The Colors of Martin Van Buren: An Engraved Postage Stamp (1938-1959)

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Introduction

In 1980 we first examined the problem of the identification and naming of postage stamp color varieties using the olive green eight cent Van Buren from the Presidential Series of United States definitive postage stamps, first issued in 1938.[1] After we agreed upon the exemplars of five different 'colors,' we then confronted, each of us independently, the question of name, using four color guides, under five lighting conditions. Using Gibbons (100 samples) we concurred on 21 of the 25 assignments of the five varieties with the five lighting conditions. Using Schwaneberger (158 samples): 19 out of 25; Foss (624 samples) 12 out of 25. Ridgway's 1115 color swatches drove our rate of concurrences to 4 out of 25. Writing in 1990 Edward R. Tufte [2] echoed our experience: "for encoding abstract information, however, more than 20 or 30 colors frequently produce not diminishing but negative returns." To further complicate the issue, recent studies disclose color perception is strongly conditioned by culture.[3] It seems the finer distinctions necessary to name or index color – a trained colorist evidently can discern a million varieties – must also require a prodigious mastery to be used effectively for communication among human beings.

In the realm of art, a turning away from representation toward form and color was evident before World War II. Artist Hilaire Hiler [4] declared a freedom from pigment in the pursuit of color, and was of the opinion chemistry and fine craft might relax the dependence on natural pigments. Several long definitive postal issues demonstrated these changes at the time, notably the King George VI's of Great Britain and the Prexies of the United States.

Within the culture of philately, identification of color varieties is especially popular. So, as part of a Smithsonian National Postal Museum scholarship program [5] we again looked to investigate our "color problem" involving the eight cent stamp of the 1938 Presidential Series – only using the National Postal Museum's Foster & Freeman Video Spectral Comparator 6000.

The typical challenge to spectral analysis is the eye perceives colors that do not correspond to the visible spectrum. Spectral signatures may be used to identify the physical chemistry of substances. But the spectral model of the VSC 6000 is based upon surface reflectivity and can only index, perhaps, a change in physical chemistry. In neither case does spectral analysis begin to represent the physiological concomitants of light, the most important being that only three color-coding proteins, say Red Green Blue, are deployed by the human eye to register light, and what we perceive as color entails the interaction among these three sources. While the interactions between Red and Green or Green and Blue might be found among the spectral hues, between Blue and Red – the Purples – will not.

Since the discovery of spectroscopy, the incommensurate nature of sight has been appreciated, leading to the promulgation of various models of a three-dimensional color space to aid in the visualization, memory, and communication of color. The VSC 6000 incorporates software for the translation of surface reflectivity into a variety of color spaces, one of which, CIE 1931, seemed especially well-suited to line-engraved stamps where an essential duality of vision – between light and hue – must be factored into the perception of color variation, as well as in the art of engraving to such effect.

CIE 1931 embeds functional representations of the three color coding proteins factored into white (expressing luminance) and hue, as coordinates in a chromaticity diagram.[6] From a reflected beam of light the VSC 6000 software generates the CIE 1931 color space location coordinated by x and y for chromaticity, and Y for luminance.

Presentation Album 1945 Van Buren (Study in Shades)

Figure 1 shows a test subject from a 1945 presentation album [7] along with a magnification of the image resolved by the test beam in an area below the "United / States / Postage" panel which we used as the standard field during the course of these investigations. Figure 2 shows in a graph what the VSC 6000 'saw' as well as the coordinate data in Figure 3 representing human perception, for five different sampling spots: from the field, from the back of Van Buren's collar, from his forehead, from the letter "M" beginning his name, and out beyond the design at the perforated edge of the stamp where only a smear of ink might register.

The lowermost spectral graph was what the instrument measured at the collar; the uppermost out upon the perforation. The noticeable bulge around 570 nanometers, where green begins to acquire yellow, for all traces, encodes the chromaticity (x, y), while the relative elevation of the trace transcribes as luminance (Y).

While, for the sake of CIE 1931, the visible range involving the color matching functions and associated luminance is approximately between 380 and 700 nanometers, here, for reasons which will emerge later, the range is extended to 1000 nanometers, into the infra red.

