

ICC profiles in real world situations: Color Management workflow

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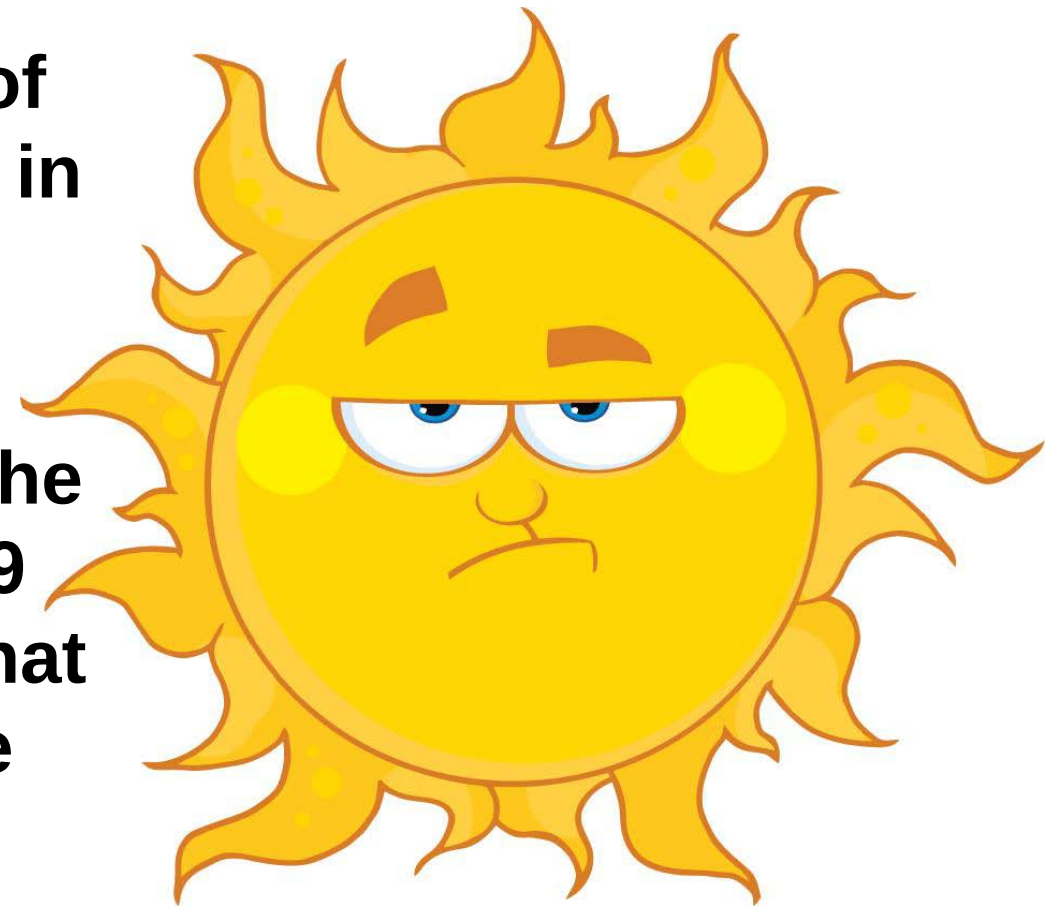
Light is Color

- Without proper viewing conditions the color you see in the printed piece or proof may not be close to the color seen by your customer.
- The viewing light source can be another source of error in color appearance. A supplier may prepare a color and compare it to the standard in one light source while the customer views it in another light source.



Light is Color

- Many color matches are metameretic, which means they match in one set of lighting conditions but do not match in another.
- It is important that the supplier and the customer agree to use ISO 3664:2009 standard lighting and a light booth that has been measured to make sure the lights are ISO compliant.
- This standard should be used for reflection prints, transparencies, and soft proofing displays.



Standardization

- **ICC Color management is an important part of color process variable management. ISO 15076-1**
- **Standardize the process and it becomes repeatable and stable, color manage a standard process and it can be adjusted by a variety of methods.**
- **Familiarity with International print standards will provide roadmaps to make sure technical variables in your color workflow are correct.**



Standardization

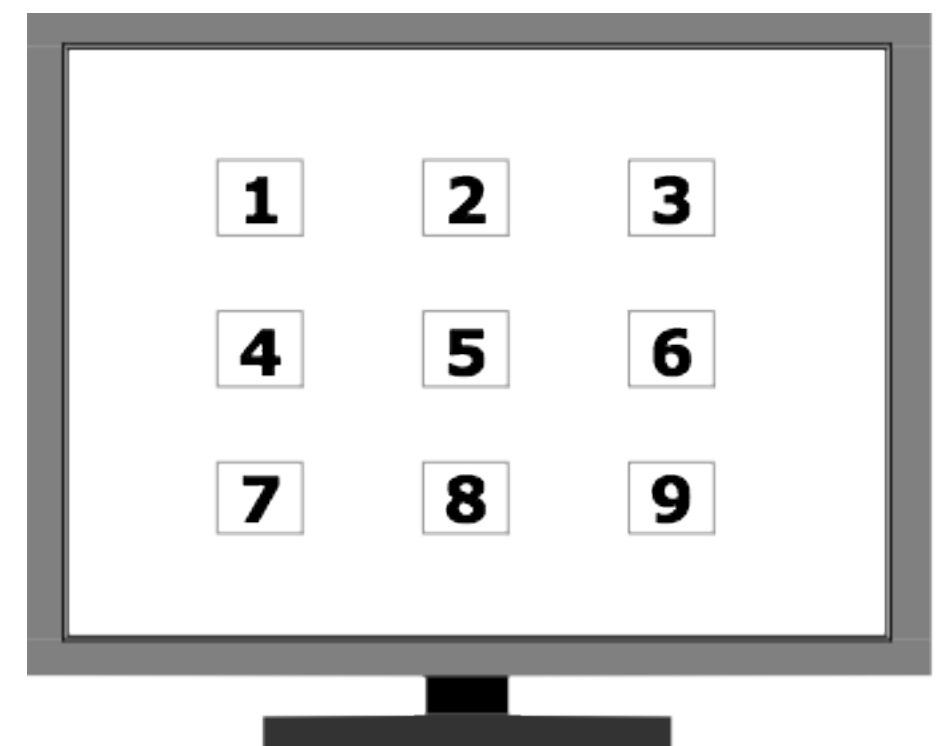
- **Print Standardization should be done on any printing press or proofing device to ensure that the equipment is functioning at standard process aims.**
- **Having a standard repeatable process provides the best foundation for an ICC color managed workflow.**
- **Using G7 qualification to calibrate and standardize the print or proofing process can produce a more accurate ICC device profile than other press or proof calibration methods**



Standardize - Monitor based Proofing

- The best ICC profile in the world, doesn't fix bad monitor hardware.
- Monitor age, color gamut and evenness of backlight illumination are key factors in monitor hardware evaluation for proofing.
- Environmental variables can and do change monitor color.

	Luminance					
	255 RGB		127 RGB		63 RGB	
	Ratio	dL*	Ratio	dL*	Ratio	dL*
Apple 30	8.8%	3.5	10.9%	2.6	12.8%	1.7
Apple 23	3.6%	1.4	4.7%	1.1	9.0%	1.2
CG211	3.2%	1.2	2.6%	0.6	3.7%	0.6
CG221	3.4%	1.3	2.9%	0.7	4.6%	0.6
CE240W	8.8%	3.5	11.9%	2.8	18.9%	2.4
CG241W	7.0%	2.7	9.4%	2.2	11.2%	1.6
CG301W	5.1%	2.0	5.5%	1.3	9.4%	1.3
All	5.7%	2.2	6.8%	1.6	9.9%	1.3



Color Measurement

- The aim of color measurement is to provide a metric which correlates with visual perception.
- ANSI/CGATS TR016 specifies tolerances for dataset conformance.
- Measurement geometry and sampling apertures, and finally process results as directed by CIE 15
- ISO 13655(2009) specifies M0 and M1 measurement conditions.



Color Measurement - OBA's

- **Accurate ICC profiles require accurate measurements.**
- **Many papers contain optical brightening agents (OBAs).**
- **OBAs fluoresce under UV light causing them to emit light in the blue spectrum making the paper appear whiter.**
- **Correcting for OBA's in color measurement is essential for good color reproduction.**



Variable Control

- **Controlling all production relevant data from receipt of an order to delivery of the finished product is the core challenge.**
- **PDFs, ICC color management systems and computer-to-plate technology, digital data allow the maximum control and consistency throughout the print production process.**
- **Good process controls can eliminate analog process variation and reduce product variability.**

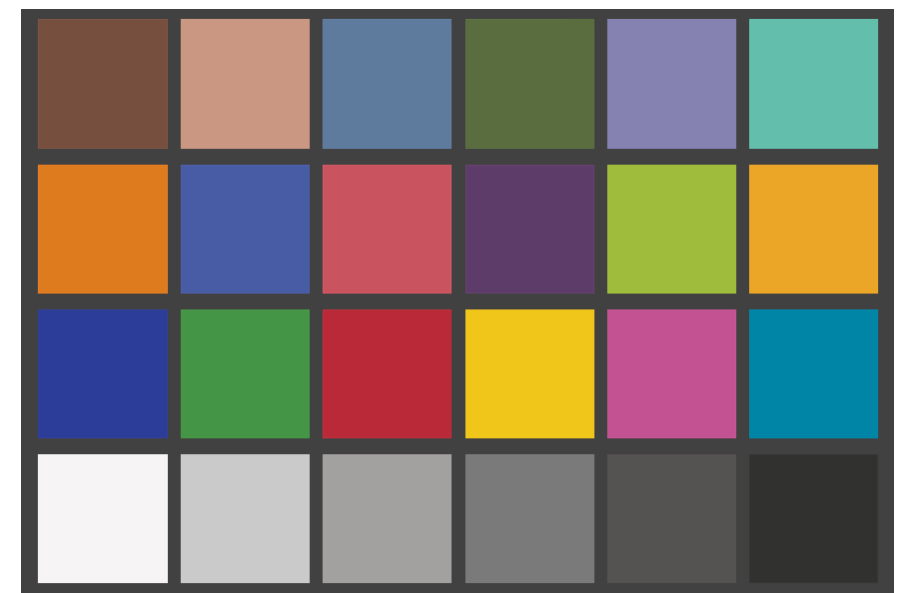


Color Characterization - Capture

- **Creating ICC profiles digital cameras is more art than science.**

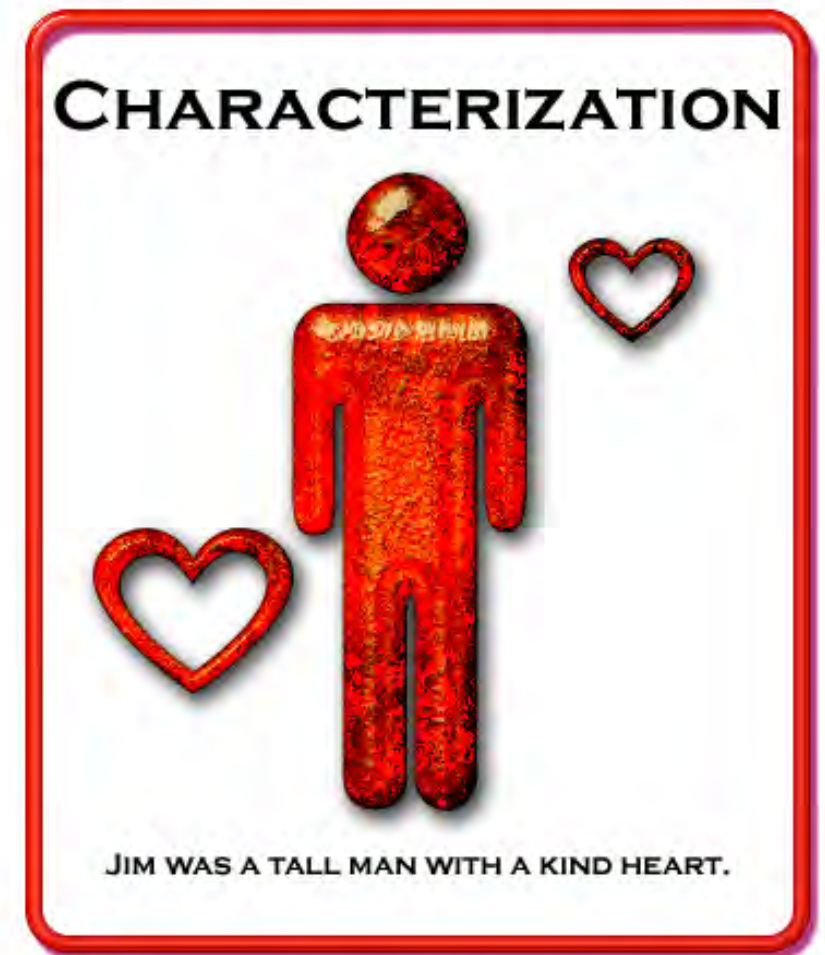


- **It is possible to get very good results in a studio environment and in outdoor situations with some softwares.**



