

"RAW" Conversion Options Too Much of a Good Thing?

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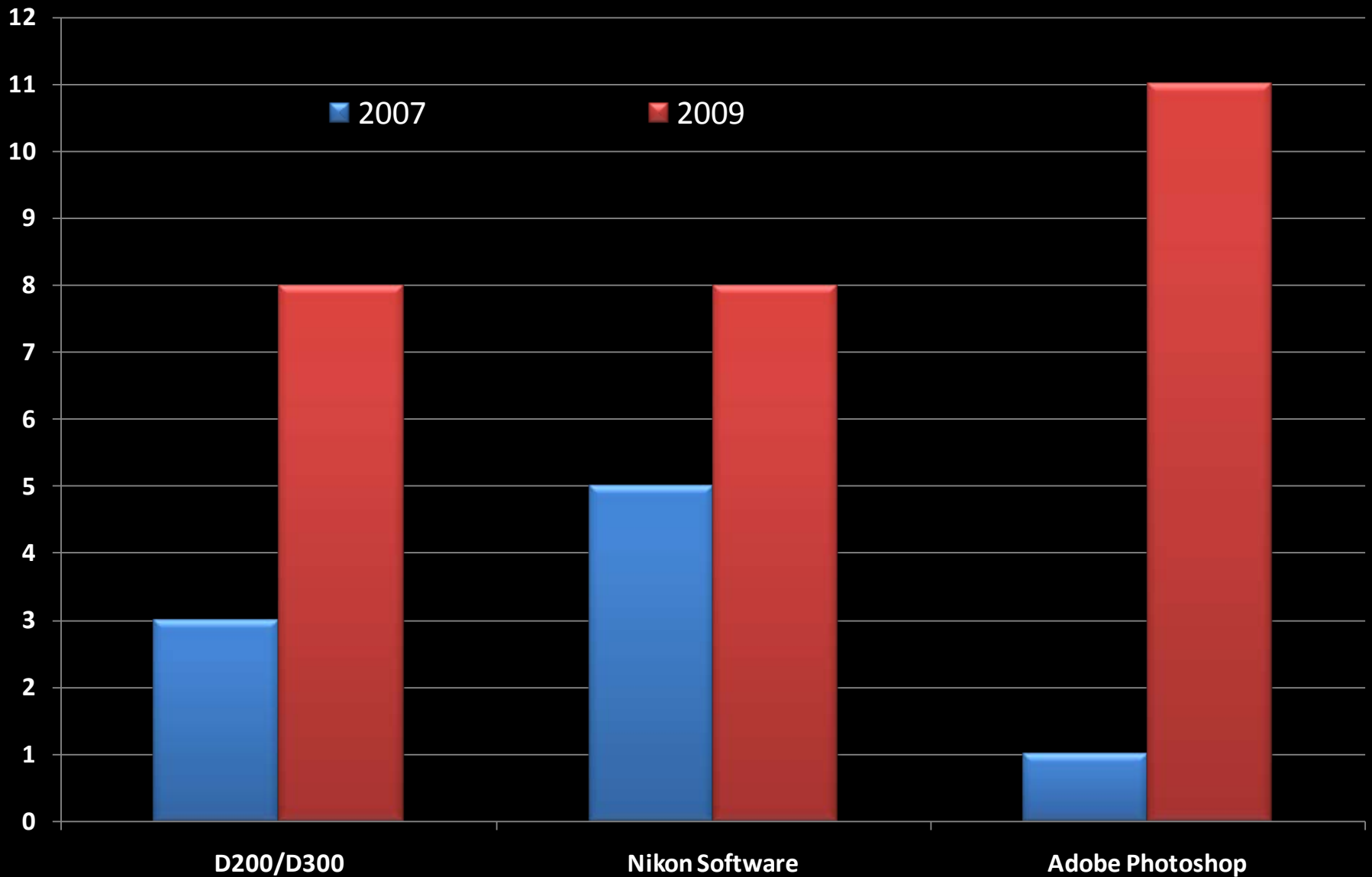
- ◆ 2007- 2009 Growth in options
- ◆ Making sense of the options
 - How to evaluate them
 - ◆ Colour balance
 - ◆ Tone scale
 - ◆ Colour reproduction
- ◆ Recommendations

2007- 2009 Growth in Options

2007			2009		
D200	NX 1.2	CS3	D300	NX 2.2	CS4
Mode I	Mode I	ACR 3.3	Standard	Standard	Standard
Mode II	Mode II		Neutral	Neutral	Neutral
Mode III	Mode III		Portrait	Portrait	Portrait
	Mode Ia		Vivid	Vivid	Vivid
	Mode IIIa		Landscape	Landscape	Landscape
			D2X Mode I*	D2X Mode I	D2X Mode I
			D2X Mode II*	D2X Mode II	D2X Mode II
			D2X Mode III*	D2X Mode III	D2X Mode III
					ACR 4.3
					ACR 4.4
					Adobe Std.
Total 3	Total 5	Total 3	Total 8	Total 8	Total 11

* Downloadable optional extra profiles

2007- 2009 Growth in Options



Understanding The Options

- ◆ How can we make sense of all these options?
 - Do a structured test
 - Use the Macbeth Color Checker Chart
 - Evaluate results
- ◆ Compare
 - D300 (Camera)
 - Nikon NX 2.2.0 Software
 - Adobe Photoshop CS4 – ACR 5.3

Colour & Tone Scale

Macbeth Color Checker

Dark Skin	Light Skin	Blue Sky	Foliage	Purplish Blue	Bluish Green
Orange	Purplish Blue	Moderate Red	Purple	Yellow Green	Orange Yellow
Blue	Green	Red	Yellow	Magenta	Cyan
White	Neutral 8	Neutral 6.5	Neutral 5	Neutral 3.5	Black

Colour & Tone Scale – Exposures

- ◆ The Macbeth Color Checker test chart was photographed with a Nikon D300 camera
 - RAW & High Quality JPEG @ ISO 200
 - Custom White Balance
 - Adobe 1998 colour space
 - All 8 “looks” selected
 - ◆ Standard
 - ◆ Neutral
 - ◆ Portrait
 - ◆ Vivid
 - ◆ Landscape
 - ◆ D2X Mode I
 - ◆ D2X Mode II
 - ◆ D2X Mode III

Image Generation – Nikon NX Software

- ◆ All 8 raw files were opened and saved as 8 bit R, G, B, TIF files
- ◆ Embedded colour profiles used
- ◆ All conversion settings were set to “default”
- ◆ Appropriate “looks/profiles” are selected automatically as NX “reads” the metadata and chooses the selected Picture Control Option

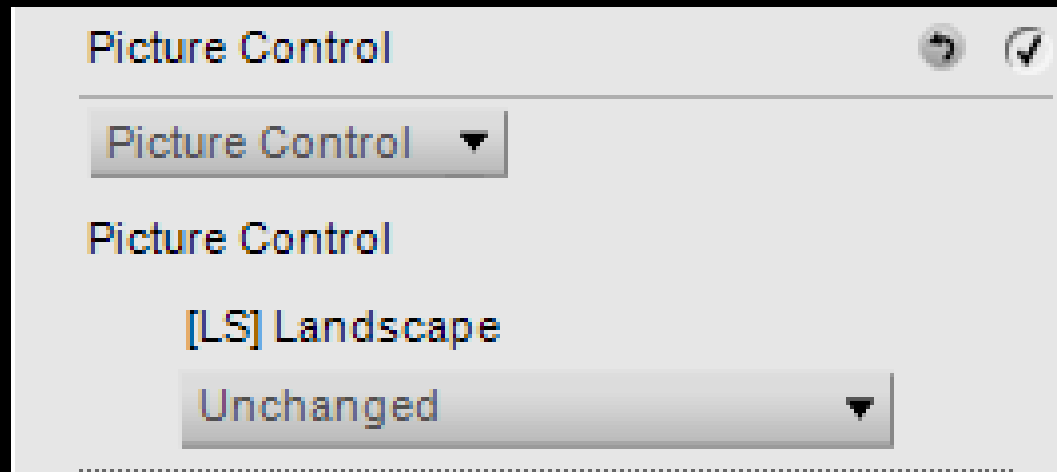
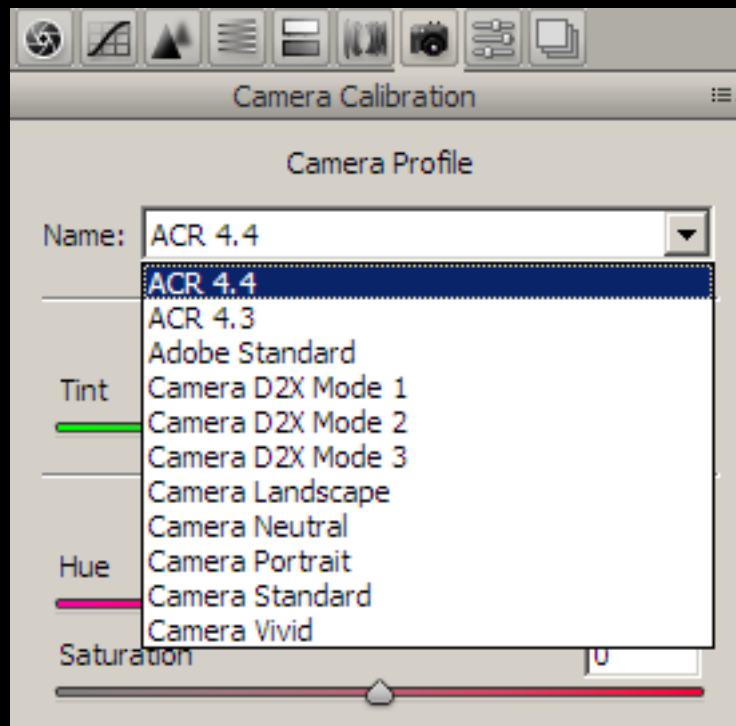