(1-6)

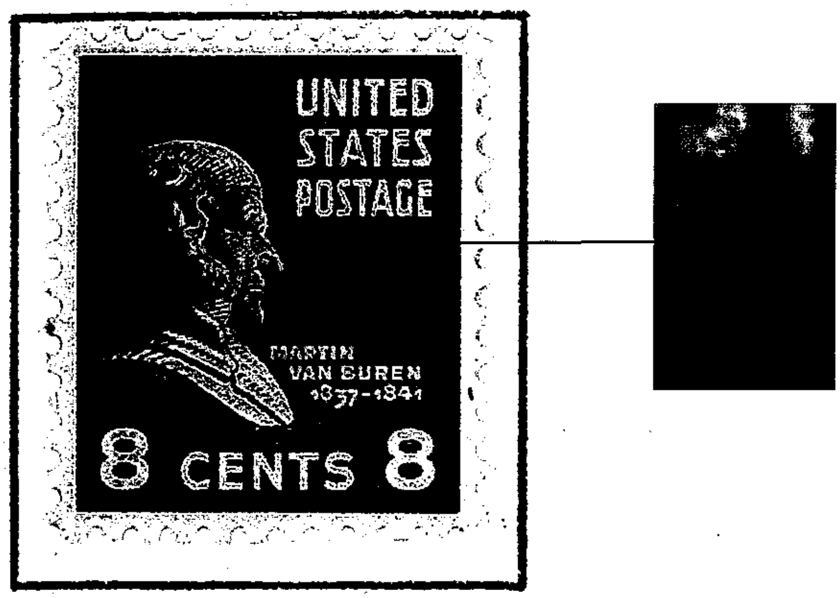


Figure 1: Mint copy of 8-cent Van Buren from 1945 presentation album, with closeup of the 1mm spot (at 4x magnification) in the 'field' sampled by the VSC 6000 for the course of these investigations.[8] [VSC 6000 image]

Figure 2: Spectral Signature of the Reflectivity from Five Positions Sampled over the Surface of the 8-Cent Van Buren Album Copy [VSC 6000 image]

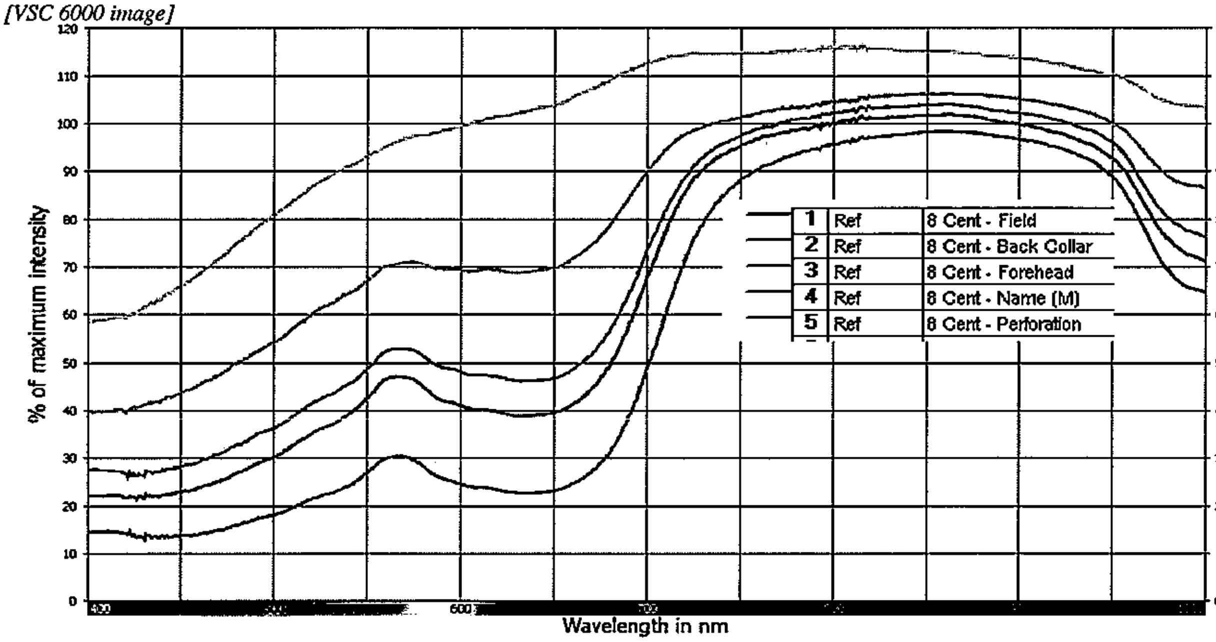


Figure 3: **8-Cent Van Buren Album Copy: Bridging from the Surface of the Stamp to the CIE Yxy Visual Space**

