



GLOBAL GRAPHICS

CGATS SC3 TF1- Summary
Two Variables Uncovered

CGATS SC3-TF1 Research Summary

Goals:

- Better understand the Visual Pass / Fail Criteria used when comparing press sheet to digital proof matches for systems going for certification
- Run experiments to validate hypotheses of human visual system when viewing graphic arts prints
- Find critical issues from trained observers comments when looking for Just Noticeable Differences (JND's)
- Develop a measurement based approach to predict the acceptance of two prints intended to match

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Partial List of Experiments:

- Validity of ΔE^*_{76} of 2 as JND for different printer gamuts
- Ring around sample prints shifting in one color direction in CIELAB color values against a reference
- Threshold Analysis – to investigate the number of pixels (in a cluster required for the eye to notice a color difference within an image
- Color sensitivity based on location in CIELAB color space

Note : Experiments run to determine JND's not acceptable color appearance matches

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Partial List of Experiments Continued:

- Media color differences (white point adaption)
- Sub-sampling to dominate colors within images
- Contrast (Dynamic Range) variances
- Correlation of more current Delta E metrics to visual experiment data
- Impact of illuminant choice on Visual Appearance

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Results:

- Found several procedures able to predict noticeable color differences but image specific and thus not a general principle
- Found Delta E*2000 a good metric for color appearance match but not able to agree on a single value for color acceptance
- Found there are thresholds for minimum pixels needed in a cluster before observed as color difference

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Results Continued:

- Found most professional print buyers noticed media color difference as being problematic at the outset
- Found more attention needed to color around the L^* axis (neutrals) where observer experiments always noticed even very slight color differences

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Conclusions – 2 uncovered variables from experiments:

- Color appearance is altered (white point adaptation) if even small amounts of media background is visible (as compared to Craig's samples) so might need to be removed when comparing prints. Observers always noticed this in experiments. Needs some discussion.
- Observers consistently noticed contrast changes (also known as dynamic range) made to an image, even complex ones, which is likely to occur to some degree across the printing gamuts being investigated. Needs some discussion in my opinion?

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Conclusions Additional:

- Typical color images with a wide and varied color scheme can have a fairly large color change without users noticing.
- Near neutral colors and grays however have very low tolerance from experienced print buyers before being noticed and rejected. Perhaps a general and near neutral metric will be required.