Image Generation – Adobe Photoshop CS4

- ◆ All 8 raw files were opened and saved as 8 bit R, G, B, TIF files
- ◆ Adobe 1998 colour space used
- ◆ All conversion settings were set to “default”
- ◆ Appropriate “looks/profiles” were selected manually as CS4 does not “read” the relevant Picture Control metadata

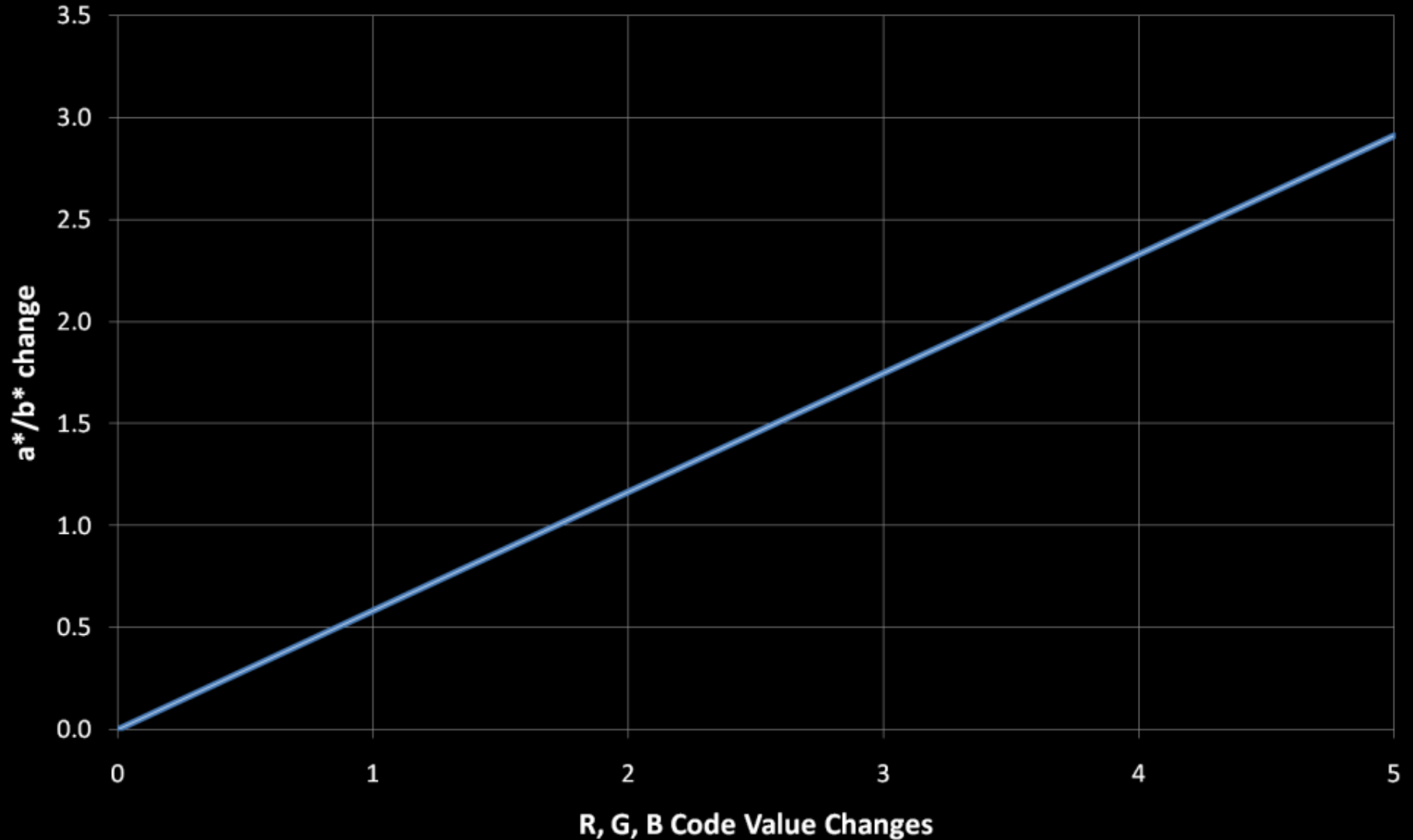


Data Analysis

- ◆ TIFS and JPEGs opened using Photoshop CS4 Extended
- ◆ Macros were run
 - To collect R, G, B code values from individual Macbeth patches
 - Convert R, G, B code values to $L^* a^* b^*$ (Lightness, R-G, Y-B)
 - Compare the $L^* a^* b^*$ values of the data from the image files with the reference values of the Macbeth Chart
 - Calculate CIE 2000 colour differences
- ◆ Data plotted
 - Colour Balance
 - Lightness
 - Colour Accuracy
 - Colour Saturation