Location	Y	x	y
1 Field	0.396	0.378	0.389
2 Back Collar	0.245	0.377	0.393
3 Forehead	0.65	0.370	0.374
4 "M"[artin]	0.46	0.375	0.383
5 Perforation	0.922	0.367	0.367

Note: Chromaticity range <x, y> = <.367 - .378, .367 - .393>
Luminance range Y = .245 - .922

Note that the chromaticity of all these test spots is relatively constant: <x, y> = <.375, .385> within two or three per cent, while Y, luminance, ranges by 60 or 70% from its average value Y = .535. The differences in the color among the test spots is registered by the instrument on our behalf, as a constant hue of different shades, dark to light (Y = .24 upon the collar; .922 at the perf). We also observe that a variation in the chromaticity of .01 or .02, 2 or 3%, does not necessarily make a color variety.

Proof Color Varieties

The Smithsonian National Postal Museum holds archives containing the sheets of stamps proofed from each plate from which the Van Buren Prexies were printed. Three of the first four plates to be proofed were accompanied by die proofs (see Figure 6).[9] Remarkably, the die proofs, and not these earliest plate proofs, were printed in the hue of the regularly produced postage stamps (Figure 4; compare with Figure 2). The Trial Color Proofs of the 8-cent Van Buren plates dated in 1938 have a chromaticity approximately <.414, .416> in contrast to the chromaticity coordinates, approximately <.375, .385> authorized for production (Figure 5). The trial colors are more saturated than the ink subsequently coded by later proofs, and by the regularly produced postage stamps.

Figure 4: Spectal Signature of the Four Trial Color Plate Proofs and Three of Their Die Proofs [VSC 6000 image]

