

The boundaries we've chosen to represent the limits of the "material universe" of gelatin silver photographic are not, in most cases, the most extreme values we've measured. They are, rather, the physical values we believe best represent the *normal range of variation* for these papers. And this is important, because our core visual representation of a paper sample, the glyph, uses these values to place each physical measurement on a standard scale, in the interval [0,1]. There are extremes, especially of gloss and color, that we feel count as special and not normal variation. As such, their inclusion would distort both our numeric representation of each paper and our understanding of what the glyphs represent. Samples outside the normal bounds still have glyph representations, but their vertices extend "off the charts", as we feel they should.

### Color

We define color as the b\* dimension (the blue–yellow axis, or *warmth*) of the CIELAB color space, measured at *dmin*, the point of minimum silver density. We take color measurements using a spectrophotometer, which is standard practice in cultural heritage preservation.

#2546g  
**Foma** Fomaspeed (2016)  
value: [-6.13](#)

#5444b  
**Mimosa** Verotype (1910)  
value: [31.45](#)

### Gloss

We define gloss as specular reflection at 60° incident to the paper surface. We take gloss measurements using a glossmeter.

#4786bb  
**Gevaert** Gevaluxe (1960)  
value: [0.19](#)

#5611a  
**Kodak London** Nikko (1935)  
value: [123.55](#)

## Roughness

Roughness is a univariate measure (i.e., a single number) derived from a *very* high-dimensional signal: a raking light micrograph of the paper surface. These micrographs are captured using a *texturescope*, a custom instrument designed by Paul Messier, and saved as TIFF images. Roughness is computed by first pre-processing these images via Gaussian bandpass filtering (to remove both very high-frequency and very low-frequency brightness variation, which are typically unrelated to surface texture), and then taking the standard deviation of pixel brightness. Pixel brightness serves as a proxy for surface heights, and higher standard deviations signal greater variation in surface heights, or rougher texture.

#2051

**Agfa Gevaert** Multicontrast Premium (1990)

value: 0.005

#2075Z

**Defender** Velour Black (1940)

value: 0.373

## Thickness

Thickness is the third spatial dimension of a leaf of paper, after height and width, and is measured in millimeters using a *micrometer*. We use a caliper style micrometer for unmounted papers and a depth micrometer for mounted papers. We here report the thinnest (non-specialty) *unmounted* paper, because measurements made using a depth micrometer have larger confidence intervals and may underreport thickness in some cases.

#2773

**Kodak** Solio (1906)

value: 0.11

#1479

**Kodak** Opal (1951)

value: 0.458