Colour Balance vs. Code Value

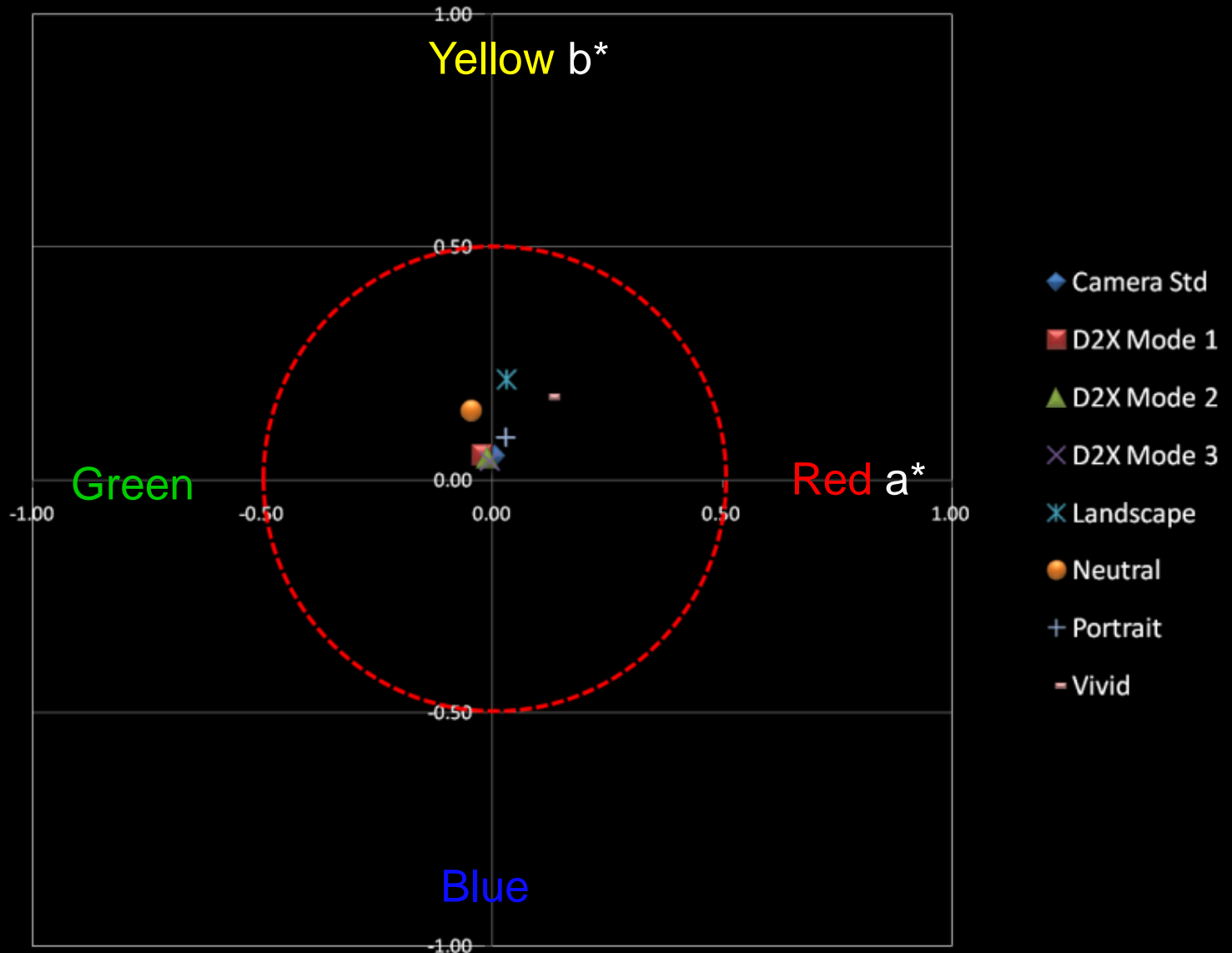
Colour Balance Change vs. Code Value



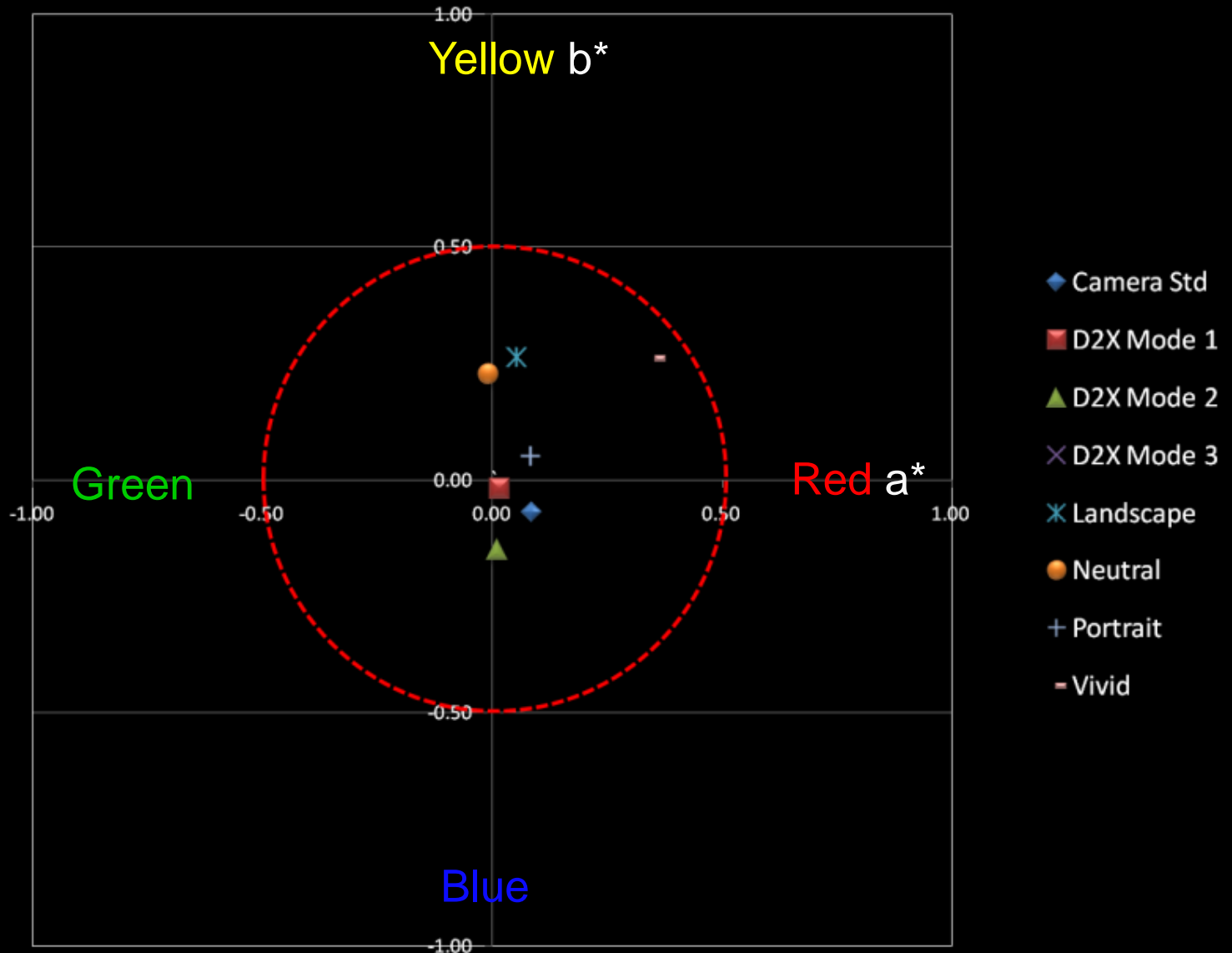
Colour Balance - $2 a^*/b^*$ shift



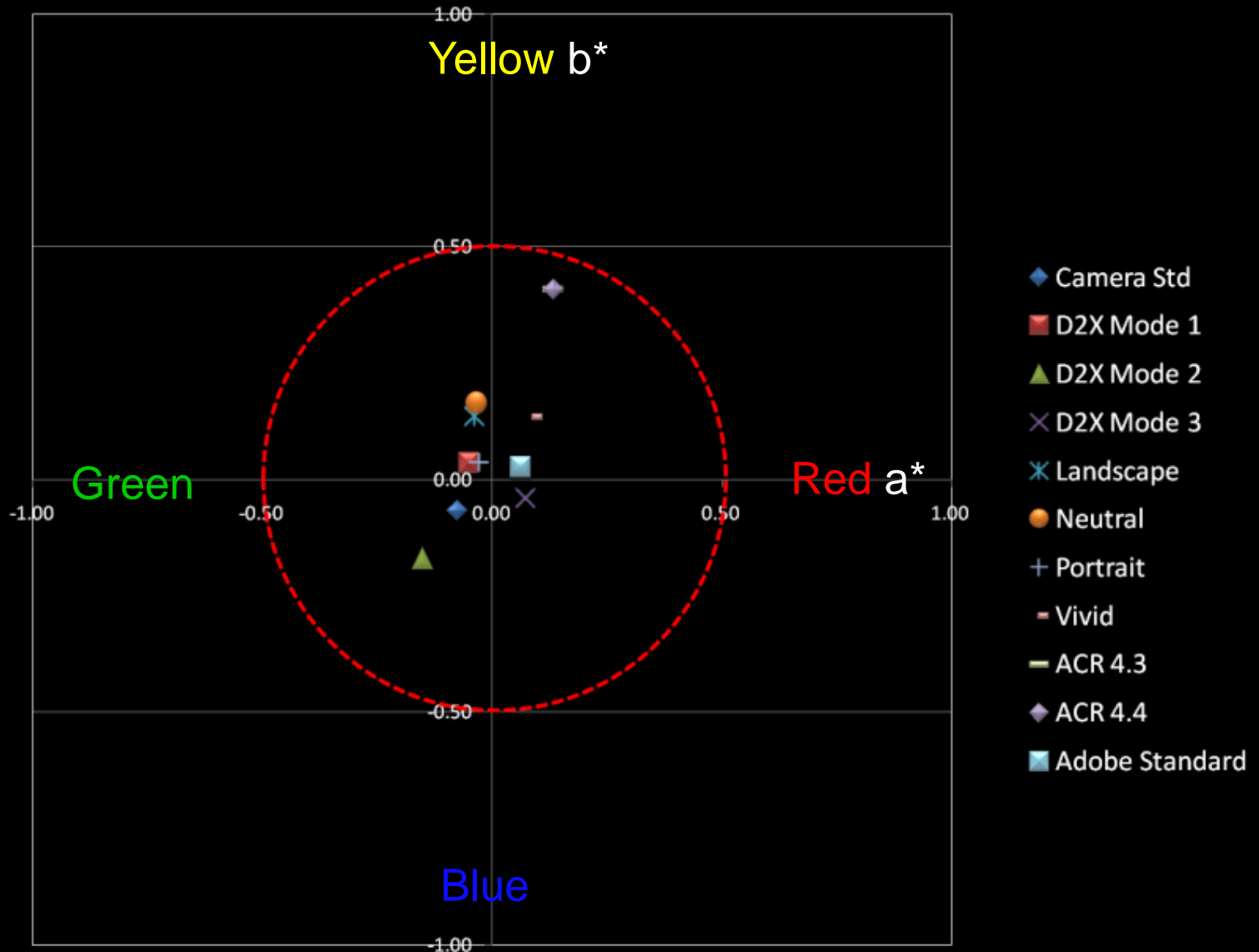