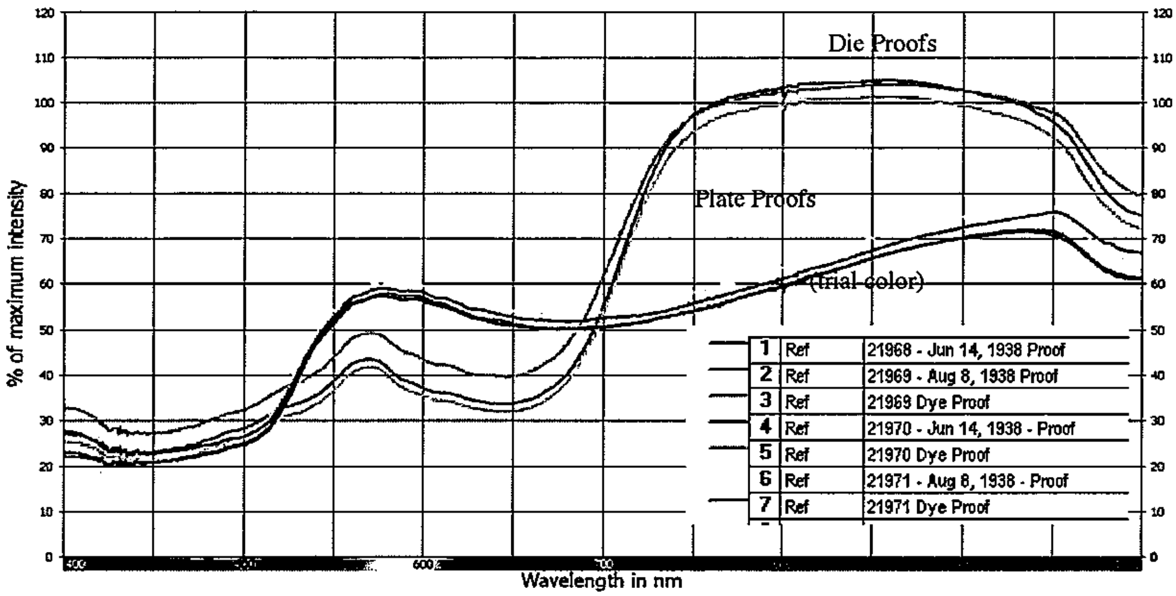


Figure 5: **Proof Impressions of Van Burens to the Eye**

	Plate	Date	Y	x	y
Trial Color Plate Proofs					
	21968	14/06/38	.47	.409	.411
	21970	14/06/38	.471	.416	.419
	21969	08/08/38	.489	.411	.413
	21971	08/08/38	.493	.419	.422
Die Proofs					
	21970d		.344	.372	.382
	21969d		.416	.369	.375
	21971d		.362	.368	.379
Plate Proofs					
(1)	22350	25/08/41	.302	.374	.384
(2)	22349	25/08/41	.316	.373	.385
(3)	22839	19/05/42	.339	.370	.390
(4)	22840	19/05/42	.361	.382	.386
(5)	22844	12/09/44	.369	.383	.389
(6)	23167	11/12/47	.358	.377	.384
(7)	23780	12/04/48	.413	.378	.374
(8)	23781	12/04/48	.432	.379	.375
(9)	24107	02/12/49	.421	.370	.375
(10)	24076	02/12/49	.463	.369	.374
(11)	24302	23/10/52	.451	.375	.374
(12)	24303	19/09/52	.478	.375	.375

Note: no die proof was attached to trial color 21968

The luminance, Y, is incrementally increased between the proofing of plates on the same day: on August 25, 1941 between 22350 (.302) and 22349 (.316); on May 19, 1942 between 22839 (.339) and 22840 (.361); and on December 2, 1949 between 24107 (.421) and 24076 (.463). Additionally, between December 11, 1947 23167 (.358) and April 12, 1948 23780 (.413) the luminance was increased substantially in the proofing of the plates of the Van Buren. The luminance of the paper itself upon which the plates were proofed varied substantially, too, and frequently in opposition to the apparent monotonic trend to lighter shades in the ink – accomplished, perhaps, by successive reductions by the same measure of pigment to base.

We are left to wonder what authority these plate proofs represent with respect to the inks used by the plates in regular production.[10] In particular, were the shades of regular postage stamps lightened over time and incrementally, at least at the times documented? This could be settled by a study of dated used copies, probably on cover. In any case, we are alerted that luminance rather than chromaticity may mark important episodes in the production of postage stamp color. Were we to collect color varieties only of sheet proof Van Buren, there would be two different chromaticities – trial and regular - and at least five shades of the latter.

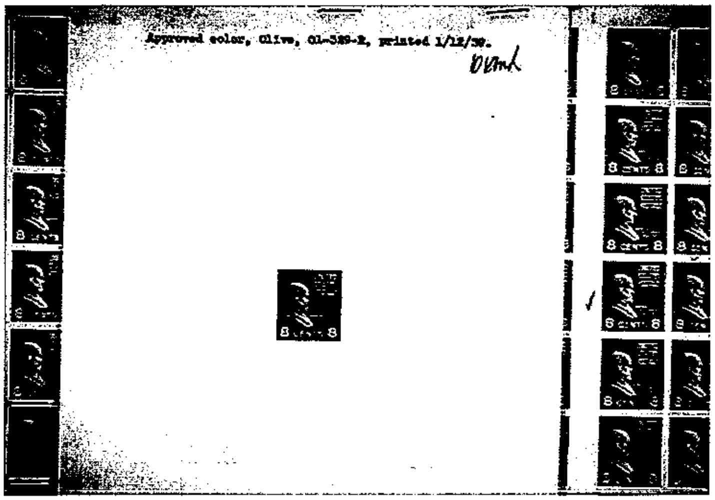


Figure 6: Image of the die proof printed January 12, 1939, stapled to the plate proof for color trial plate 21970 dated June14, 1938 (paired with plate 21968). The other two die proofs in the National Postal Museum Archives, attached to plate proofs 21969 and 21971 (proofed as a pair August 8, 1938) were also printed January 12, 1939, and all three have the ink code 1-329-R. [VSC 6000 image]

Used Color Varieties

How does this approach work with regular postage stamps? From a batch of used Prexie Van Burens, we distinguished exemplars – in some cases, several – of seven different color varieties, Types I – VII, coded them upon their backs and submitted them to the VSC 6000 for coordination in the Yxy space of CIE 1931 (see Figure 7).