Color Characterization - Print

- **Creating ICC profiles from accurate device measurement data is quite easy to do for your own devices.**
- **Standard ICC profiles can provide accurate characterization data connection between the print buyer and designer with the color definition contained in the characterization data set or ICC profile, and the press color reproduction capability as defined by ISO 12647 requirements is not complete.**



Color Characterization - Print

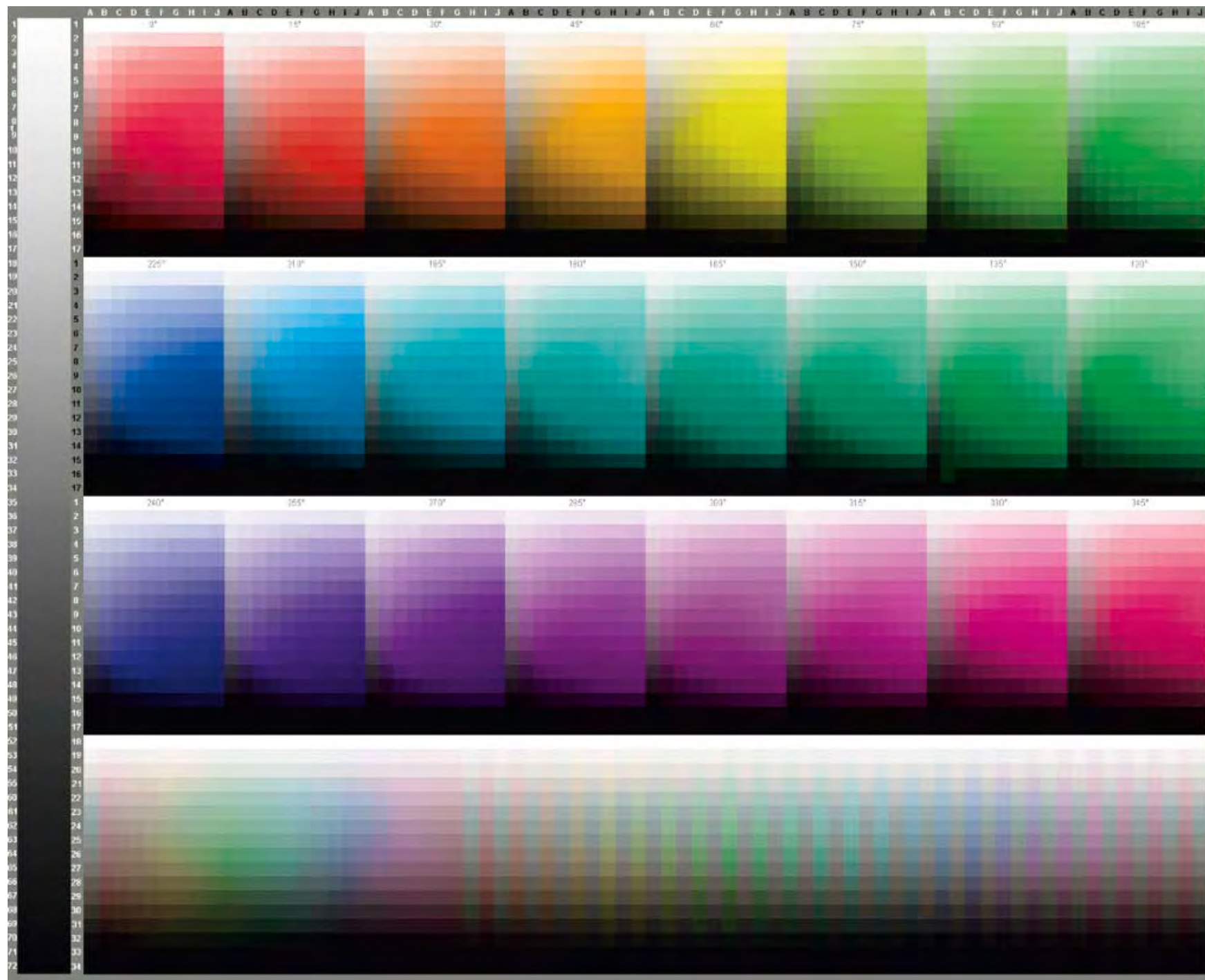
- Choosing the correct way to characterize a device is very important.
- Spectral characterization data should be used at the maximum available measurement resolution to avoid finding out you have an OBA issue that was not obvious, and to provide for future enhancements in profile creation softwares.

SPECTRAL_NM_380	SPECTRAL_NM_390	SPECTRAL_NM_400	SPECTRAL_NM_410	SPECTRAL_NM_420	SPECTRAL_NM_430	SPECTRAL_NM_440	SPECTRAL_NM_450
0.1214	0.1285	0.1329	0.1367	0.1417	0.1514	0.1632	0.1656
0.1622	0.1717	0.1775	0.1825	0.1897	0.2001	0.2125	0.2189
0.1766	0.1869	0.1932	0.1988	0.2068	0.2176	0.2306	0.2401
0.2366	0.2504	0.2589	0.2663	0.2713	0.2817	0.2952	0.3064
0.2558	0.2708	0.2799	0.2879	0.2974	0.3094	0.323	0.3363
0.3218	0.3407	0.3522	0.3623	0.371	0.3833	0.3982	0.4129
0.3457	0.3659	0.3783	0.3891	0.4003	0.4142	0.43	0.4469
0.3885	0.4113	0.4251	0.4373	0.448	0.4611	0.4762	0.4923
0.4156	0.44	0.4548	0.4678	0.4799	0.494	0.51	0.5291
0.143	0.1514	0.1565	0.161	0.1676	0.1795	0.1926	0.1934
0.1821	0.1928	0.1993	0.205	0.2125	0.2254	0.2397	0.2452
0.2113	0.2236	0.2312	0.2378	0.2454	0.2581	0.2729	0.2811
0.2758	0.292	0.3018	0.3104	0.3205	0.3353	0.3513	0.3616
0.319	0.3377	0.3491	0.359	0.3692	0.3842	0.4007	0.4134
0.3708	0.3926	0.4058	0.4174	0.4295	0.4451	0.4612	0.4745
0.3948	0.4179	0.432	0.4444	0.4566	0.4719	0.4893	0.5064

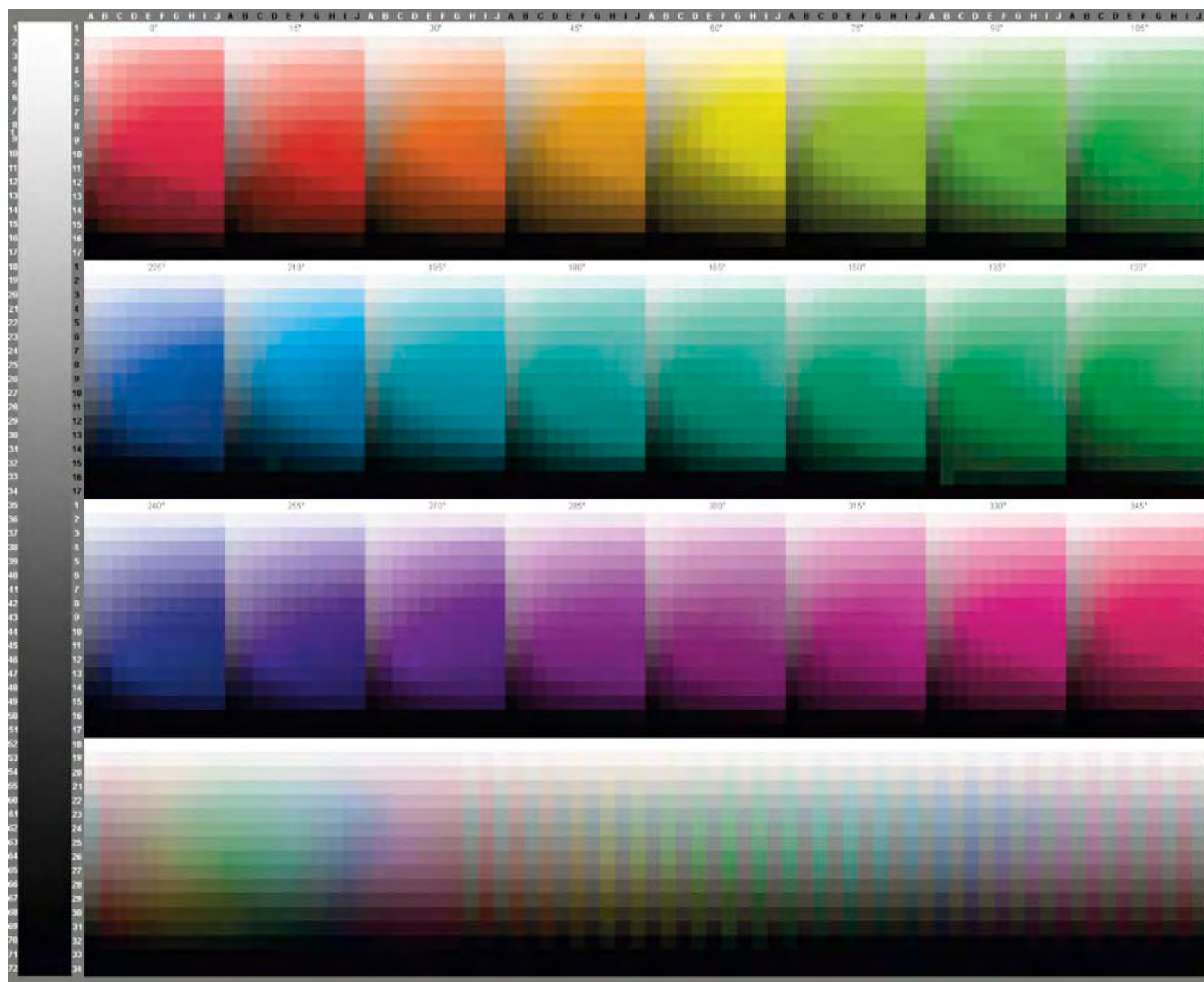
Color Transform or Conversion

- **ICC profiles can convert from source color spaces to destination color spaces through Profile Connection Space (PCS).**
- **ICC based monitor proofing, Ink jet proofing can provide an accurate way to compare if supplied proofs will match the printed result.**
- **RGB files propose a special risk when they are not converted, but an opportunity to convert directly to the correct destination color space and potentially add custom colors to match very bright or saturated colors in an image.**

