

Quantifying Perceived Chroma and Hue Changes of Object Colors in Lighting due to Hunt Effect

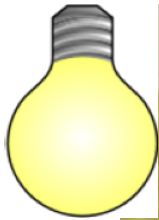
Yuki Kawashima and Yoshi Ohno

National Institute of Standards and Technology, USA

Hunt Effect

The illuminance level of the lighting can affect to the perceived saturation

Low light level

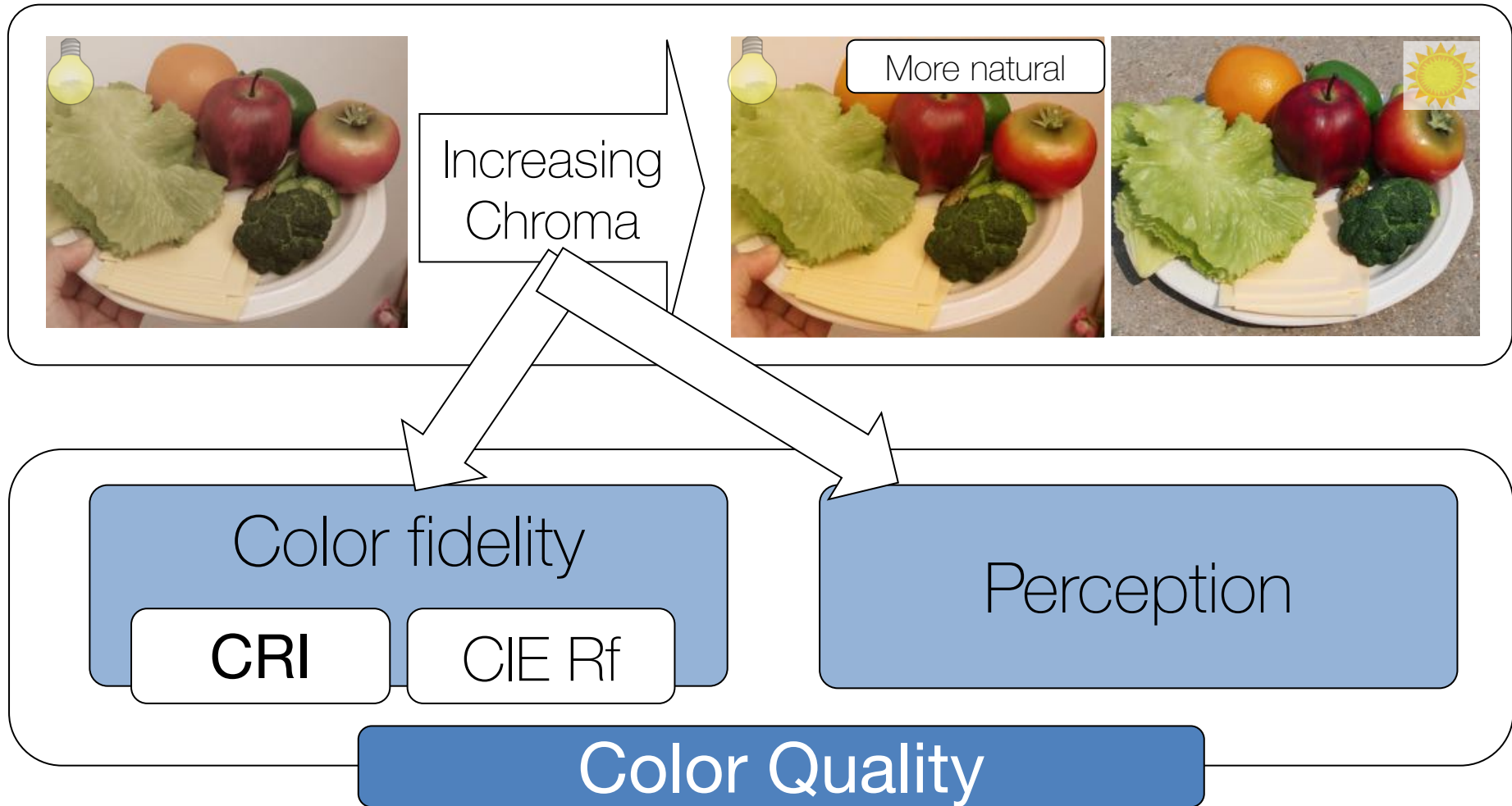


High light level



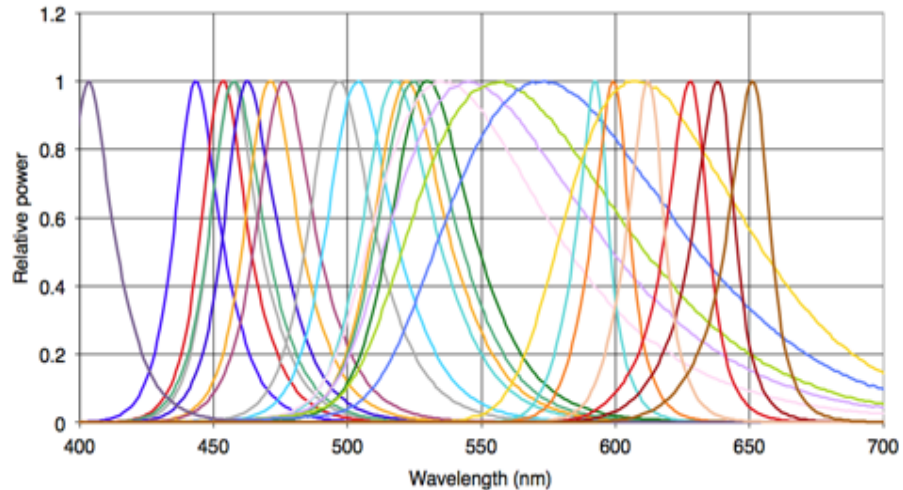
Introduction - Hunt Effect on Color Quality

2



- However, there are only a few studies about Hunt Effect using light levels for general lighting