Figure 7:

Fourteen Used Van Burens: CIE 1931

Sample	Type	Y	x	y
1	Ia	.393	.388	.379
2	Ib	.447	.387	.38
3	Ic	.448	.386	.38
4	Id	.441	.394	.383
5	Ie	.363	.397	.382
6	II	.422	.381	.381
7	III	.418	.379	.381
8	IV	.403	.381	.386
9	Va	.349	.382	.389
10	Vb	.314	.379	.387
11	Vc	.344	.385	.383
12	VIa	.37	.371	.385
13	VIb	.343	.375	.388
14	VII	.345	.377	.393

The constellation of the blue diamonds representing the chromaticities of the used Van Burens overlaps the red squares representing the chromaticities of the proofs (Figure 8). The non-overlapping used Van Burens (numbers 1 to 5) are all of a Type I, by eye. The non-overlapping plates (7-12) were all those subsequently proofed after 1947, at higher luminance. The trial colors proofed in 1938 are off the graph.

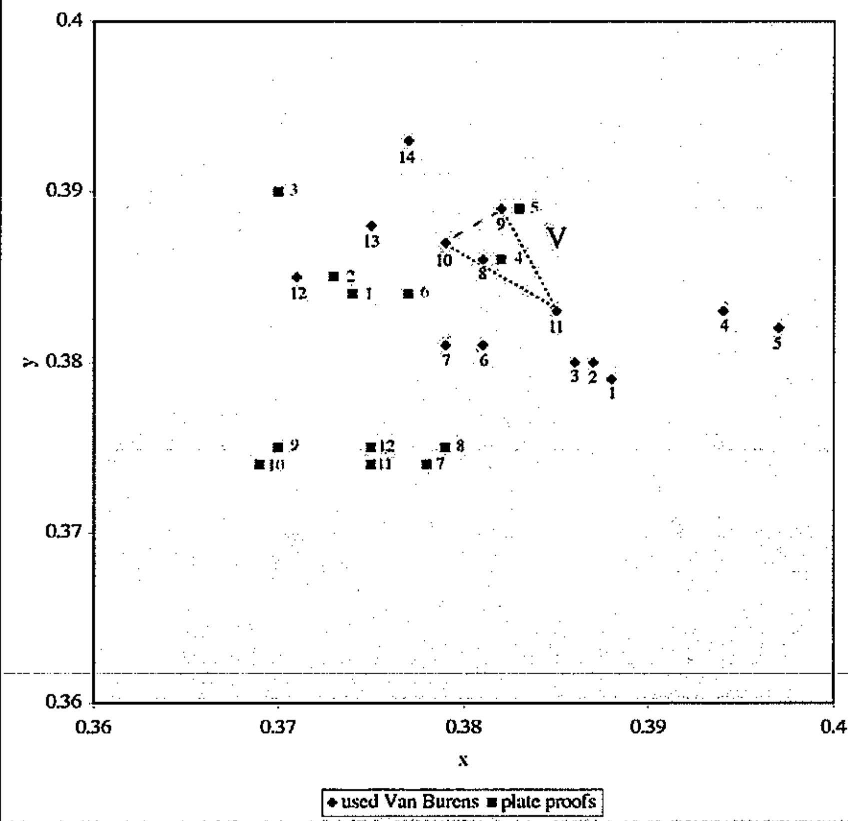


Figure 8: Plate Proofs & Used Van Buren Chromaticities

Though the five samples of Type I (see Figure 7 samples 1-5) look to be reasonably well clustered as a variety in chromaticity, their range of luminance (Y .363-.448) belies substantial variation in shade, which includes in its range the luminance of Types II, III and IV.