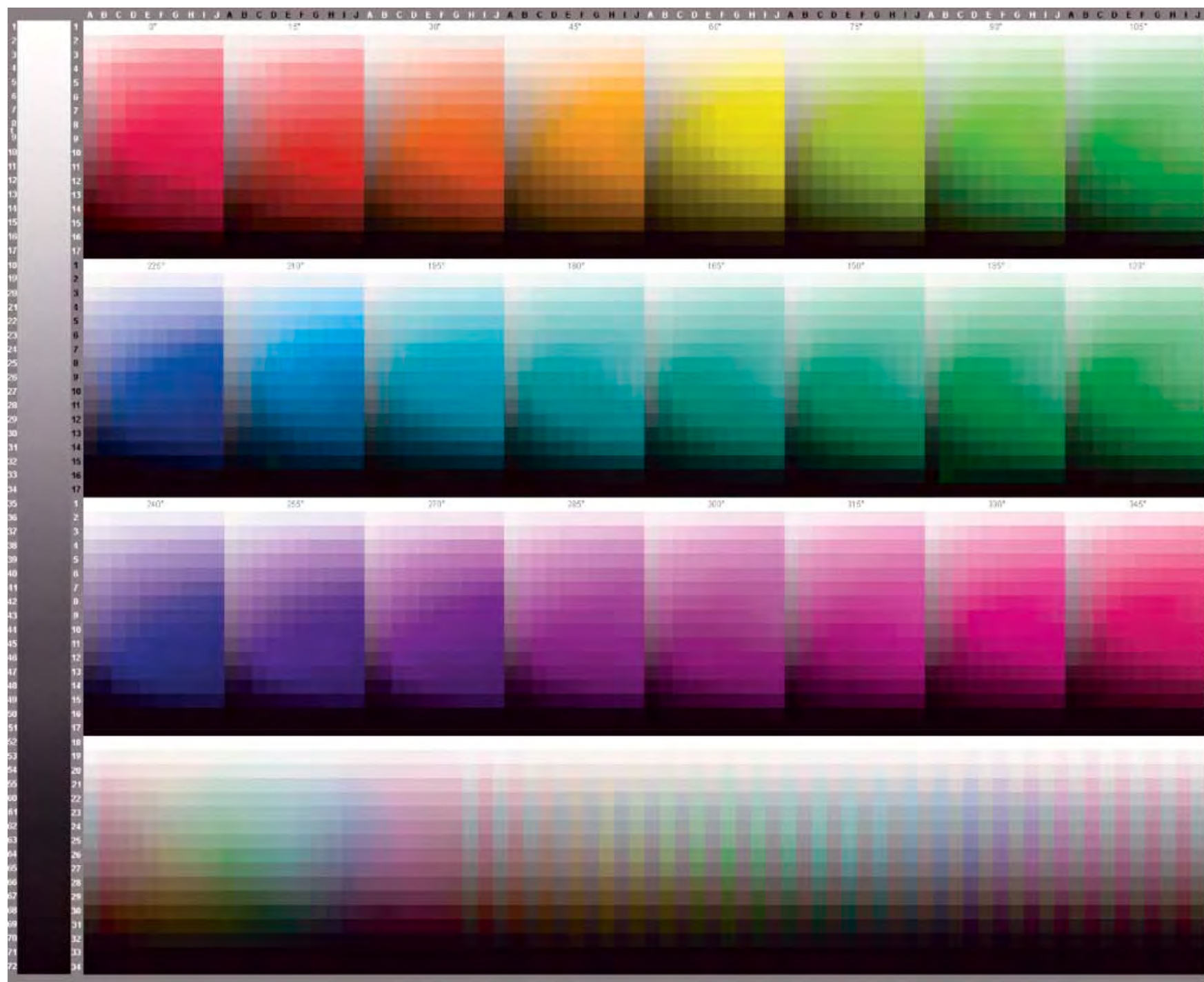
Conversion- Which profile?



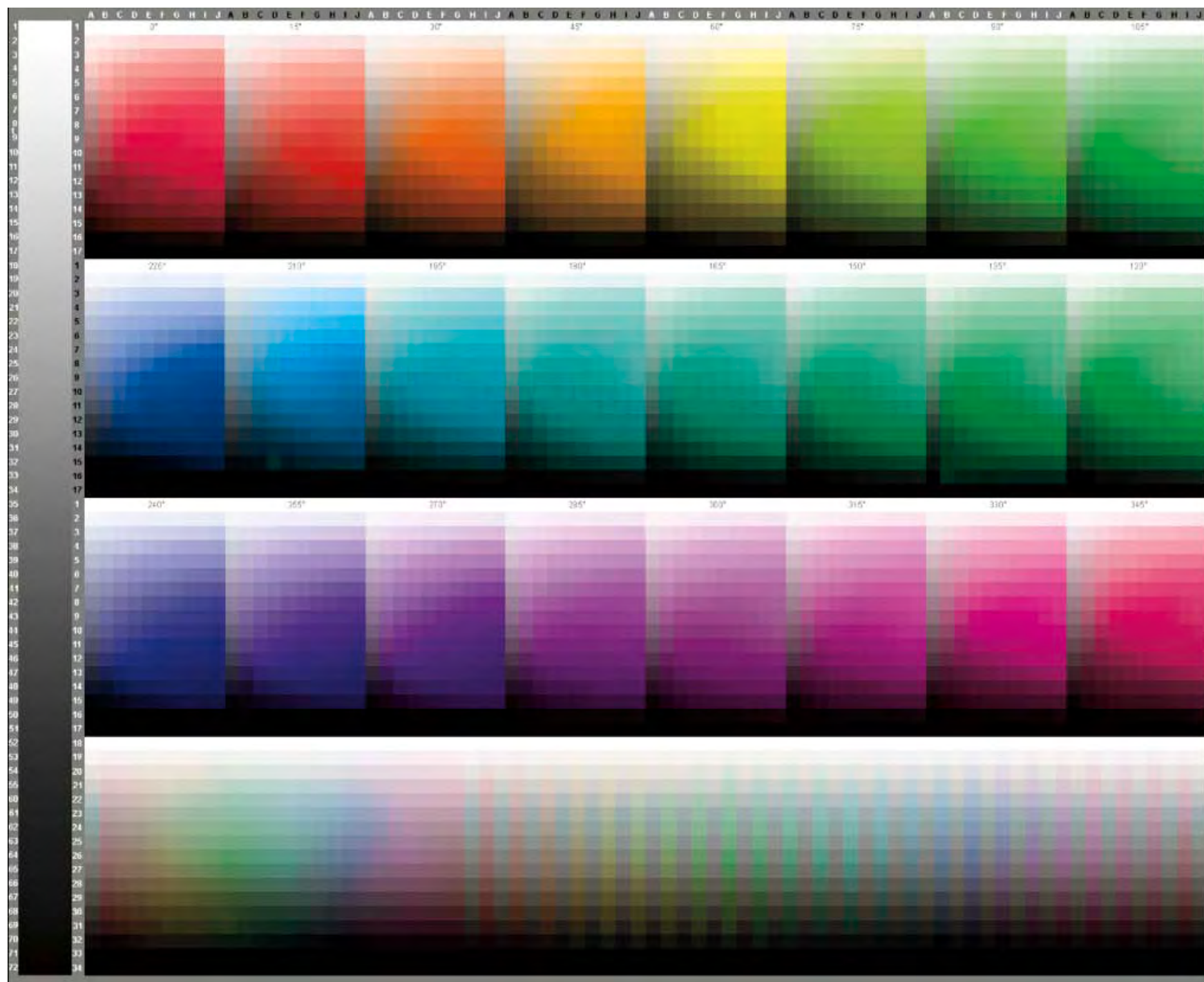
Conversion- Which profile?



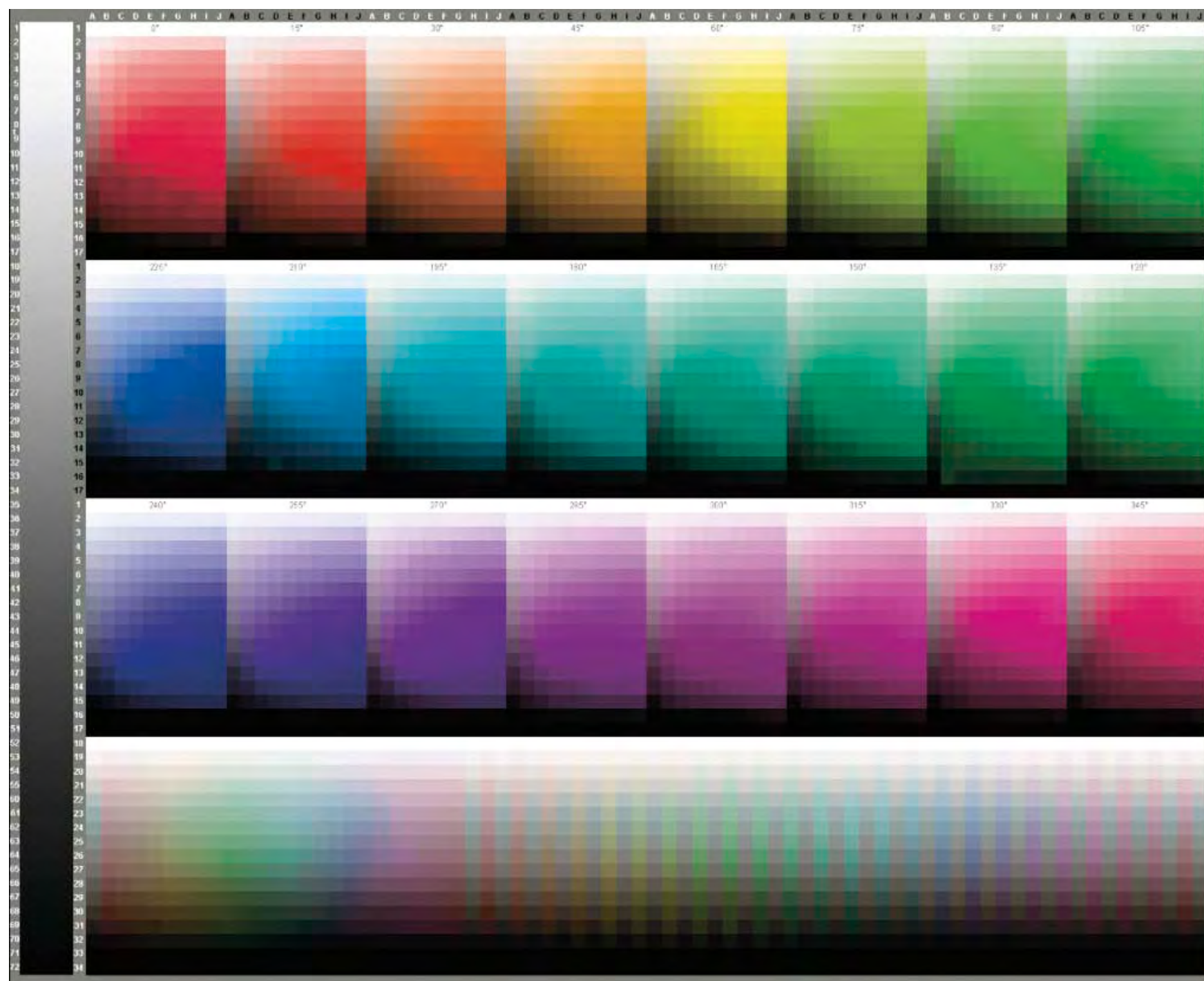
Conversion- Which profile?



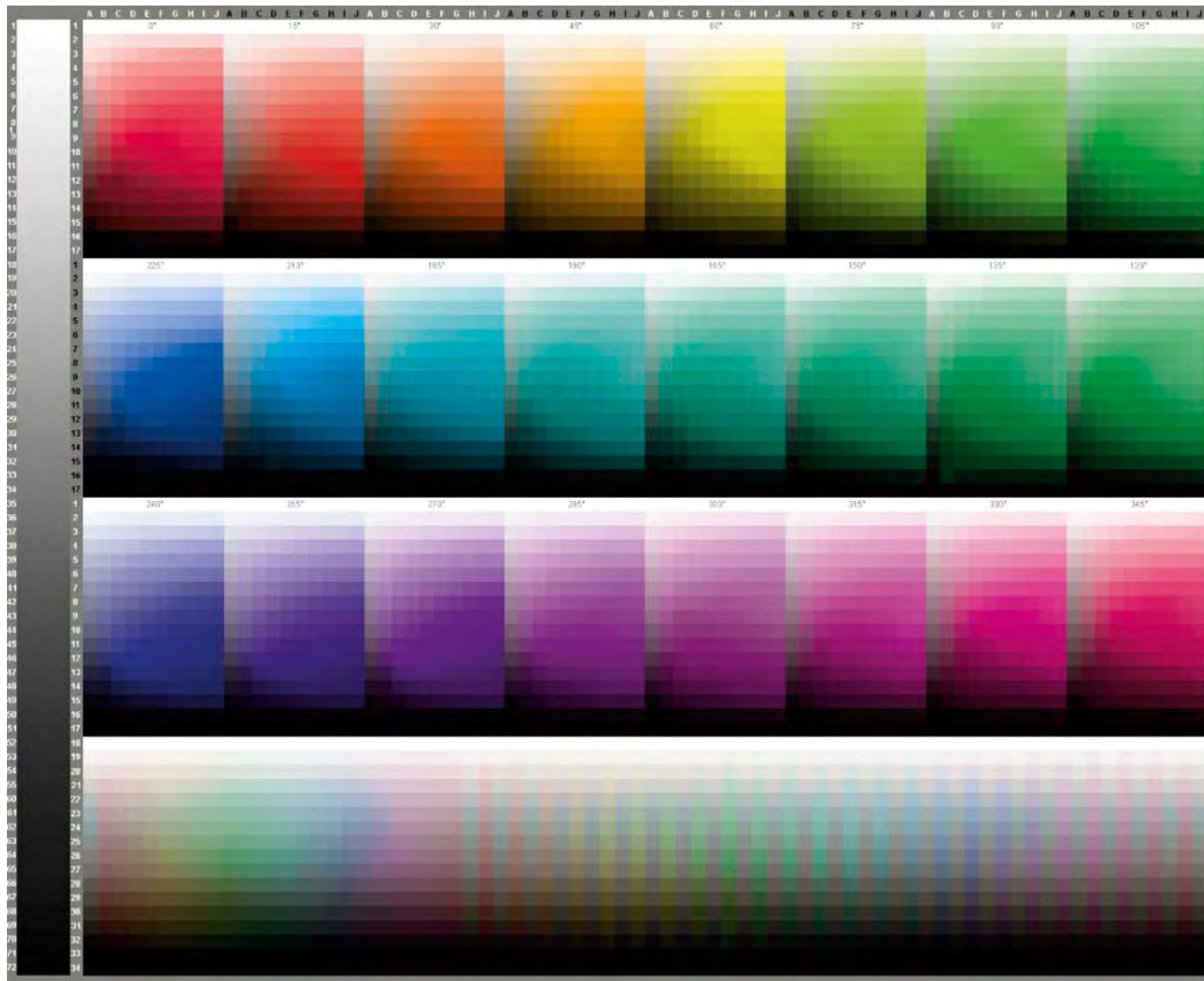
Conversion- Which profile?



