## Psychophysics in Color Science Education: Two Case Studies Hao Xie<sup>1</sup>, Yongmin Park<sup>1</sup>, Olivia Kuzio<sup>1</sup>, Joshua Gallaro<sup>1</sup>, Sara Leary<sup>1</sup>, Adi Robinson<sup>1</sup>, Samuel Morillas<sup>2</sup>, Michael J. Murdoch<sup>1</sup> <sup>1</sup>MCSL, RIT, Rochester, USA <sup>2</sup>Instituto Universitario de Matemática Pura y Aplicada, Universitat Politècnica de València, Valencia, Spain

## **Introduction of Psychophysics**

A core course in the Program of Color Science (PoCS) at RIT, Computational Vision Science (CVS) provides an introduction to modern computer-based methods for psychophysics. Two case studies from students' perspectives are presented: Difference Thresholds for Image Noise (Case #1) and MacAdam-style Ellipses Equivalent to 5  $\Delta E_{00}^*$  (Case #2).

Two psychophysical methods, both using 2-Alternative Forced Choice (2AFC), were respectively used:

**Method of Constant Stimuli**: fixed number of stimuli at random order; psychometric function fit and threshold at  $X_{75}$  (or  $X_{50}$ )

Adaptive Staircase: adaptive stimuli presentation (up & down) until enough reversals; more sampling near threshold



Program of Color Science Munsell Color Science Laboratory



 Calibrated display; • Three color centers at constant luminance (150 cd/m<sup>2</sup>); Proximity chromaticities in 8 directions with  $\Delta E_{00}^*$  from 1 to 10;  $5 \Delta E_{00}^*$  along +v' as references

- AFC: Which one (left or right) has larger color difference to the center patch?
- Stop until 12 reversals: 2-up-2-down for first 6 reversals, and 1-up-1-down followed;
- 11 sets of observations from 7 observers, 4 of which did twice
- Planckian 400K has the most variation of uniformity, whereas D65 has the least;
- The 7-observer perceptual results were consistent with the DE00 results of CIE standard observers