Types II, III and IV cluster together in chromaticity (6-8) as well as in luminance. The gamut of the three samples of Type V (see Figure 7 samples 9-11) overlap II, III, and IV in chromaticity, but with substantial reduction in luminance, about equal to the range of luminances comprehended in Type I. The gamut of VI and VII (12-14) overlaps the chromaticities of the plates 22350, 22349, and 22839 (1-3) proofed 1941-42. The CIE coordination seems sufficient to address but not explain the differences selected by eye.

From the point of view of the instrument, however, we see a much different story, a skein of two plies (Figure 9). As it turns out, the Type V used Van Burens constitute the lowest ply while the upper ply is bounded from below by Type VI, and this difference evidently has its basis in the physical chemistry of the ink. With the Type V ply the ink seems to have been invested with a colorless substance, relatively dark in the infra red, and wetting even the uninked portion of the design.

Figure 9: Fourteen Used Van Burens as seen by the VSC 6000

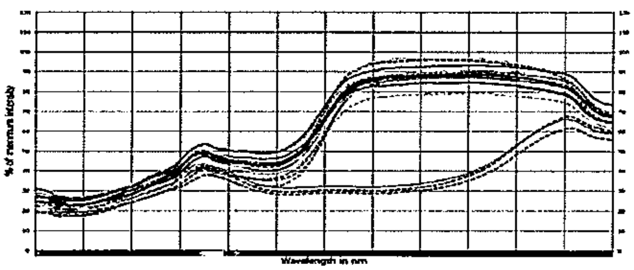
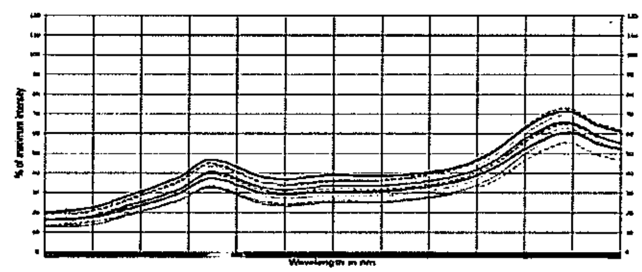


Figure 10: Spectral Signature of Eight Used Van Burens on Cover, 1953-1961. [VSC 6000 image]



Armed with the ability to distinguish this variety from all the others by eye, we found a brace of eight dated covers bearing this color variety of the Van Buren, none dated before 1953. The VSC 6000 plied them all Type V (see Figure 10)

We should, perhaps, look again at how the color differentiations of the 8-cent Van Burens are named in philatelic reference. Scott Specialized (2006) says of No. 813 that olive green appeared August 11, 1939; light olive green in 1943; olive in 1942. Rustad concluded that olive green was the way to describe the first printings, and that light olive green (greenish) appeared in 1941; and olive covered 1943 to 1949. Unlike Scott, Rustad does mention our Type V, calling it dark olive green of the 1950s with the darkest shades appearing in mid 1953 (in addition he addresses other color variants which were probably chemical alterations). Rustad also finds the lighter olive green before Scott (1941 instead of 1943) but olive after Scott (1943 instead of 1942).

We propose that these Type V stamps were "dry printed" - in the period when such printing upon dry paper was introduced with the Liberty Series, but also acknowledged to have been used with the Dollar Value Prexie beginning in 1954. In Figure 11, the used Prexie Van Burens - Type Ia on the left and Type Va on the right - conform to the distinctions of wet versus dry used to describe the Liberties: "Wet printings have a soft, fuzzy, muddy appearance. Dry printings have a crisp, sharply focused appearance, with hard, glossy ink in high relief that is discernible to the touch. The paper of wet printings is thin and somewhat translucent. Paper used in dry printing is whiter, thicker, stiffer, and more opaque."[11]

Figure 11: On the left, Type Ia, on the right Type Va, to show the most obvious differences in color by eye. [VSC 6000 image]

The Plate Proofs locate an incremental increase in luminance in May 1942 that seems to have lasted until December 1948, which had been coordinated with a shift in chromaticity, and which would accord with Rustad's olive.

But a light olive green, in terms of the plate proofs, might not be warranted until after December 1948 referring to luminace alone, though Rustad and Scott would have light shades appearing substantially earlier. Perhaps this is testimony that the vagaries of production might swamp the nuances of specification at the technical level, which makes a massive survey of used copies on cover that much more interesting, to distinguish Types of variations as well as variations of Type.