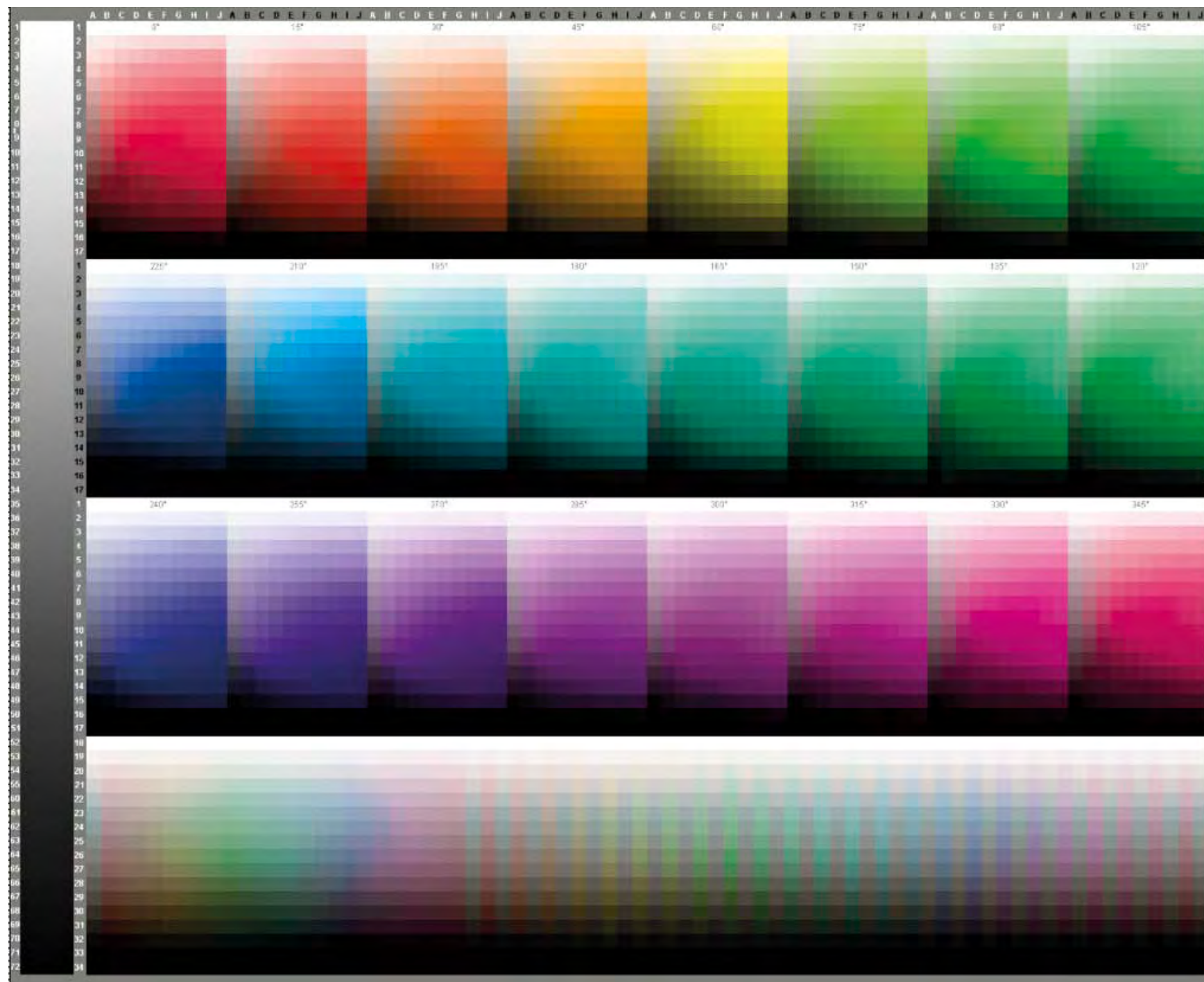
Conversion- Which profile?



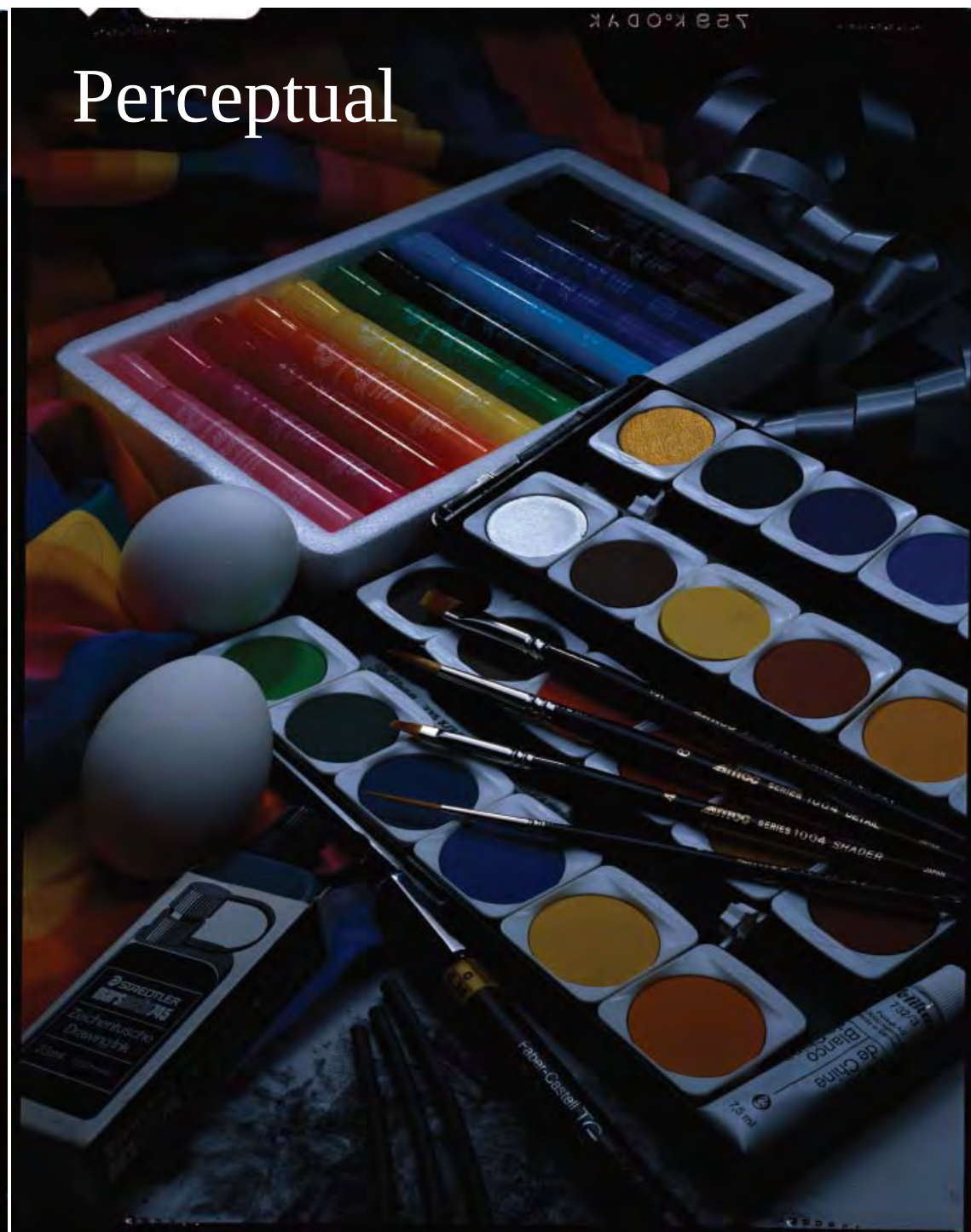
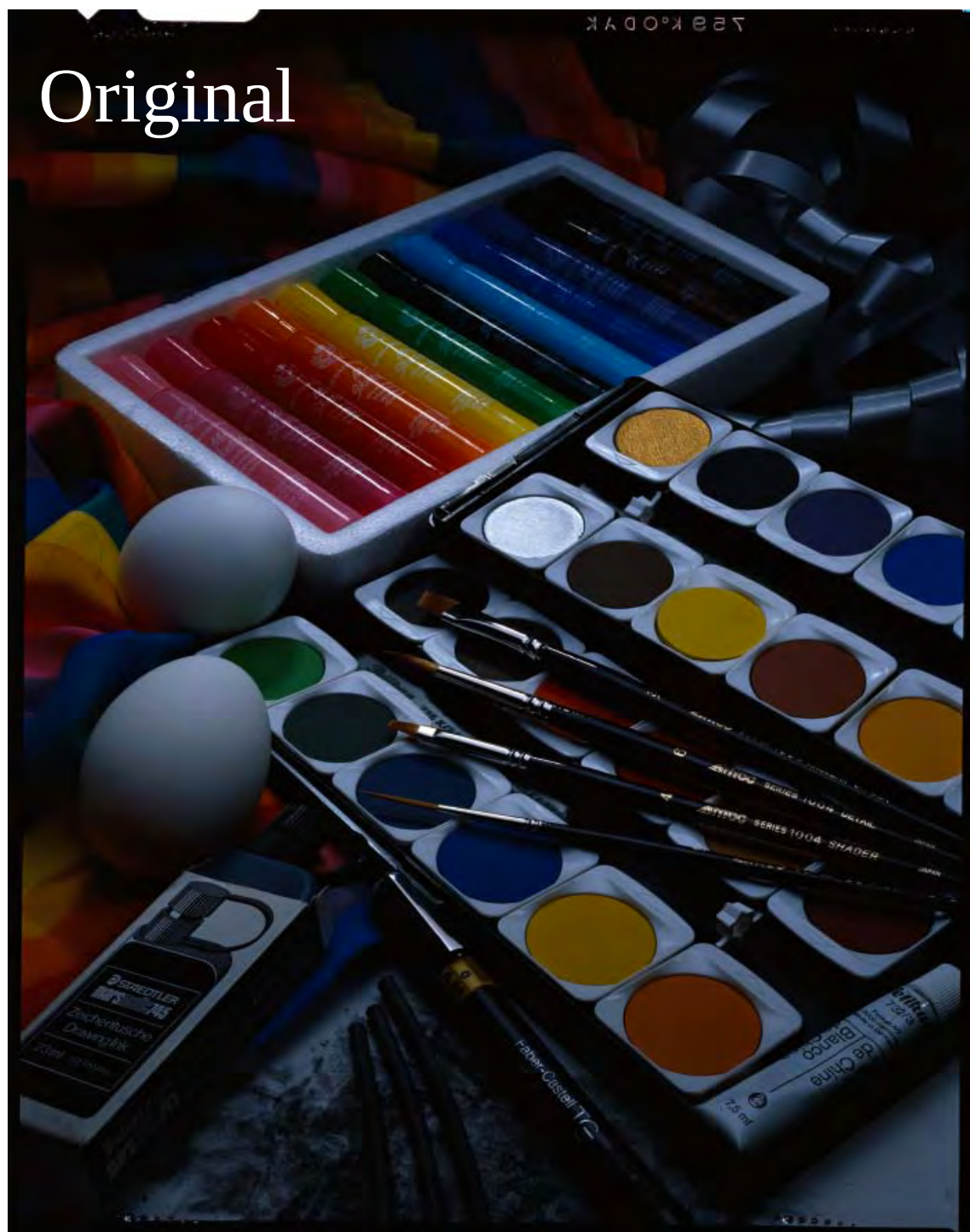
Conversion- Which profile?



