



A metric of visual difference using the TC 8-16 candidate viewing conditions

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Choice of reference print conditions

Profile Name	Gamut Volume	Whitepoint			Blackpoint		
		L*	a*	b*	L*	a*	b*
FOGRA53 candidate 5	513872	97	0	-2	5	0	2
ISO Coated v2 300%	402279	95	0	-2	9	0	2
PSR_SC_STD_V2_PT.icc	297244	89	-1	5	7	-1	-2
JapanWebCoated	281370	90	0	-1	10	0	-1
SC paper (ECI)	261783	89	0	5	14	1	2
PSRgravureMF	173298	89	-1	4	18	0	-1
Uncoated_Fogra47L_VIGC_300	172361	95	0	-2	23	2	2
CGATS21_CRPC1	84280	85	1	5	32	0	1

Choice of 4 gamuts with indicative volumes

- Good progression in terms of gamut volume and lightness contrast
- Whitepoints are clustered around two centres (a bluish white and a yellow)
- Irregular gamut shapes pose a problem for a simplistic approach to image colour difference related to gamut volume alone
 - Therefore, for a first phase of work, a set of partially synthetic gamuts (i.e using scaled colorimetry) may be easier to work with.





Softproofing the 4 print conditions



- BenQ SW320
- Calibrated to D50 @ 160 cd/m²
- P2 viewing conditions
- After a training session and 'warm up', **observers are asked to rate overall visual difference on scale of 0 – 9**



D – CRPC1 Newsprint



C – PSR Gravure MF



B – Japan Web Coated



A – Fogra 39L



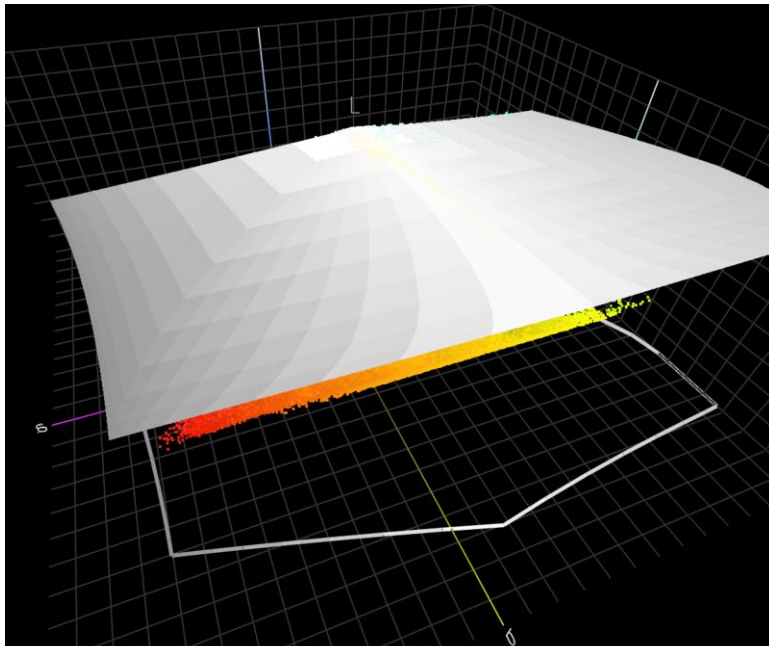
sRGB image set



- ISO 12640-2 (sRGB SCID)



Gamut concerns – D65 Adobe RGB display



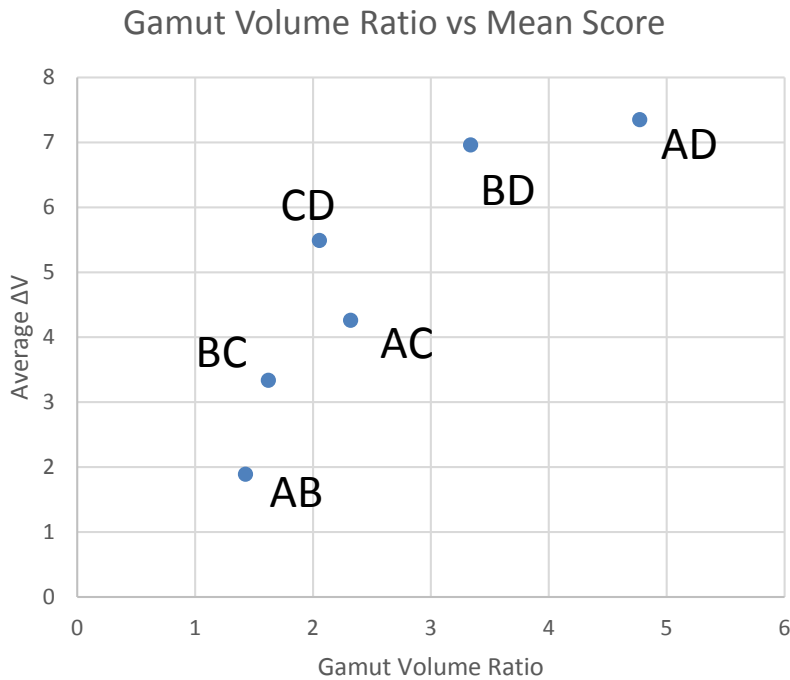
- Adobe RGB image colours fall outside display gamut when it is calibrated to D50

- When the display is calibrated to D50, its gamut shape and volume are modified
 - Reduced coverage in magenta/red/orange colours (relative to whitepoint)
- Potential clipping of colours from sRGB & Adobe RGB encoded images
- Solutions:
 - Adapt experimental work to D65.
 - Render reference images to a 'display safe' gamut.



Pilot Results

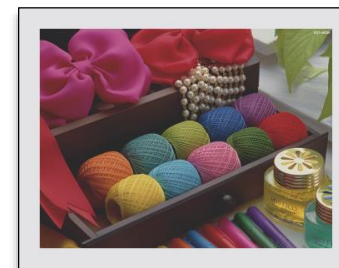
ΔV driven by gamut volume ratio?



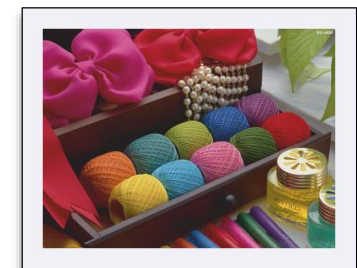
D – CRPC1 Newsprint



C – PSR Gravure MF



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- Average ΔV across all images as a function of the ratio of RPC gamut volumes



Observer STRESS₁

Intra-observer STRESS	
Obs_1	27.52
Obs_2	34.63
Obs_3	33.86
Obs_4	28.58
Obs_5	31.14
Obs_6	38.95
Obs_7	23.64
Obs_8	18.99
Min	18.99
Max	38.95
Mean	29.66

Inter-observer STRESS	
Obs_1	23.56
Obs_2	27.10
Obs_3	22.60
Obs_4	20.06
Obs_5	18.03
Obs_6	31.77
Obs_7	16.82
Obs_8	14.99
Min	14.99
Max	31.77
Mean	21.87

- Pilot experiment:
- 8 observers repeated the experiment
- Intra-observer variability mean STRESS = 29.66
- Inter-observer variability mean STRESS = 21.87

[1] Melgosa, Manuel, et al. *Notes on the application of the standardized residual sum of squares index for the assessment of intra-and inter-observer variability in color-difference experiments.* JOSA A 28.5 (2011): 949-953.



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Thank you for your attention

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