Colour Balance - D3000 JPEGs



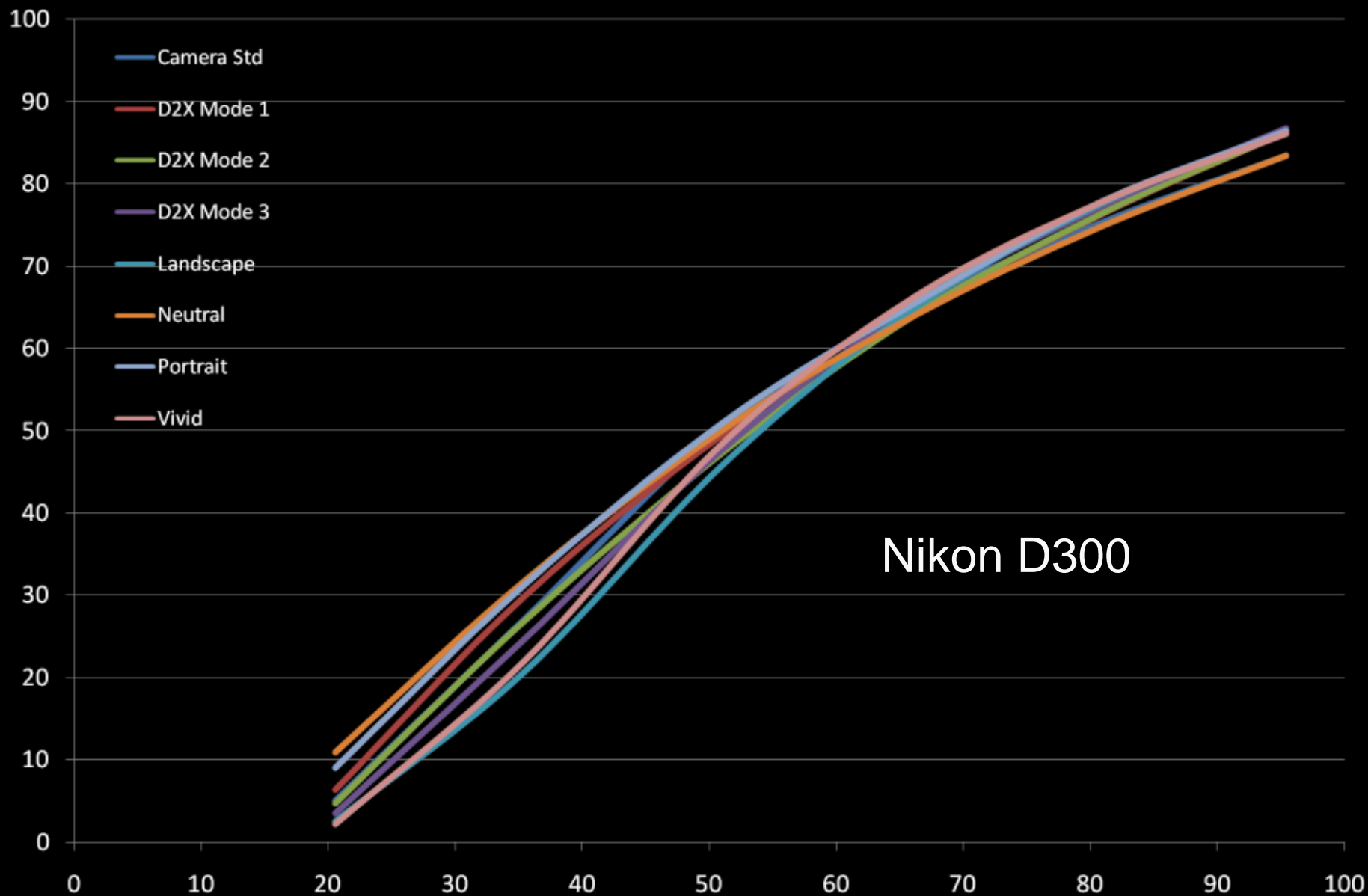
Colour Balance – NX TIFS



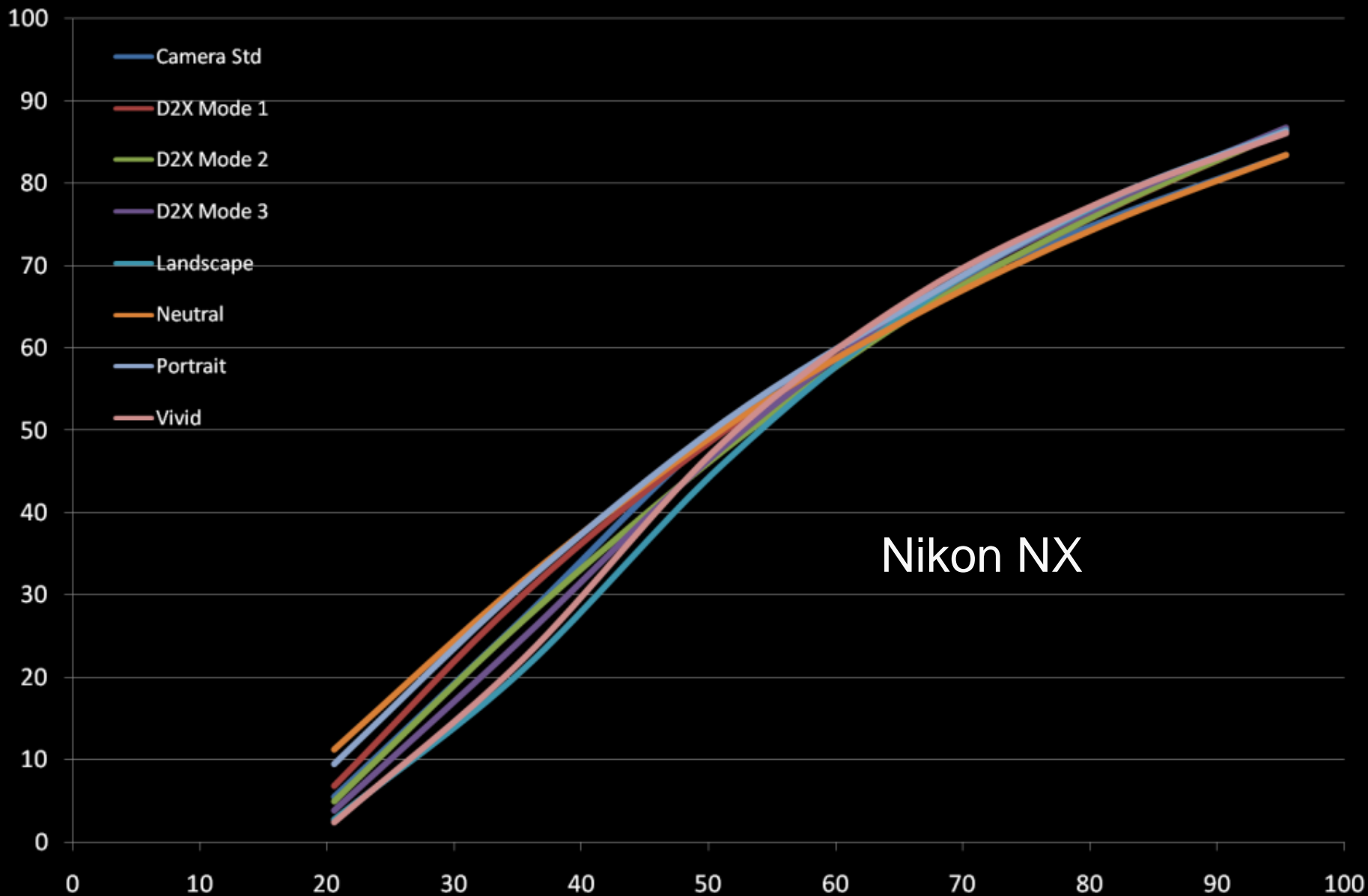
Colour Balance – CS4 TIFS



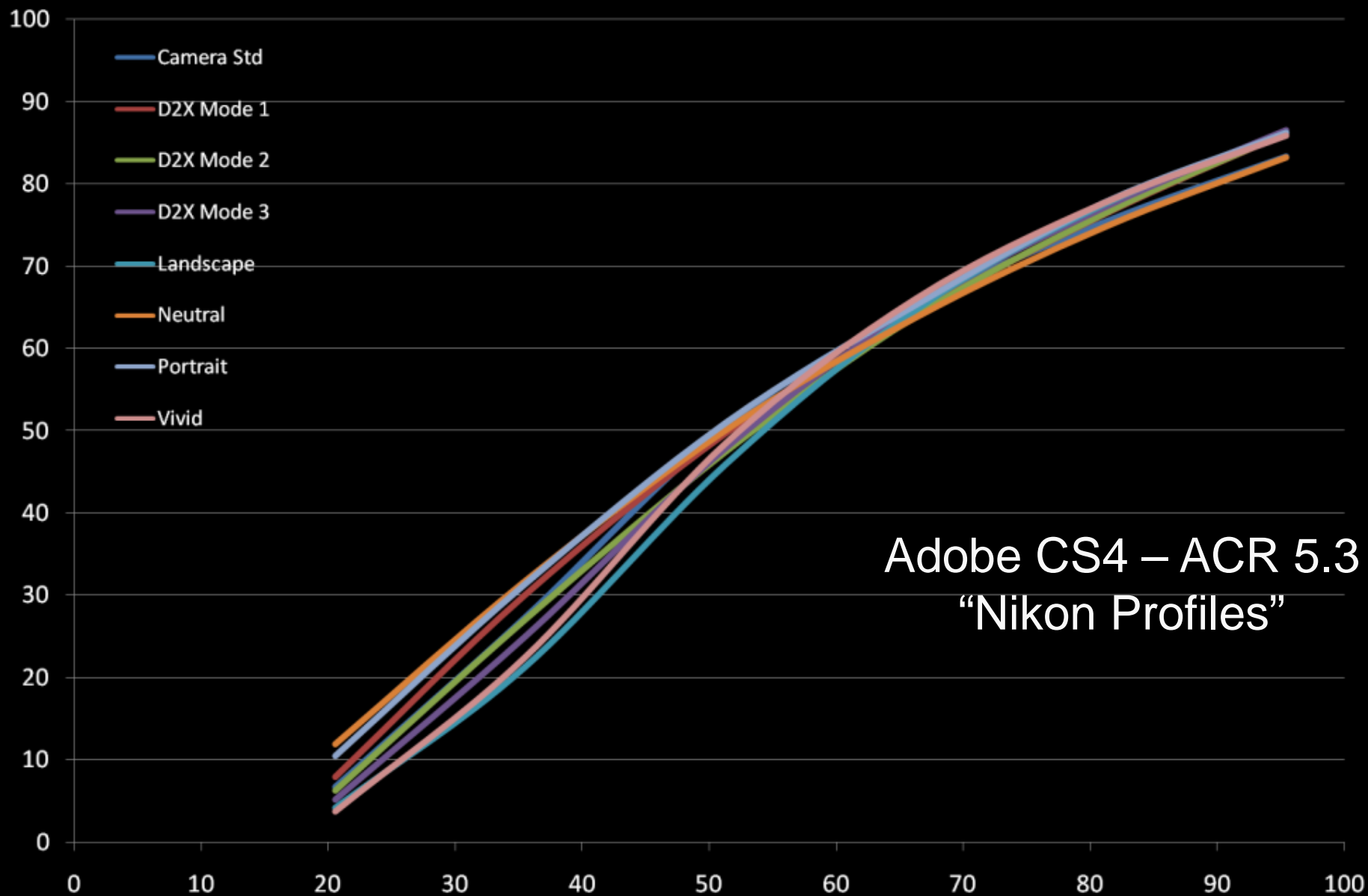
Tone Scale L*out vs. L*in