Conclusions

1. [Album Stamp] For the eye the CIE 1931 Yxy space stablilizes the hue, giving the variation to luminance. The VSC 6000's measures of luminance sample more or less the presence of paper in the area of the spot, partially filmed by ink from the wiping of the plate. The line-engraved postage stamps which prevailed worldwide until after World War II are each a patterning of shades which our eye must integrate from the entire surface of such stamps a modal shade to characterize the whole. This is an aspect of the "problem of color" which will not go away – philatelists must estimate a modal value from a range of shades over the surface of the design.
2. [Proof Sheets] Because luminance proves to be such a variable over the surface of the stamp, largely as a function of the degree to which the white of the paper is allowed to accompany the relatively dark shade of the inked lines, we are forewarned of a variation in the luminance of regularly-produced stamps: by the wiping the plate, wear of the engraving, wetting of the paper by the ink. The proofing of the plates, however, involved some measure of control over these variables, permitting a feature in the proofing inks, their monotonic brightening over time (marked by incremental changes) to emerge with some degree of validity, - a pattern which should be found among regular stamps, even given the vagaries of production.
3. [Used Stamps] The chromaticity of the proofs and of the regular stamps are comparable. The colors Typed according to eye were largely corroborated by the CIE 1931 Yxy coordination, but by pattern more than measure. What the instrument saw of the used Van Burens, however, indicated one among all these Types for special consideration.

The VSC 6000 could be used to survey Van Burens on dated covers, to investigate a timeline for luminance and perhaps validate the relation between the proof and the production ink, as benchmarks for discerning significant varieties. Done for the entire Prexie definitive series, these benchmarks should survey a new domain for future exploration, across the frontier of color.

Footnotes

[1] "The Problem with 'Color in Philately'" *P.S. a quarterly journal of postal history*, No. 8 [1980], pages 1-4.

[2] Edward R. Tufte, *Envisioning Information*, 1990. Chapter 5: "Color and Information" pp 81-95.

[3] Guy Deutscher, *Through the Language Glass: Why the World looks Different in Other Languages*, NY 2010. W.E. Gladstone's observation in his 1858 *Studies on Homer and the Homeric Age* that the Greeks had no word for blue led him to the mistaken conclusion that the Greeks saw colors physiologically differently than do we moderns. The lack of blue was cultural – and similar to the Japanese changing the color of green traffic lights towards the blue spectrum to more closely align with the traditional word, ao, which originally meant both green and blue, and which was assigned to traffic lights.

[4] Hilaire Hiler, Henry Miller & Wm. Saroyan, *Why Abstract?* New York 1946

[5] Diane DeBlois, Robert Dalton Harris and Kristina Wilson were awarded in August 2010 a Smithsonian Naitonal Postal Museum and Washington 2006 World Philatelic Exhibition scholarship; research done September and November 2010, with the assistance of Thomas Lera, Winton M. Blount Chair in Research, and James O'Donnell, Museum Specialist Collections Department, Smithsonian National Postal Museum.

[6] Douglas A. Kerr, *Color and Color Spaces*, November 8, 2005, Issue 8.

[7] *Postage Stamps of the United States of America, Souvenir of United Nations Conference on International Organization, San Francisco: 1945.*

[8] David Tobin of Foster Freeman, email communication of October 19, 2010: "You can use the spectrometer down to the lowest magnification setting (x1.5) which gives you the sample size of 2.8mm, and up to x31 which gives you the 130 microns sample size. then by interpolation x3 = 1.4mm sample, x6 = 700 microns, x12 = 350 microns, x15.5 - 260 microns, etc."

[9] Roland E. Rustad, *The Prexies* (Bureau Issues Association 1994) lists only 21968 as a trial color (whereas each of the 1938 plates was done in the same chromaticity). Page 18: "the die proofs were all dated between January 9 and January 13, 1939: it is probable that these

die proofs were made as color samples for future reference."

[10] Rustad p. 18 corroborates this probability: "All of the die proofs have the ink color code written on them, and some of the plate proofs also have ink color codes noted on them." How do these codes translate?

[11] Ken Lawrence, C. David Eeles, and Anthony S. Wawrukiewicz, *The Liberty Series*, APS 2007, p. 10.