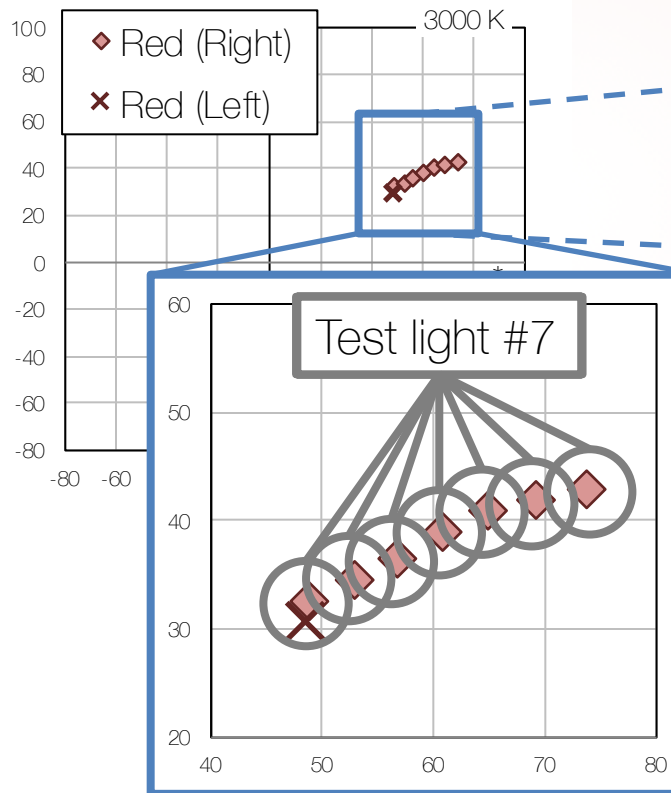
3



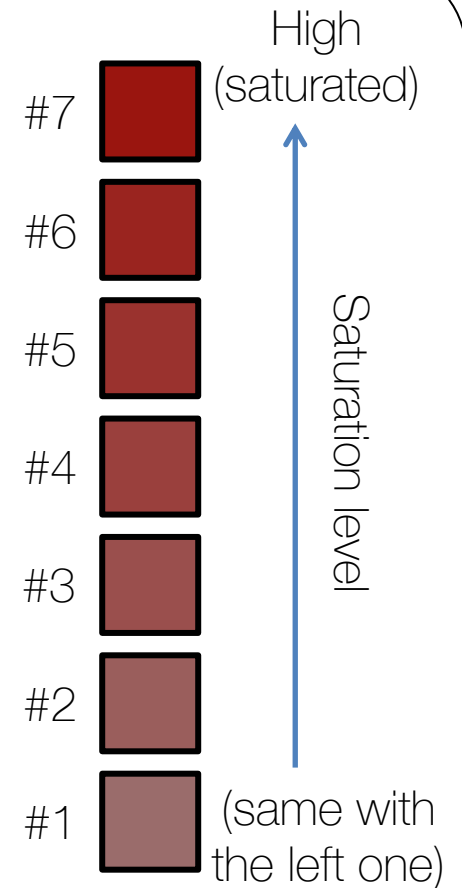