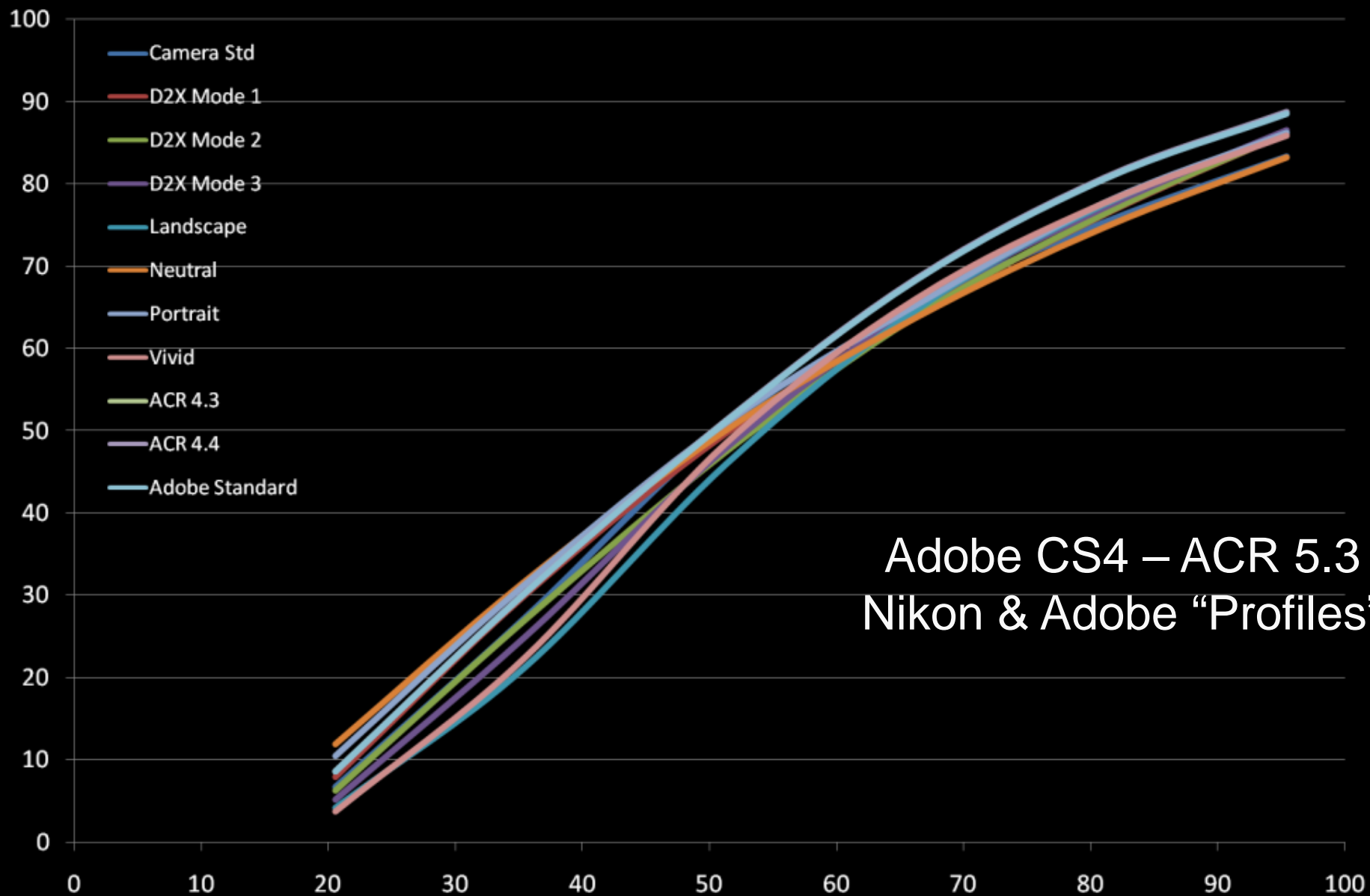
Tone Scale L*out vs. L*in



Tone Scale L*out vs. L*in

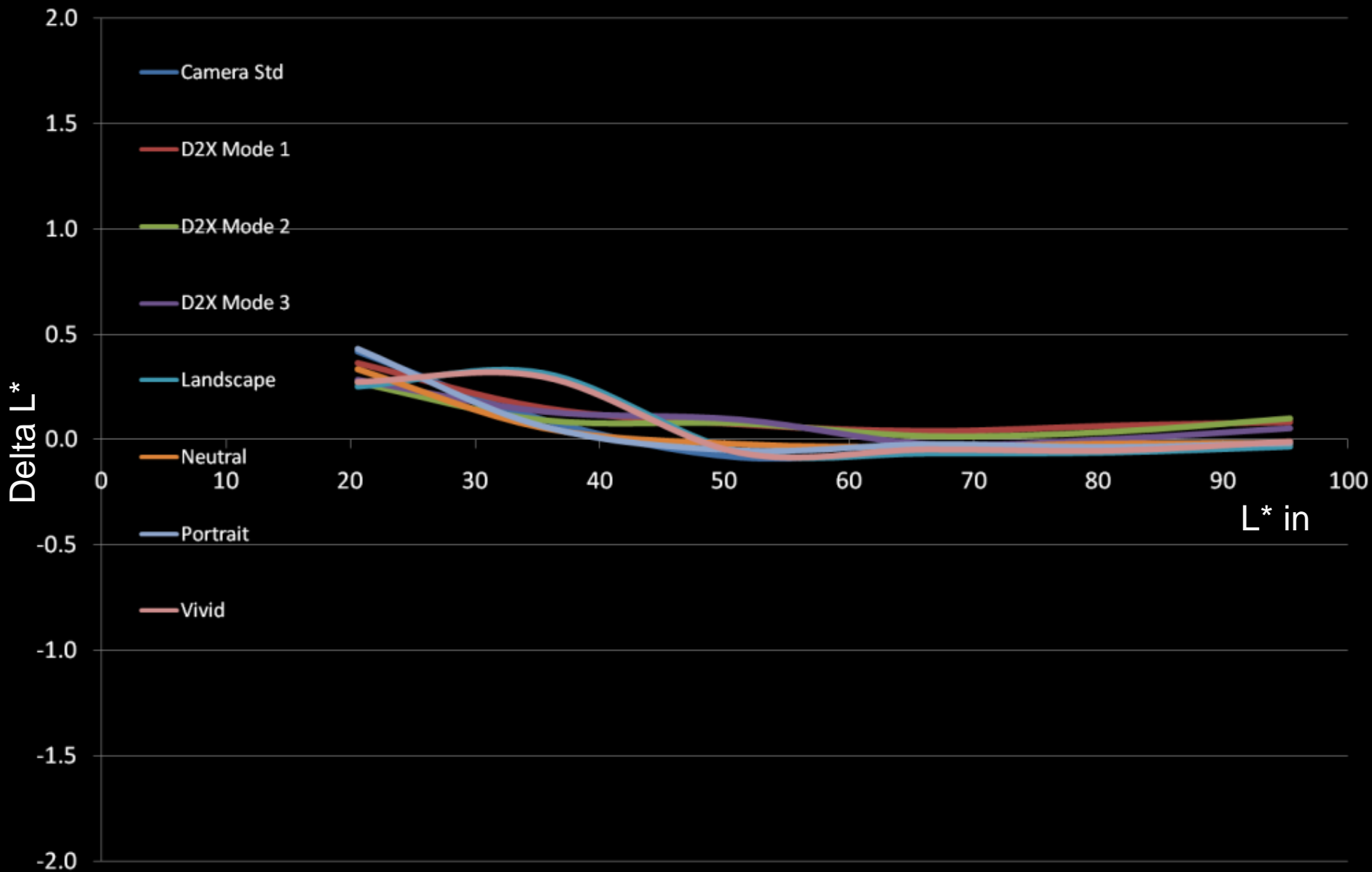


Tone Scale L*out vs. L*in



Adobe CS4 – ACR 5.3
Nikon & Adobe “Profiles”