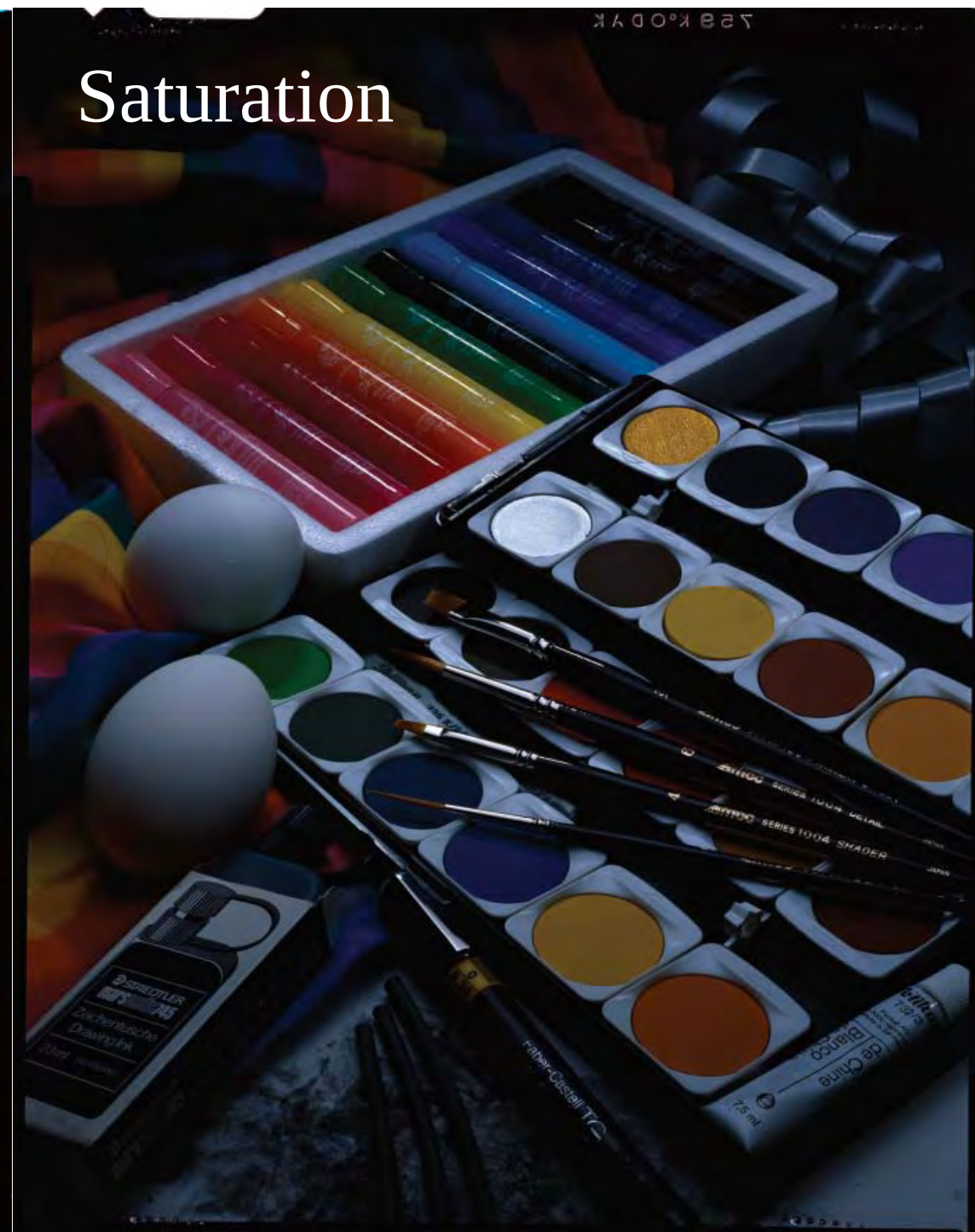
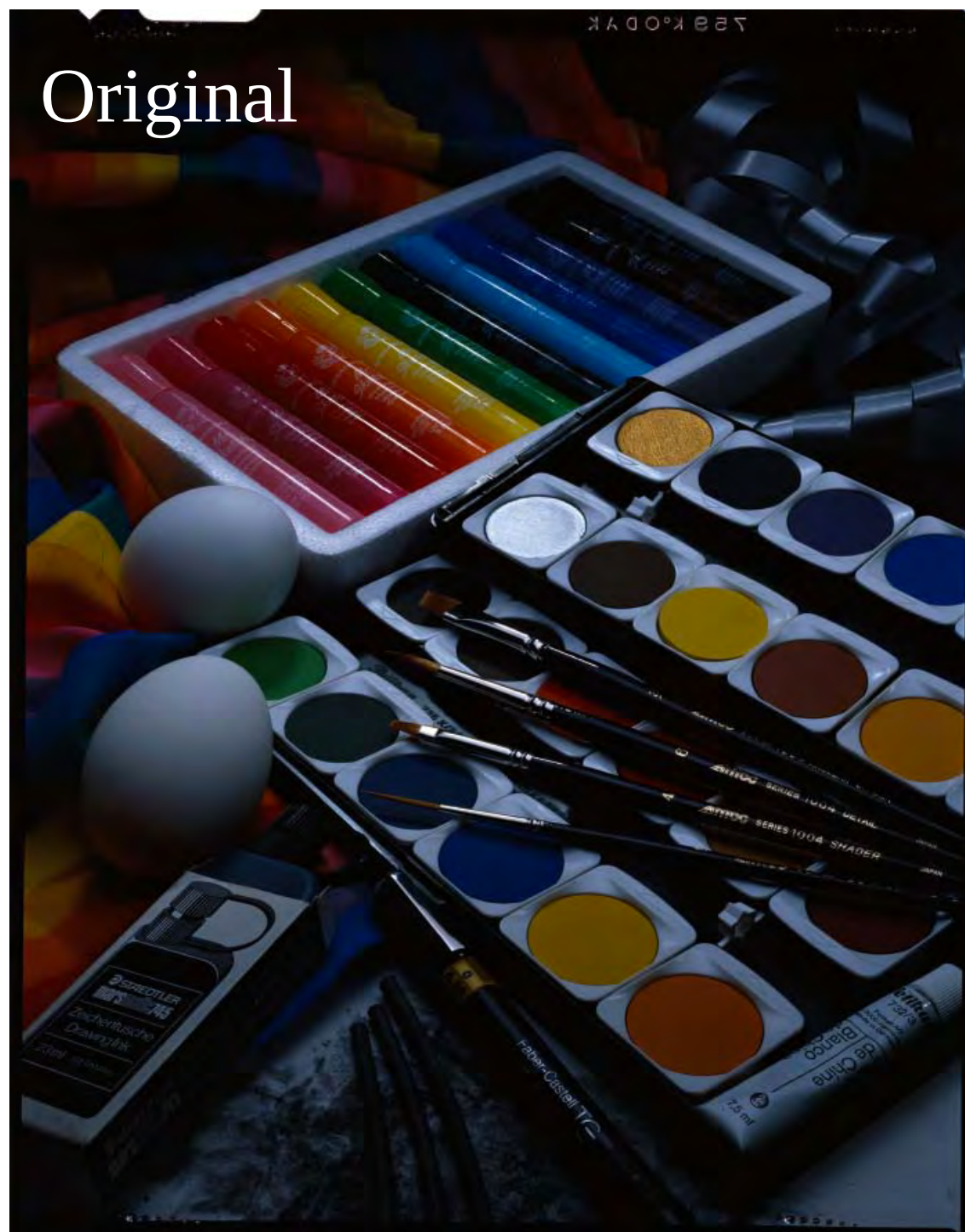
Conversion- Which profile?