Introduction - 2018 Experiment

4

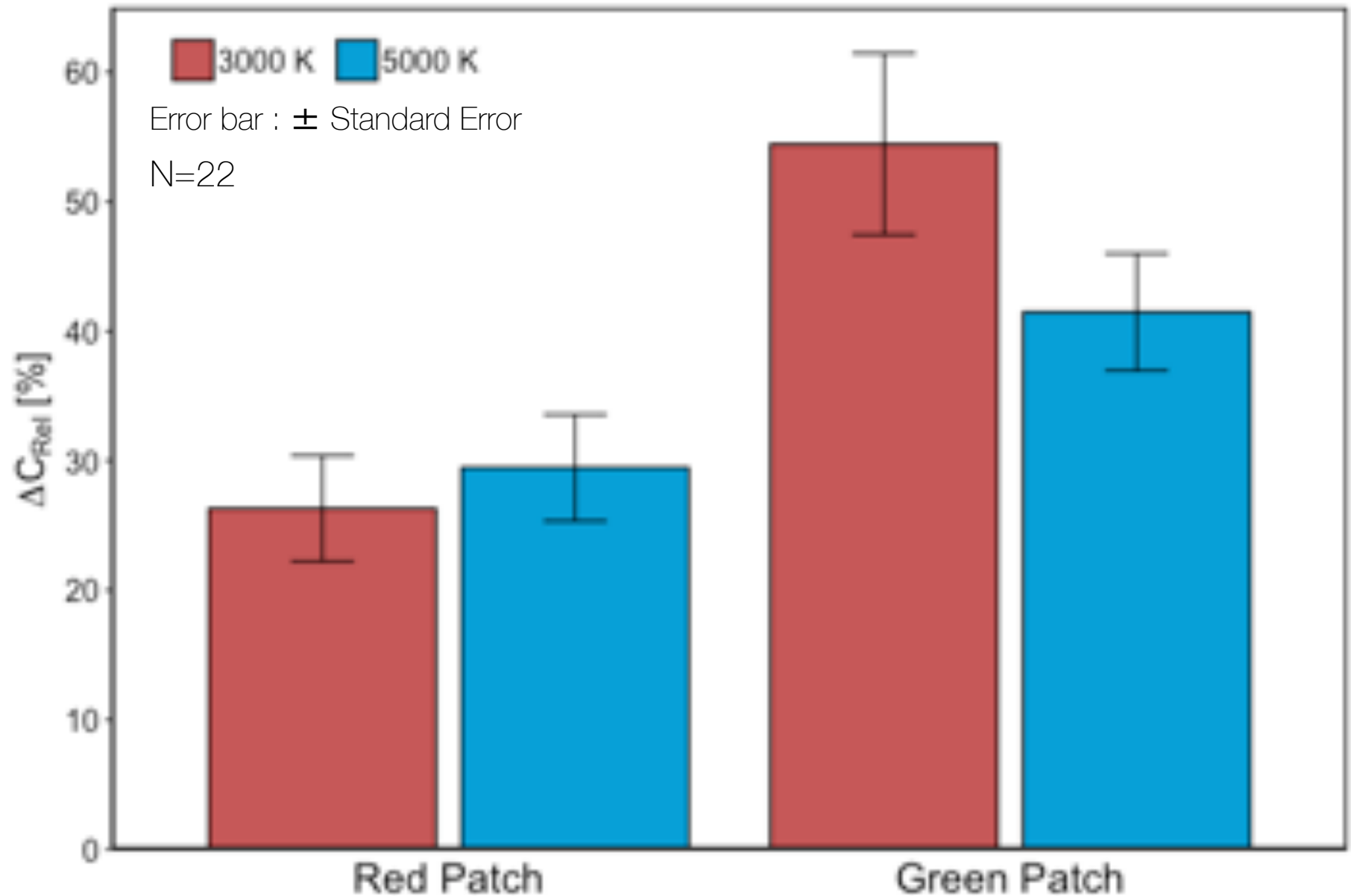
Reference light (1000 lx)