NX vs. D300 In Camera



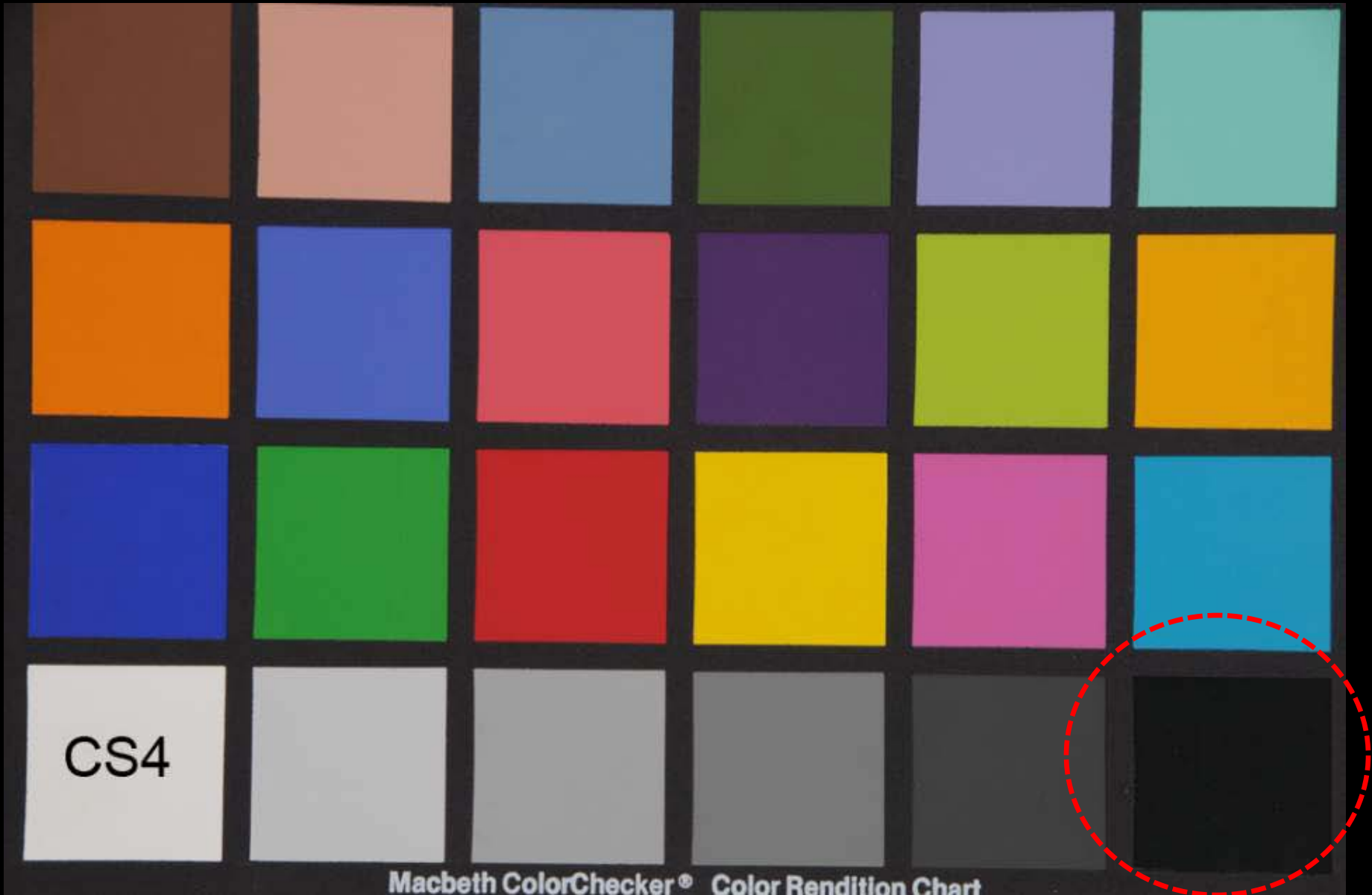
Camera Standard



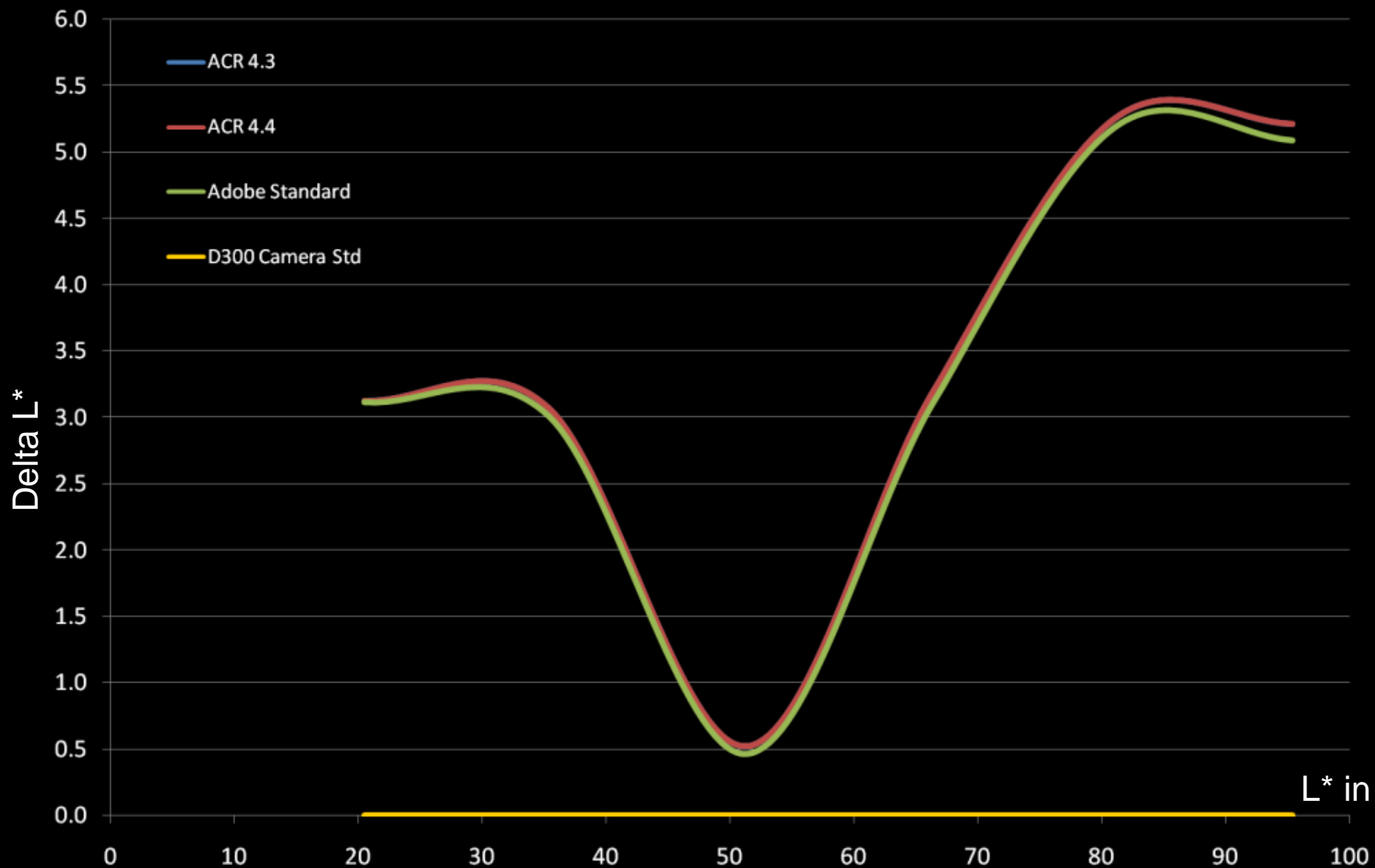
D300

Macbeth ColorChecker® Color Rendition Chart

Camera Standard



Adobe Profiles



Adobe Standard vs. Nikon Standard



Nikon NX



Adobe CS4

Adobe Standard vs. Nikon Standard



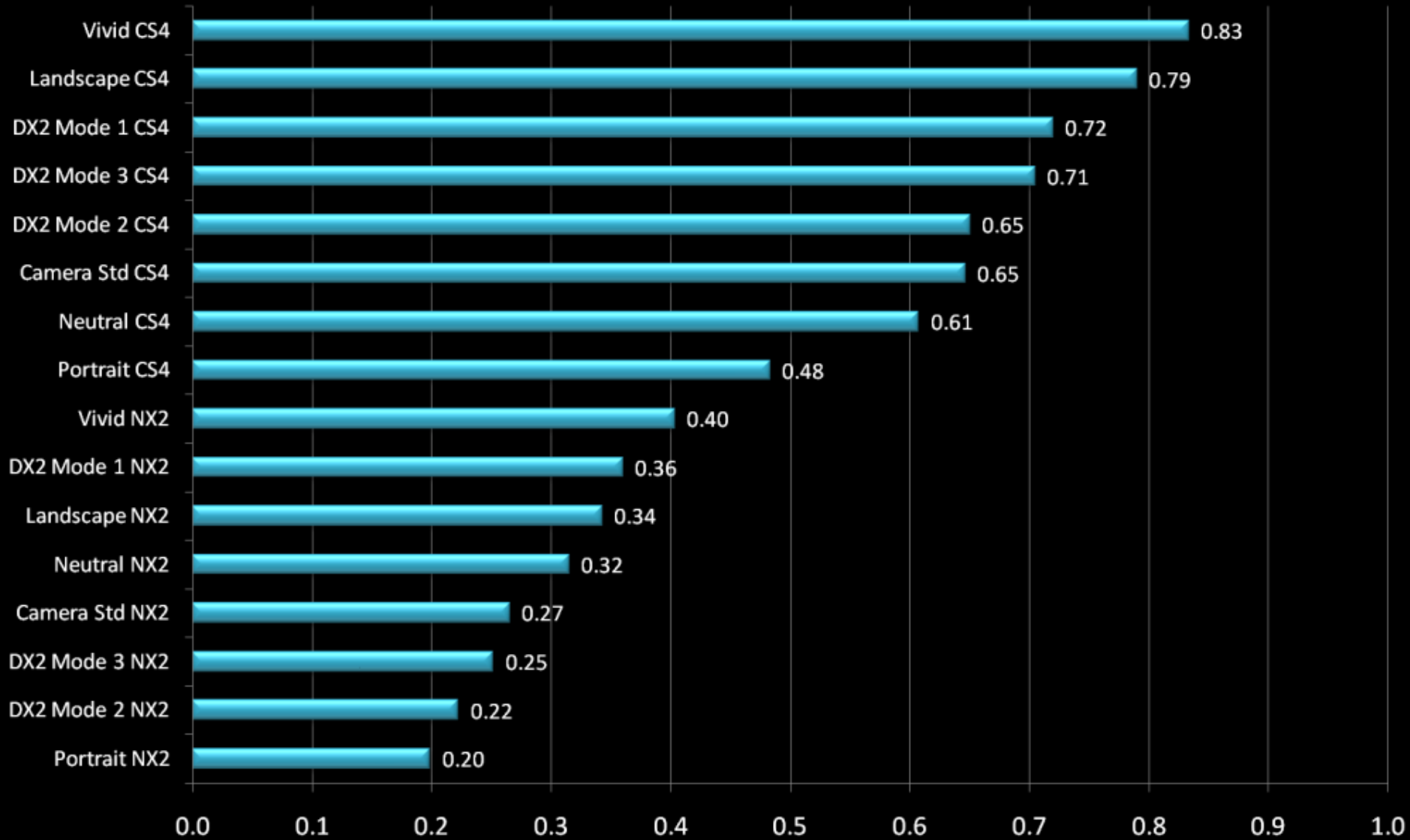
Nikon NX



Adobe CS4

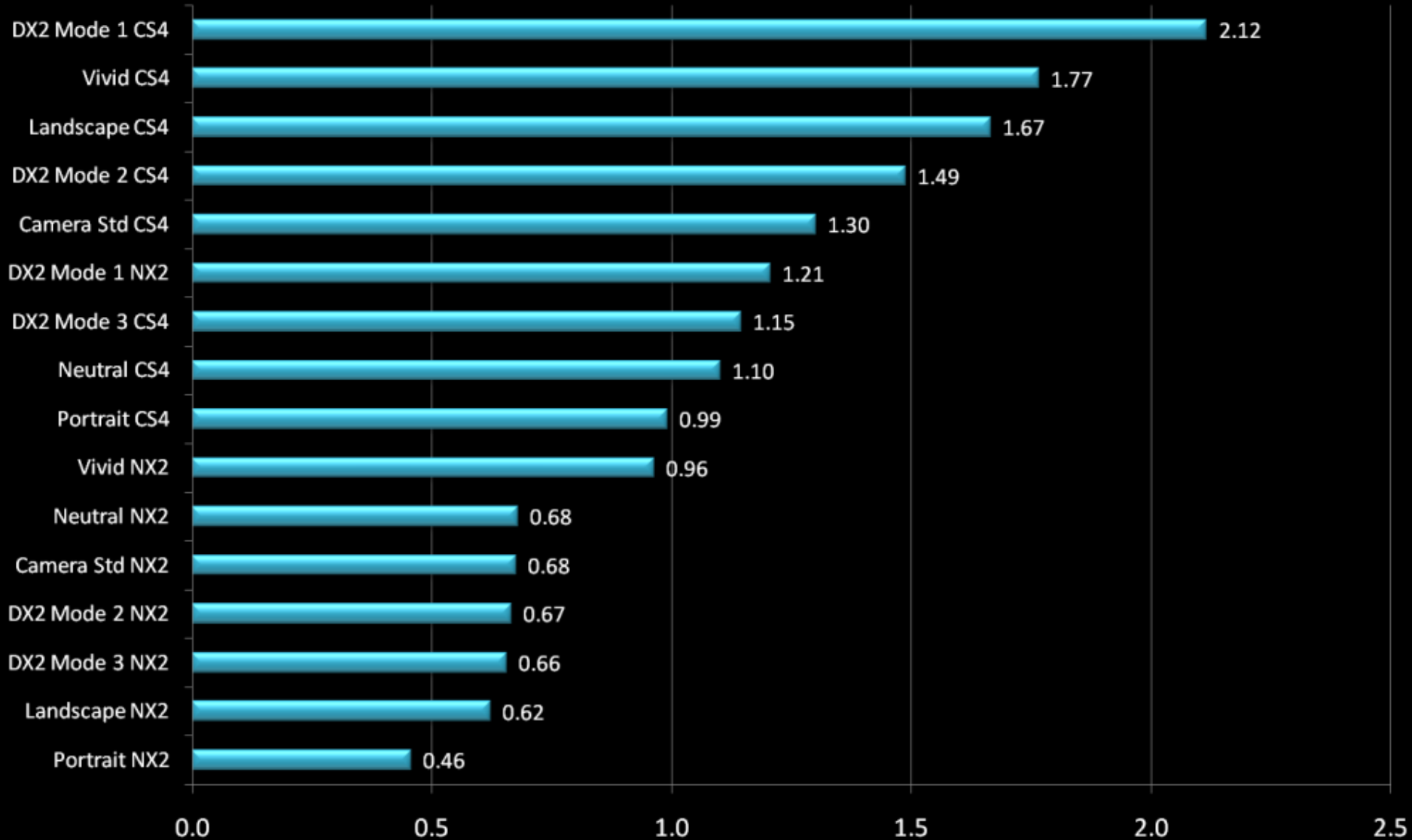
Average Colour Accuracy (Error)

Average DE200 c.f Camera



Maximum Colour Accuracy (Error)

Maximum DE200 c.f Camera



Colour Reproduction – Vivid



In Camera

Colour Reproduction – Vivid

