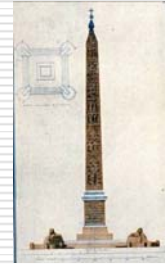
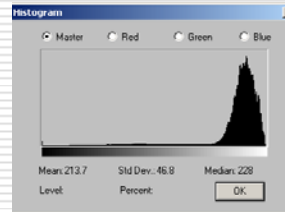


Values very compressed

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Dynamic Range - adjusted



Values more spread out over full range

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Image Mode and Color Space

- Color models – numeric methods for describing color
 - RGB (red, green, blue), monitors
 - CMYK (cyan, magenta, yellow, black), print
- Color space – variants of models, define a gamut (range) of colors
 - Web-safe palettes
 - sRGB, ensures consistency across platforms
 - Adobe RGB
 - ProPhoto RGB

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Color Settings

- Screen / scanner “calibration”
 - Greytag Macbeth “Eye-One Display 2” screen calibration tool: \$249.00
 - Scanner hardware calibration harder
- Test scan
 - Color target
 - Item from collection
 - Black (shadows) @ 10–15, White (highlights) @ 249

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Color Checker



<http://usa.gretagmacbethstore.com/>

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Before Scanning

- Assess imaging needs and make decisions
- Test processes
- Establish procedures
 - Write down for training and consistency

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What are you scanning?

- Document Attributes
 - Document classification
 - Key informational content
 - Physical type, size, and presentation
 - Physical condition
 - Tonal representation
 - Color appearance
 - Detail

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Document Classification

- Printed text or simple line art
 - hard edges
- Manuscripts or hand-drawn illustrations
 - softer edges and more tonal nuances
- Half-tone
 - regularly spaced dots, lines, or markings
- Continuous tone, photographs, watercolors
 - smooth variations
- Mixed

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Key Informational Content

- What is essential to meaning?
 - Physical properties
 - Visual perception
- Consider the audience(s)
- How much can reasonably be captured?
- Preservation/ archival imaging vs. access imaging

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Physical Attributes

- Dimensions
- Reflective, opaque support
 - Capture full page, borders, edges?
 - Include ruler or scale in image?
- Transmissive, transparent base
 - Types (roll film, slides, transparencies)
 - Formats (35 mm, 4" x 5", ...)

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Physical Condition

- Protect the originals
 - Mechanical stress
 - Light and heat damage
- Train scanning technicians on proper handling
- Sacrifice image quality
- Existing damage affects scanning requirements

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Tonal Representation

- How many tones are represented?
- What is the range of tones?
- Do highlights or shadows contain the most important details?

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Color Appearance

- How does color affect the informational content?
 - Is color reproduction necessary?
- Variation and range of color (poster vs. photograph)
- How important is it to maintain exact shades? (map vs. Chagall)

Detail

- What is the smallest character or stroke-width that must be captured?
- For continuous tone, what is the finest sharp detail?
- For halftones, what is the screen frequency?
- For mixed, measure various portions.
- Effective capture of detail depends upon resolution, bit-depth, system performance

Prepare Documents

- Conservation
 - Basic repair
 - Stabilization
- Organizing physical volumes, slide, etc.
- Metadata analysis

How will you use the digital object?

- Short-term needs: derivatives
- Long-term needs: use-neutral master
- Preservation
 - Scan once
 - Back up
 - Maintain

Thank you

- For more information, please feel free to contact me at:
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