Test light (100 lx)

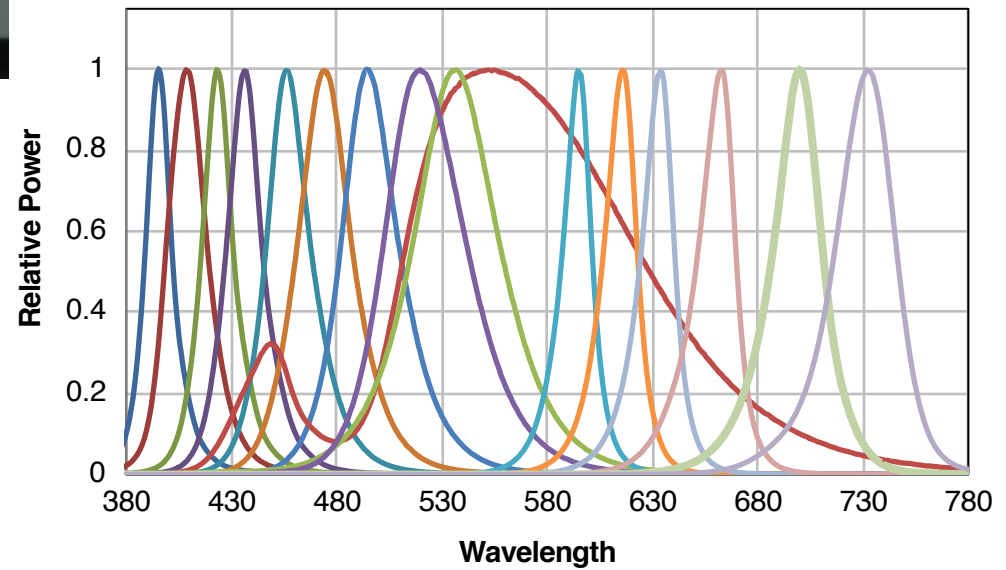
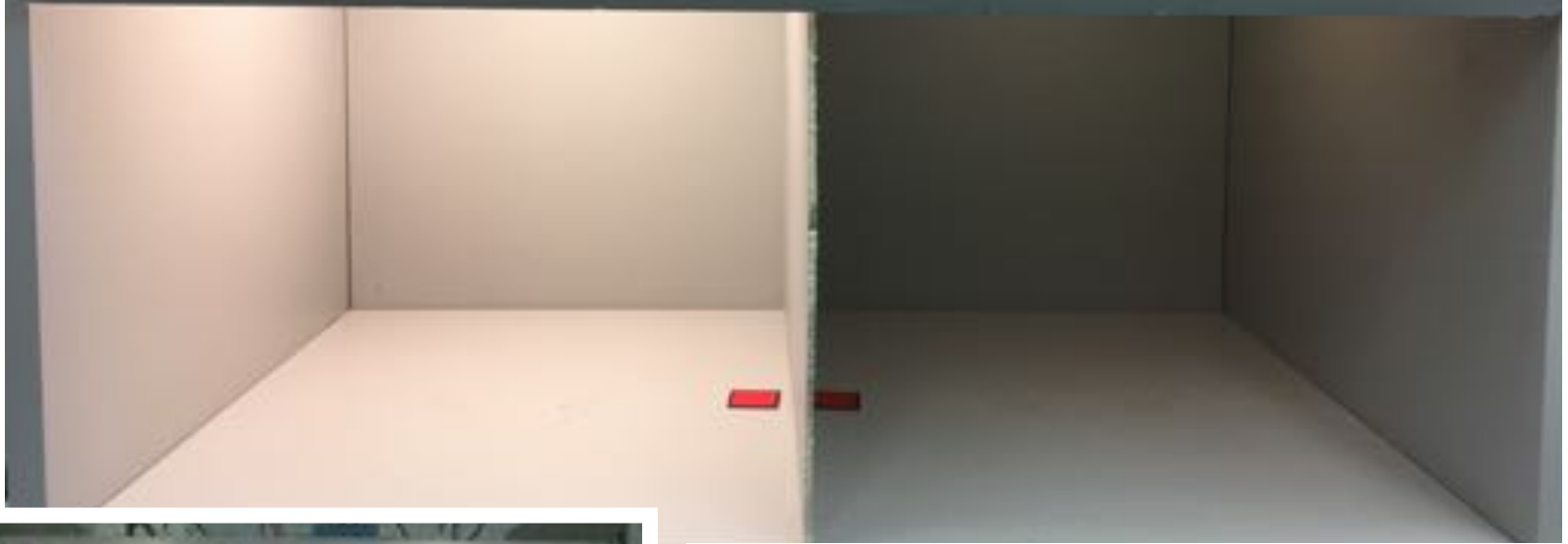