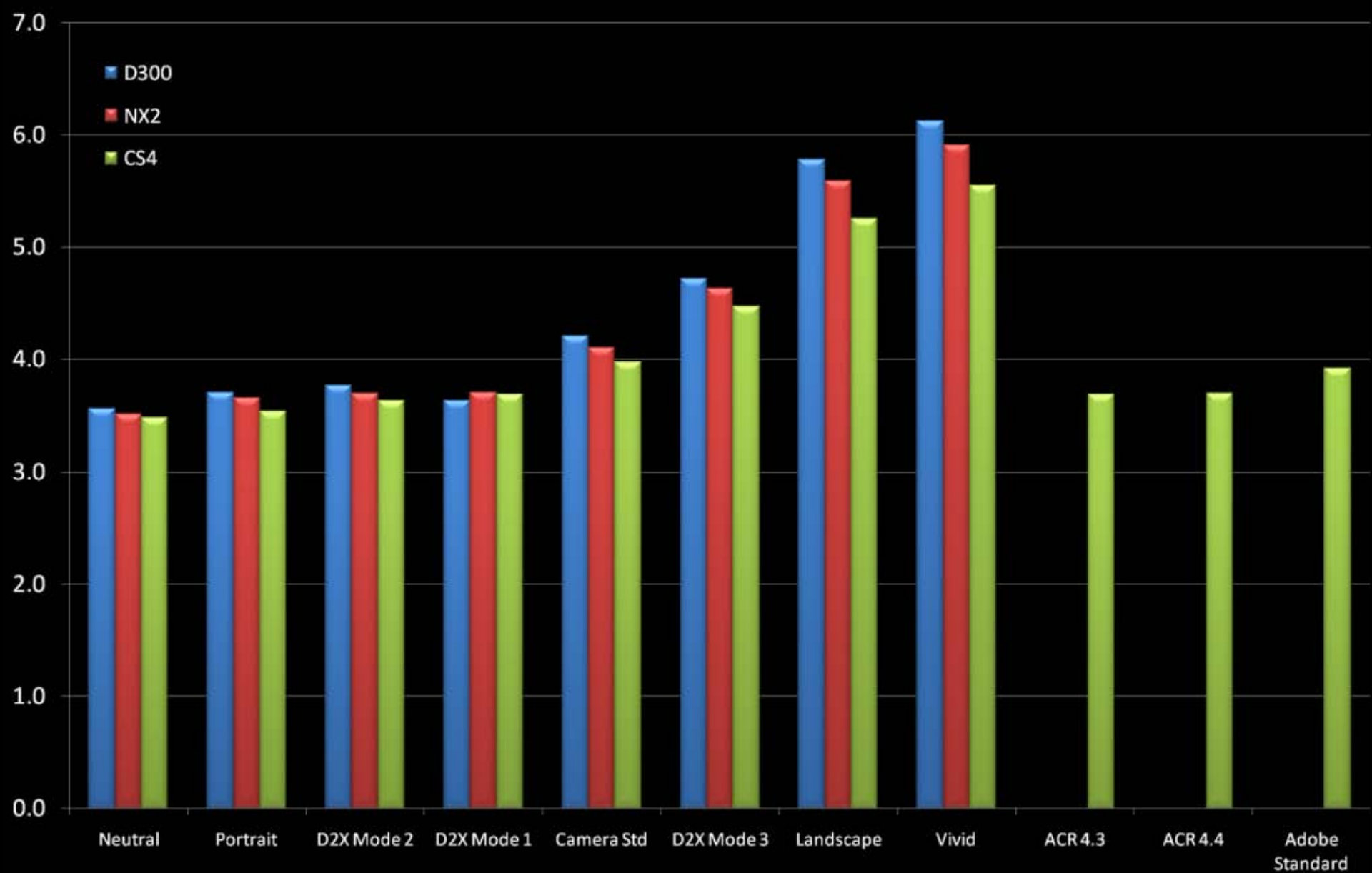


Adobe CS4

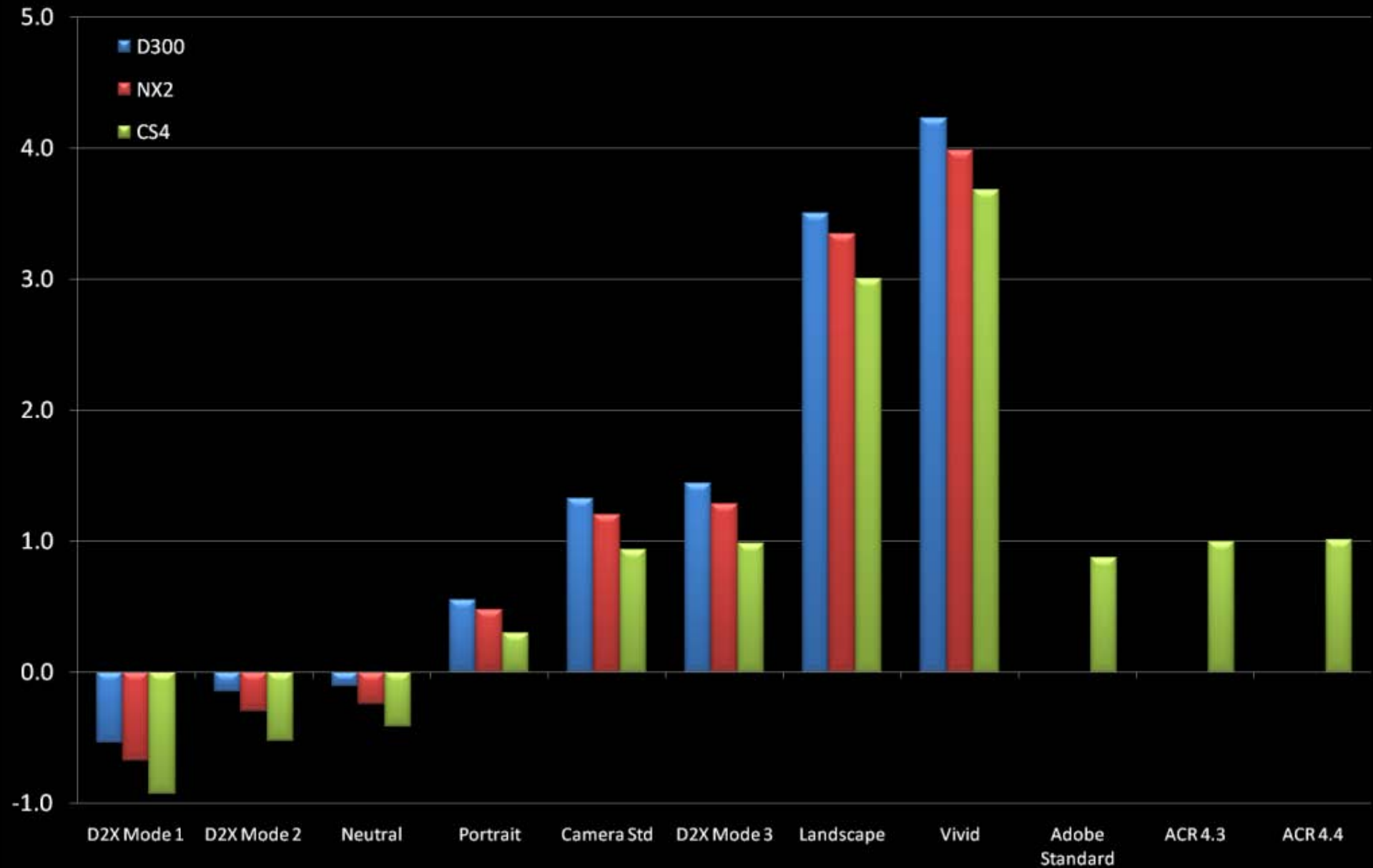
Tone Scale - Choices

- ◆ Camera vs. NX vs. CS4 – Tone Scale
 - Small differences in tone scale mainly confined to shadows where Adobe is trying to replicate in-camera performance
 - Big differences in preference between Nikon tone scales and Adobe tone scales (ACR 4.3/4.4 & Adobe Standard)
- ◆ Camera vs. NX vs. CS4 – Impact on Colour
 - Small differences in colour observed, influenced by tone scale differences
 - What about “real” colour preferences?
 - ◆ Nikon “looks” vs. Adobe “looks”