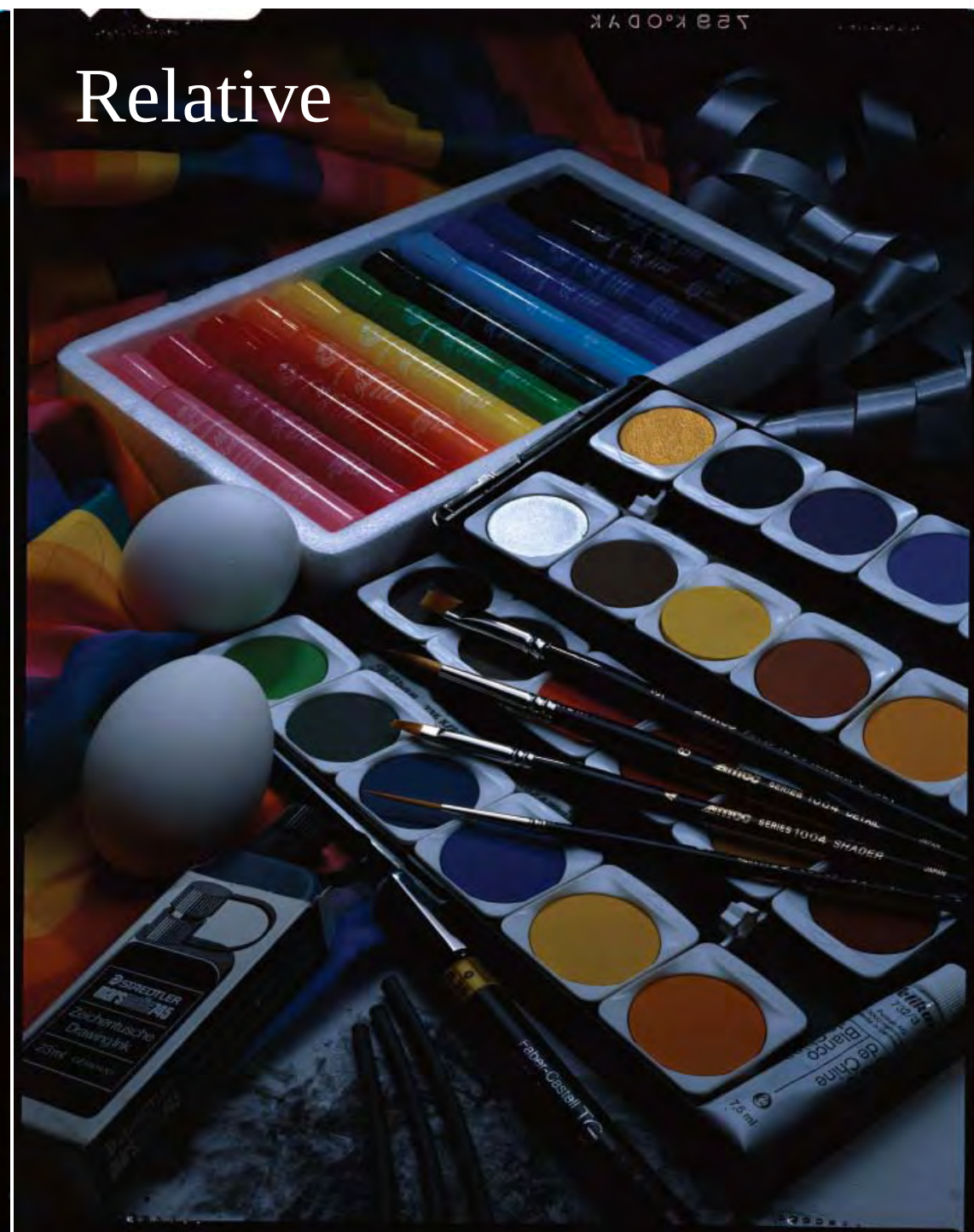
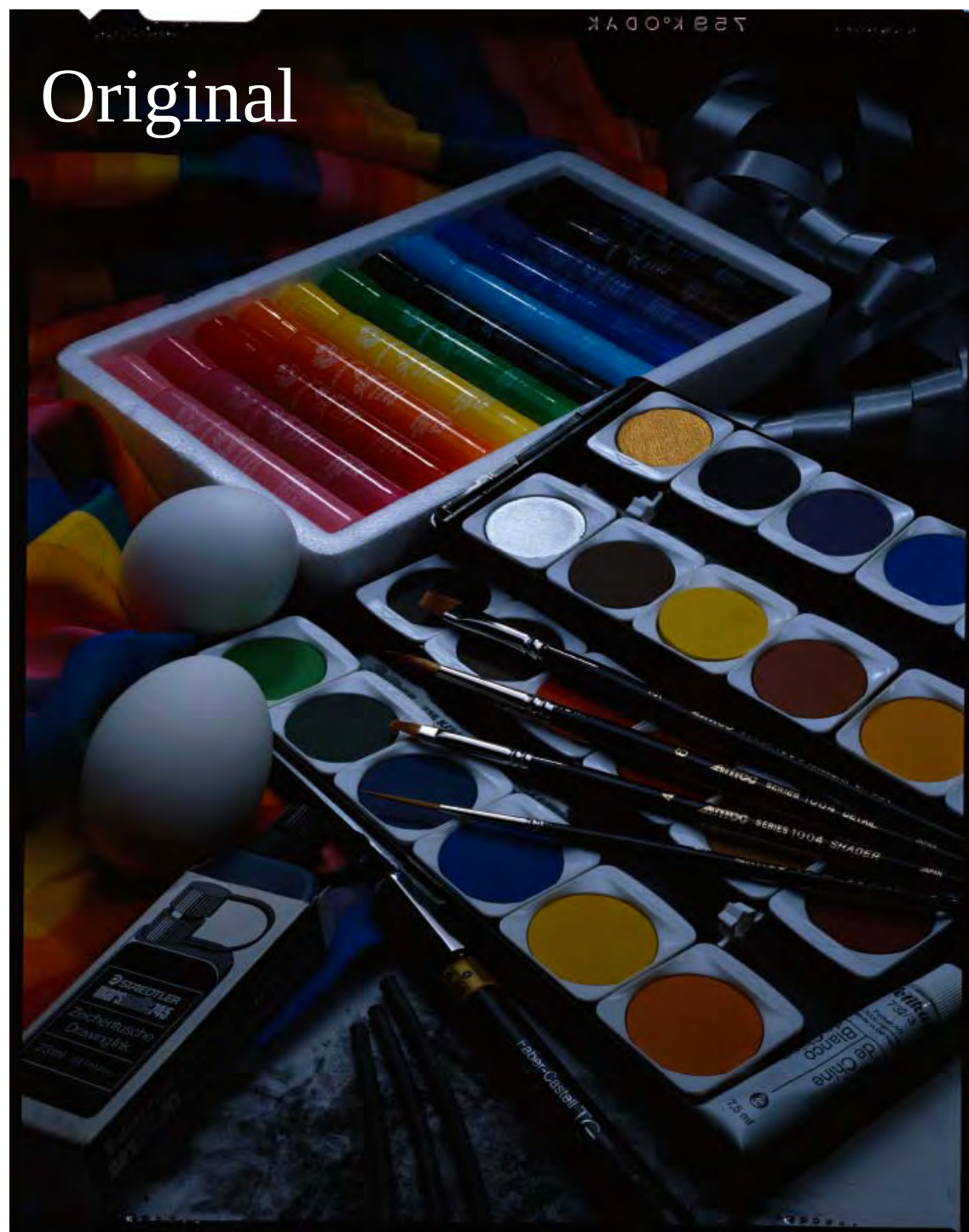
Conversion- Rendering Intents



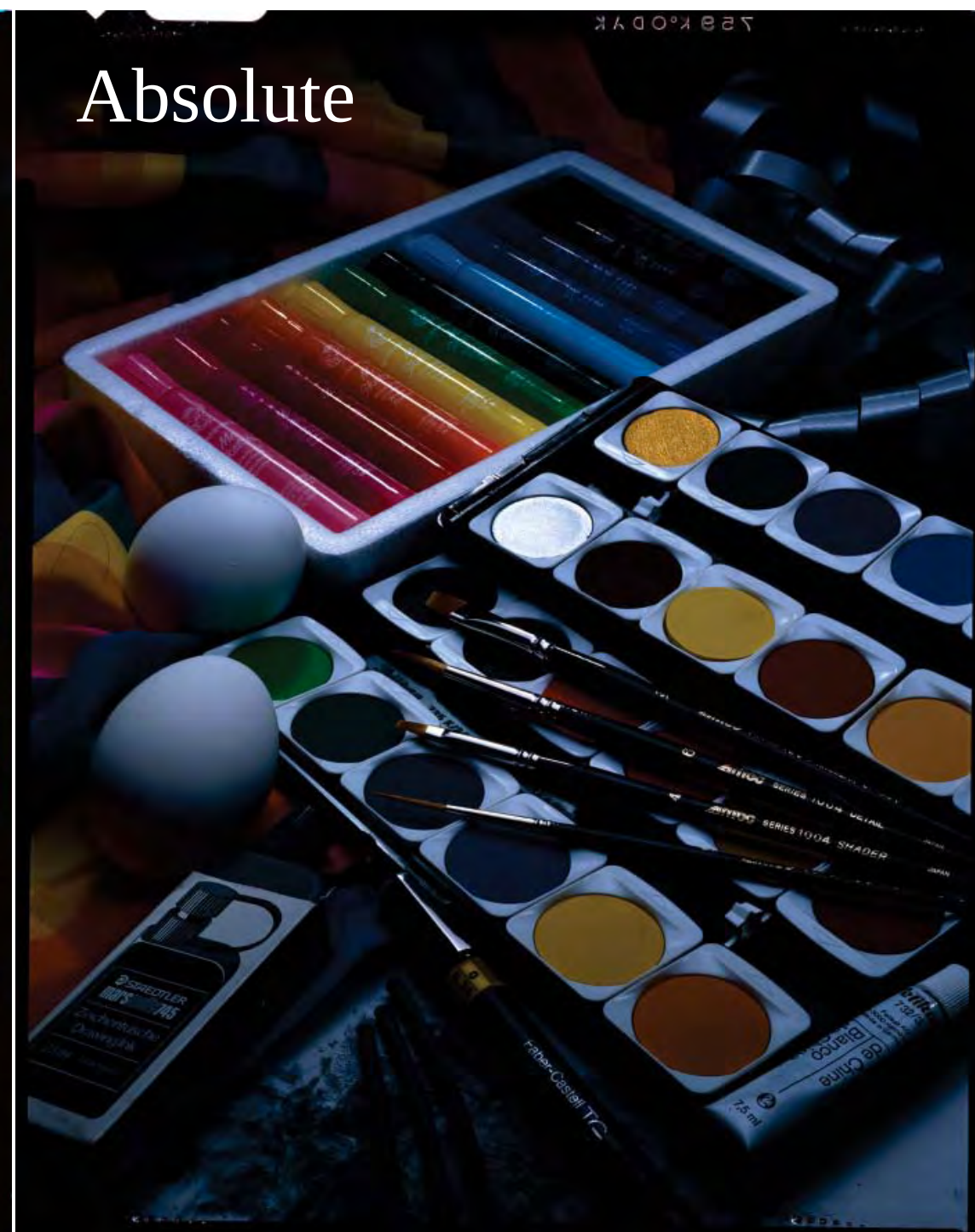
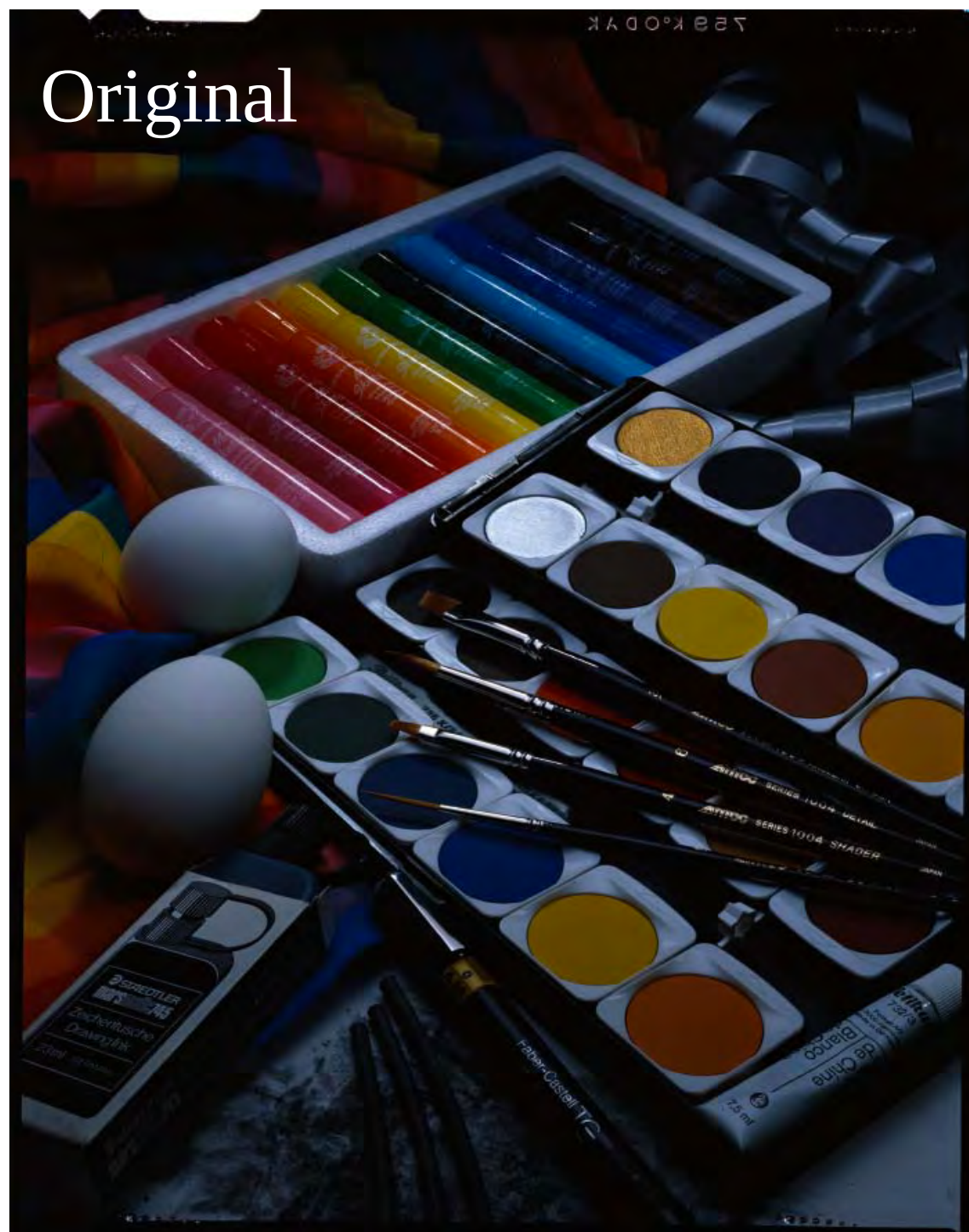
Conversion- Rendering Intents



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Conversion- Rendering Intents



