The Effect of DLP™ White Channel Enhancement on Perceptual Gamut
Texas Instruments’ LDP™ Projector Technology

1 Chip DLP™ Projection

DLP Board
Processor
Memory
Projection Lens
DMD
Shaping Lens
Optics
Color Filter
Condensing Lens
Light Source
Screen

Image courtesy of Texas instruments’ website
Infocus LP650 Projector
Infocus LP650 Projector
Gamut in CIE xy
Projector Perceptual Gamut

CIECAM02
Lightness/Chroma

Volume Ratio: 1.58

CIECAM02
Brightness/Colorfulness

Volume Ratio: 0.92
Psychophysical Test Verification

- 27 expert judges scaled five (5) images for
  - Lightness and Chroma Contrast
  - Brightness and Colorfulness

in both Photographic Mode and Presentation Modes

- 8 foot wide screen in the Grum Learning Center (MCSL)
- Dark surround
- 23” Sony Monitor as a reference or anchor
Results - Log Lightness Contrast Ratio

CIECAM02 Prediction
Observed (95% C.I.)

Photographic Mode

Presentation Mode

Street Scene
Barn
Flowers
Woman
Coastal Town
average
Results - Log Chroma Contrast Ratio

Street Scene  Barn  Flowers  Woman  Coastal average Town

Photographic Mode

Presentation Mode
Results - Log Colorfulness Ratio

Street Scene Barn Flowers Woman Coastal average Town

Photographic Mode

Presentation Mode
Conclusions

- The effect of white channel enhancement
  - reduces perceptual gamut volume in Chroma and Colorfulness
  - is predicted amazingly well by CIECAM02 by an INCREASE in white point adaptation
- White point adaptation seems to be a powerful perceptual tool …
So what if we push the White Point down (instead of up)?

The MacAdam Limits

CIECAM02 Lightness/Chroma
Acknowledgements

• Many thanks to the MacBeth-Engel Fellowship Fund for making this work possible.
• And many thanks to my advisor, Dr. Mark Fairchild, for his support.