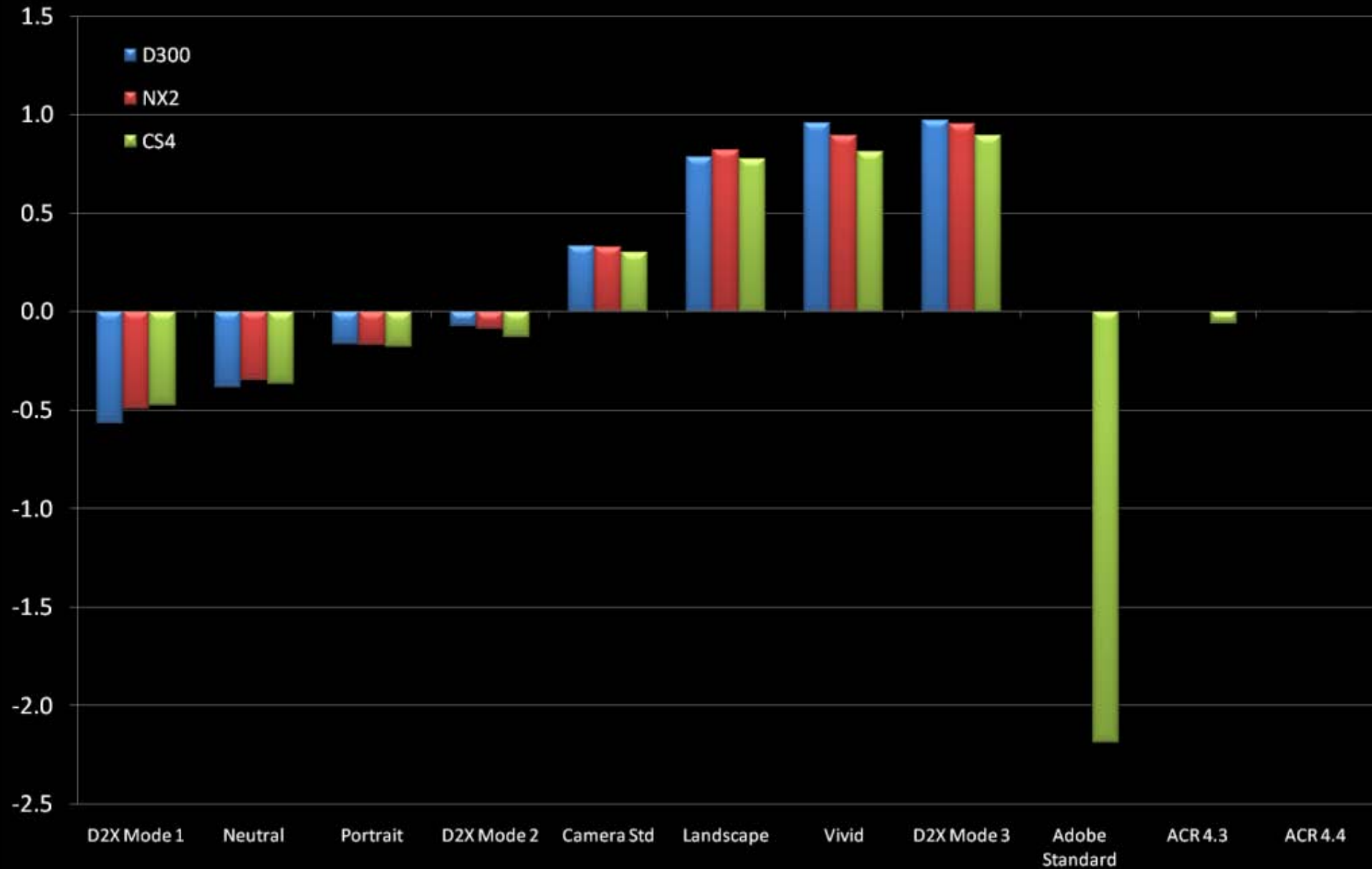
Overall Colour Accuracy (Error)



Overall Colour Saturation



Overall Hue Errors



Colour - Choices

◆ Nikon “looks”

- Overall colour becomes less accurate as the colour saturation increases
- Hue errors on average are small

◆ Adobe “looks”

- Overall accuracy similar to mid saturation Nikon “looks” for ACR 4.3 & 4.4 profiles
- Overall saturation similar to Nikon “camera standard”
- Adobe Standard very different in terms of hue error compared to all other profiles
 - ◆ **Worth investigating further!!**

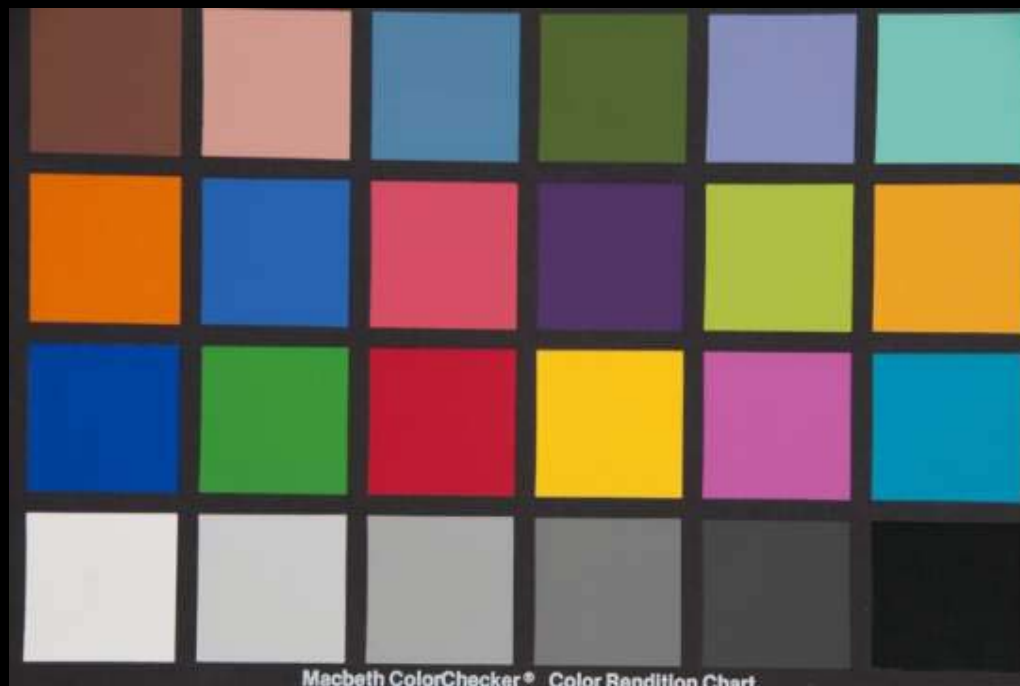
Nikon D300 Standard



Adobe ACR 4.4



Adobe Standard



Adobe Standard



Nikon D300 Standard



Adobe Standard



Nikon D300 Standard



Adobe Standard??

- ◆ Average hue error Adobe Standard -2.27
- ◆ Can this error be reduced?
 - Try Adobe DNG Profile Editor
- ◆ Optimise using Macbeth Color Checker
 - Average hue error 0.55
 - Similar to other profiles!
- ◆ **Does Adobe have a distinct preference for colour reproduction or is there a “bug” in ACR?**

Conclusions

- ◆ Lots of choice!!!
- ◆ Similar to choosing a film!
- ◆ Adobe emulation of Nikon Profiles
 - Broadly similar in overall saturation and colour reproduction
 - Tone scale differences in shadows
 - Not a true match but ACR 5.3 has a similar “look” to Nikon
- ◆ Adobe Standard
 - Different preference to previous Adobe profiles
 - Different to Nikon profiles
 - Blues >> cyan
 - Reds >> magenta
 - Skin tones >> pinker

Final Thoughts/Recommendations

- ◆ Regard choosing a profile (“look”) as the same as choosing a film
 - Depending upon scene content, lighting etc. choice of film may vary
 - Fuji Velvia not too good for portraits but may be great for certain landscapes
 - Kodak Portra 160 NC not too good for landscapes but great in the studio for portraits
- ◆ Get to know the “looks”
 - Explore the differences on a variety of scenes
- ◆ Simple life, can I just use one?
 - Yes of course, and tweak colour and contrast afterwards if you don't like the results on certain scenes

CS4 - Adobe Standard



CS4 - Camera Standard



CS4 - Camera Portrait



CS4 - Camera Vivid



CS4 - Adobe Standard



CS4 - Camera Standard



CS4 - Camera Portrait



CS4 - Camera Vivid





Thank You
Questions?