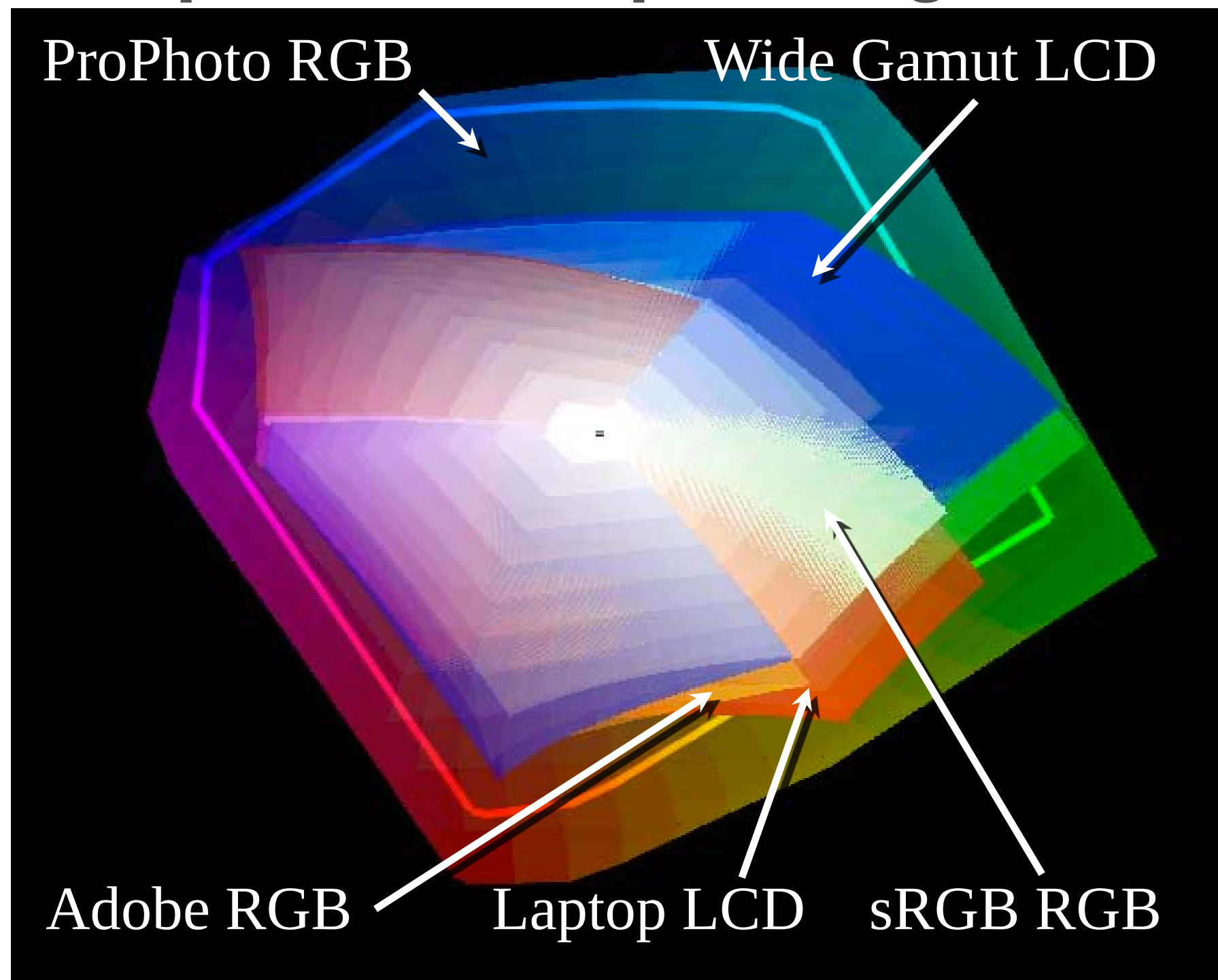
Conversion- Rendering Intents



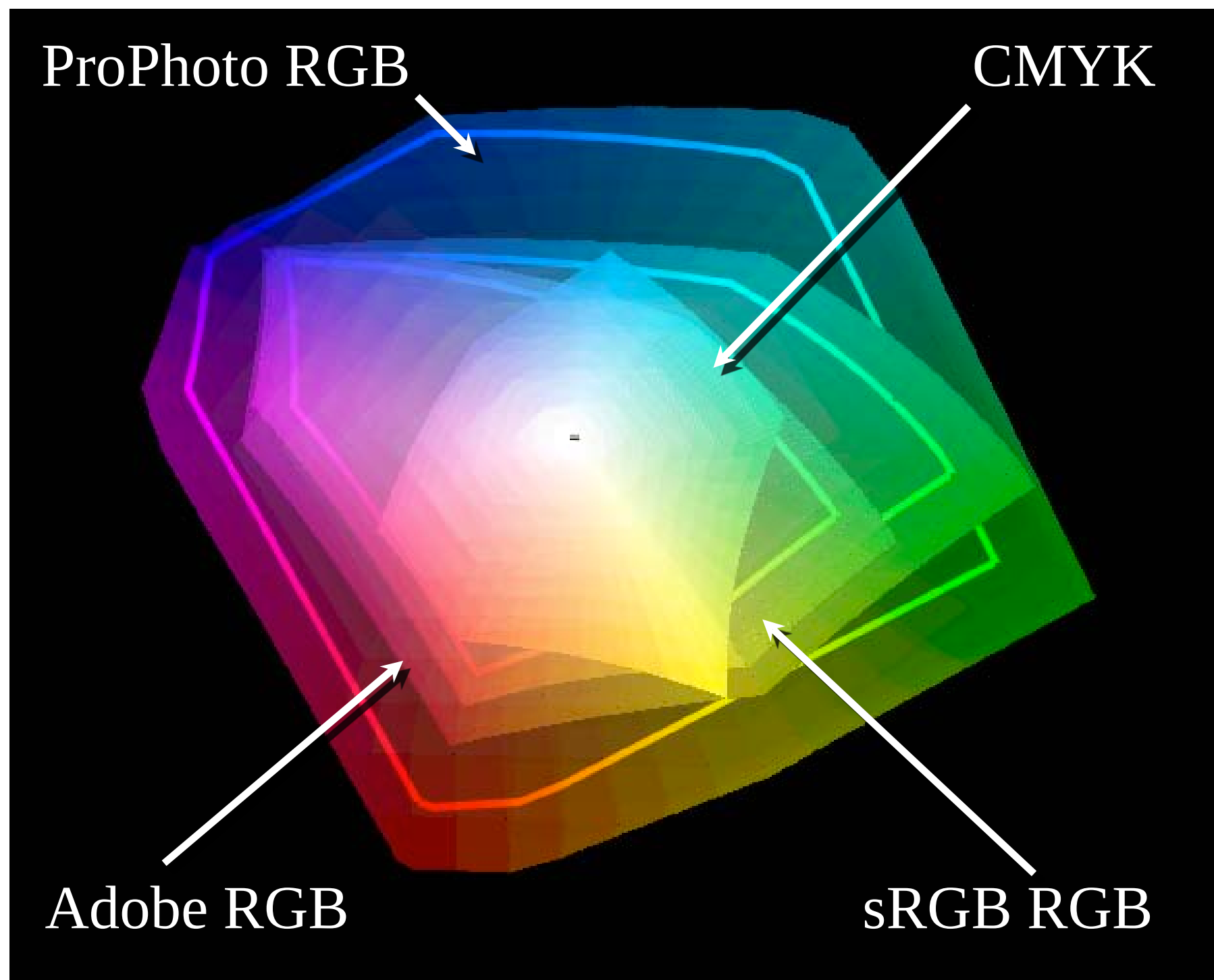
Conversion- Rendering Intents



Device Independent Color Space & soft proofing



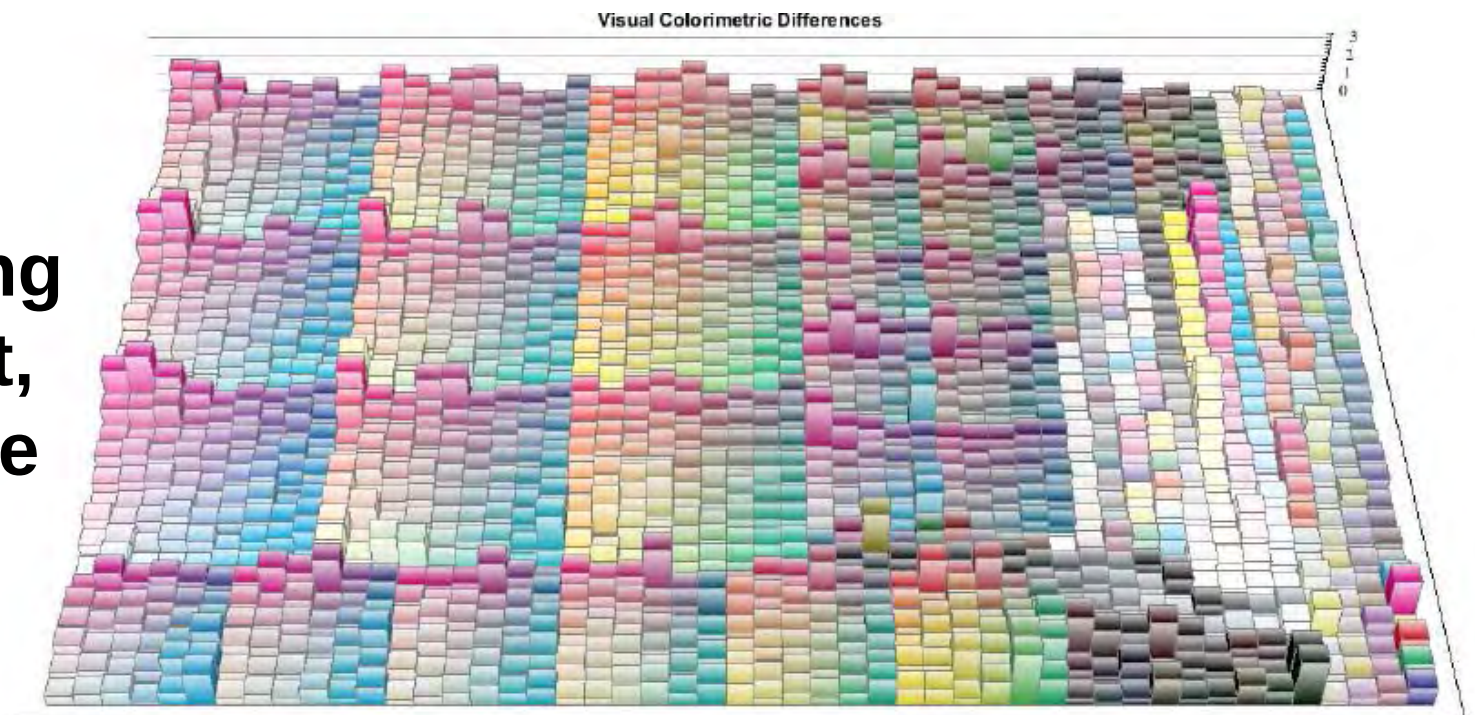
Color Space and soft proofing



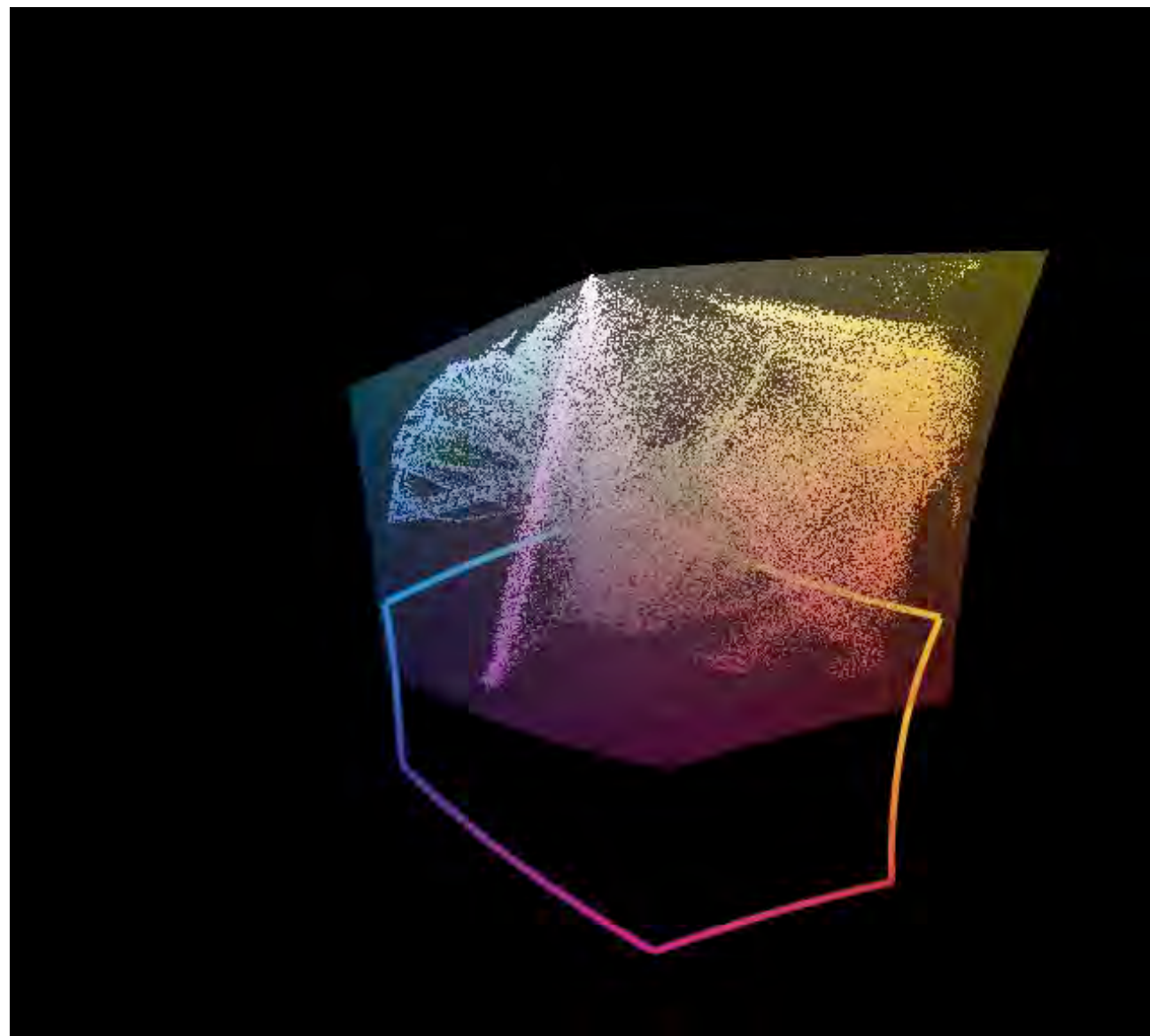
Proofing and Print standards

Mix or Match?

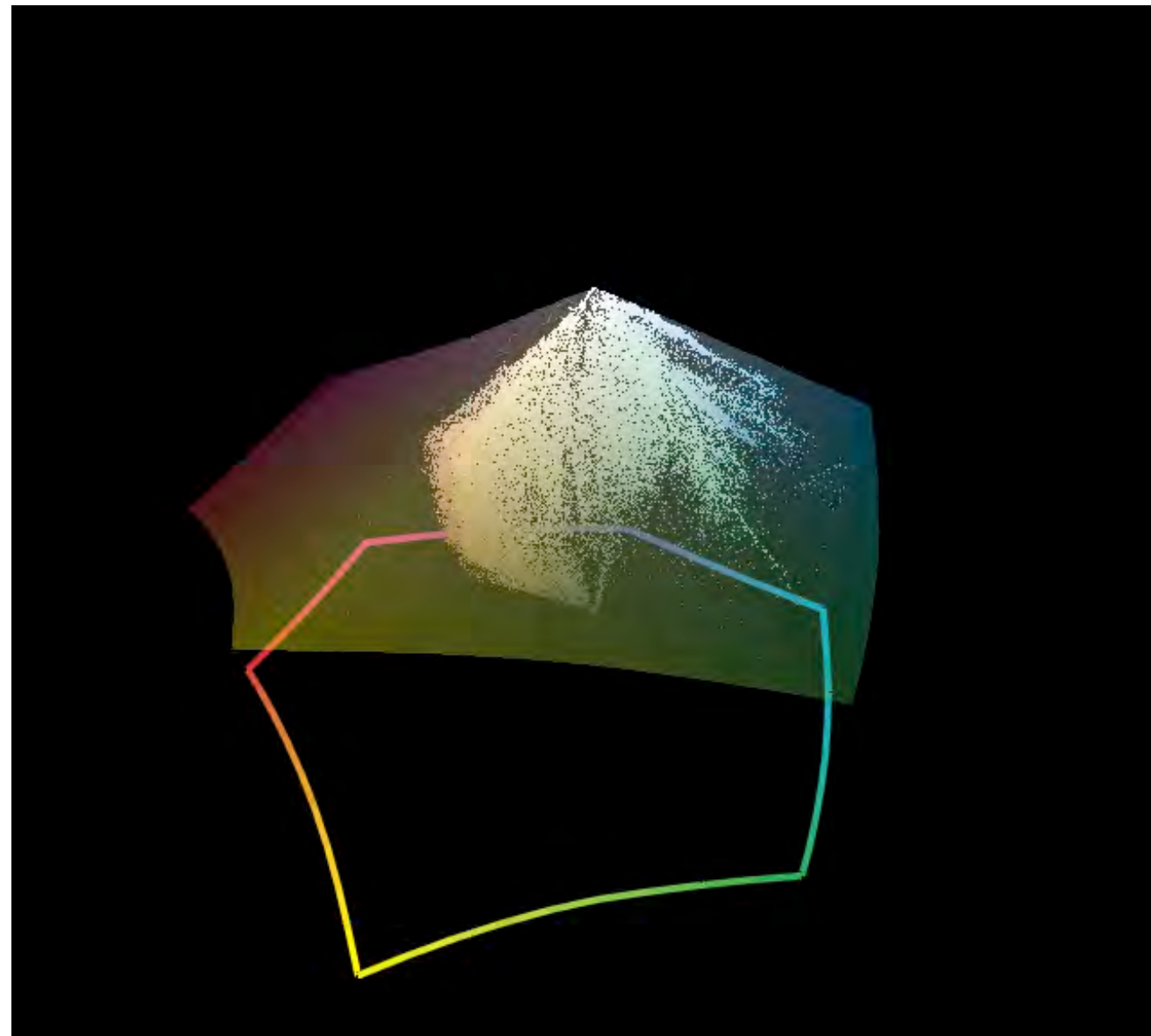
- **Printing to match a supplied proof can be mysterious and somewhat dangerous.**
- **What standard were the proofs made for? Do they contain errors?**
- **Good proof checking is foundational to producing a quality printed product, and one that matches the printed results.**



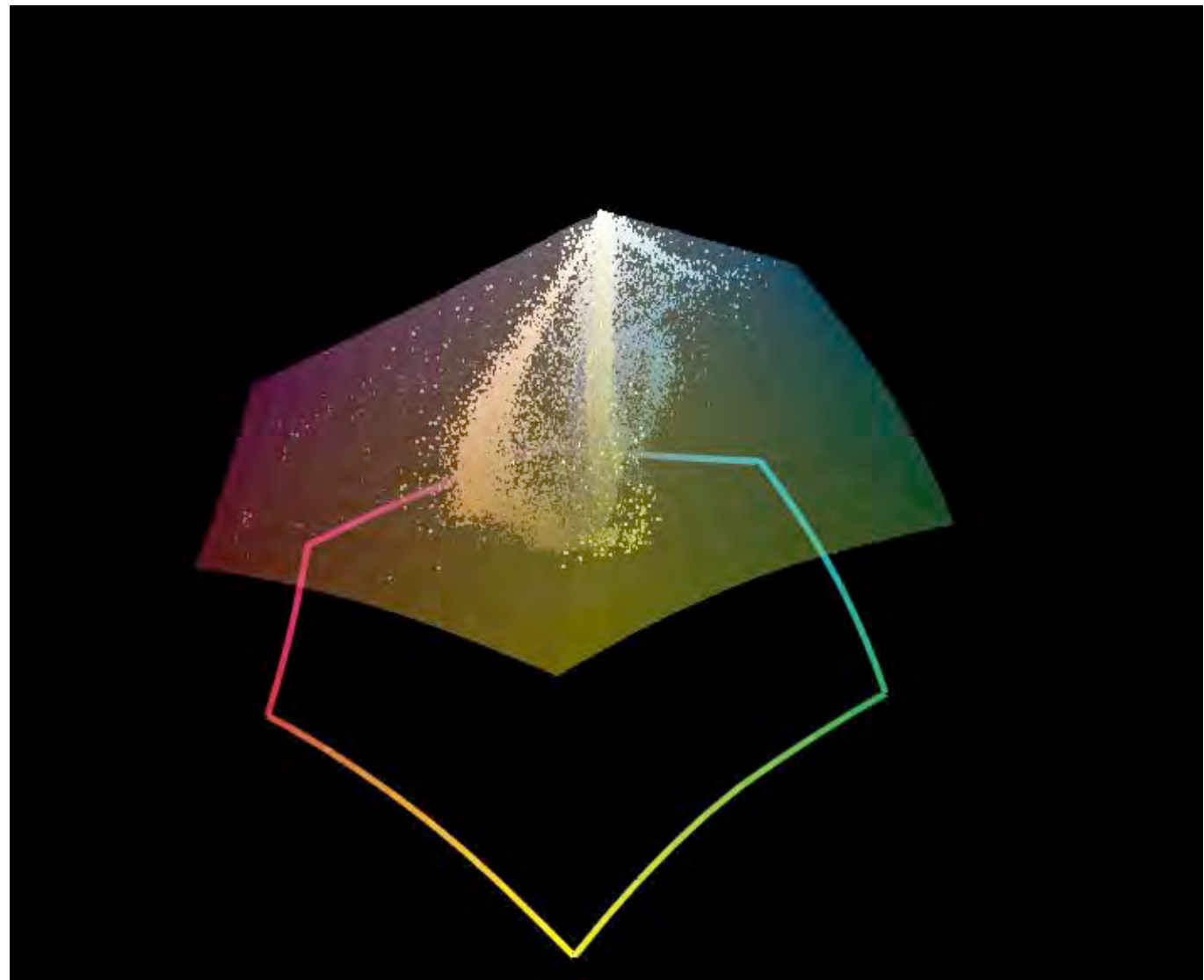
Good proofs or Subject Dependent?



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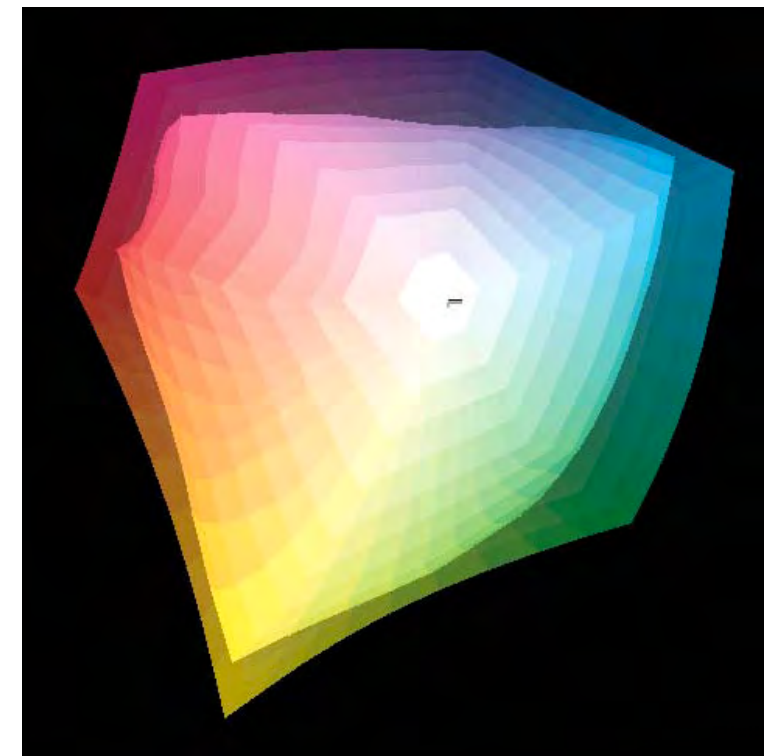
Good proofs or Subject Dependent?



Proofing and Print standards

Mix or Match?

- Proofs that comply to a known standard print condition are essential, but what about the press?
- The press condition must also be standardized and characterized and profiled to provide a close match to an accurate proof.
- ICC Device Links provide a method to color manage different devices and match colors more closely in different press conditions.



ICC Device link profiles

- **Device Link profiles, link a profile from a source device color space and a profile from a destination device color space using a mathematical look up table, to produce a profile that can be used to convert between these color spaces and produce a close match to the source color space in the destination space.**
- **Common uses for device Link profiles are a color correction profiles in printing, where the ink set and process produces different visual results than a standard proof, or in ink jet proofing where the color space of the device is different than the proofing aims.**
- **GCR or Grey Component Replacement is another common use for device link profiles since each color channel can be adjusted as black generation is increased.**

Thank you!