Subjects select a test light that makes the right-side color patch closest to the left side one



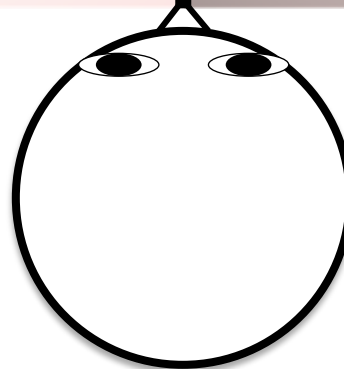
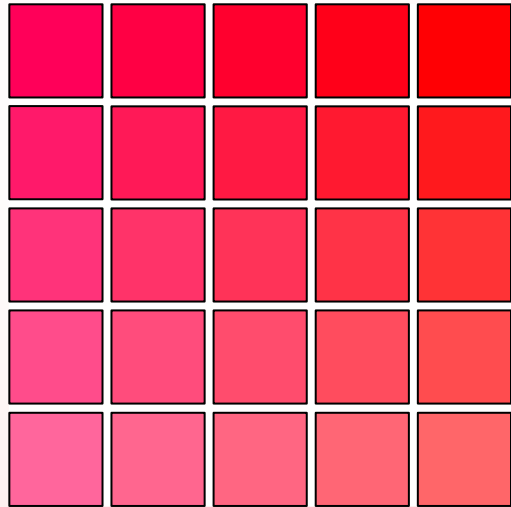
Quantifying changes of chroma saturation
and to verify whether *hue angle shift* occurs
by Hunt Effect with *yellow and blue* in
addition to red and green

Spectrally-Tunable (ST) Double Booth



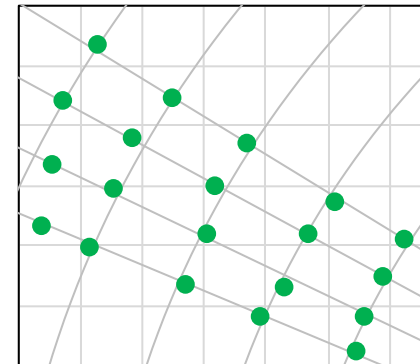
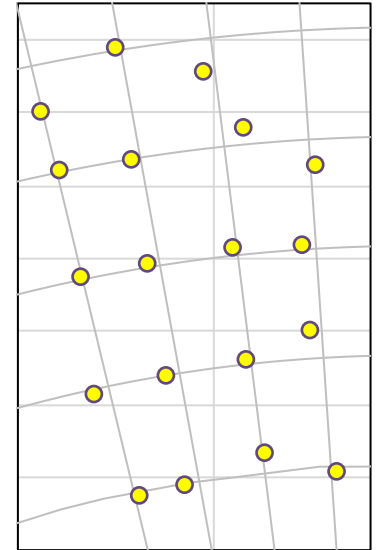
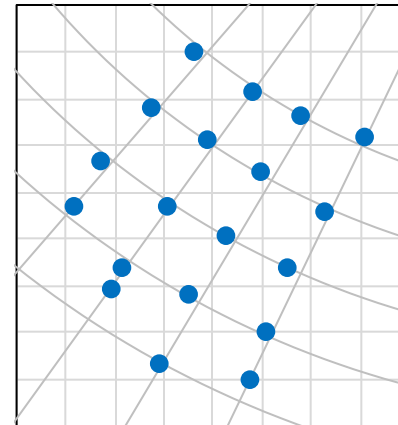
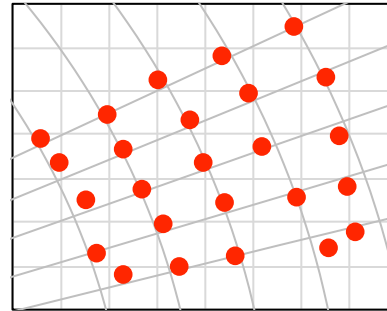
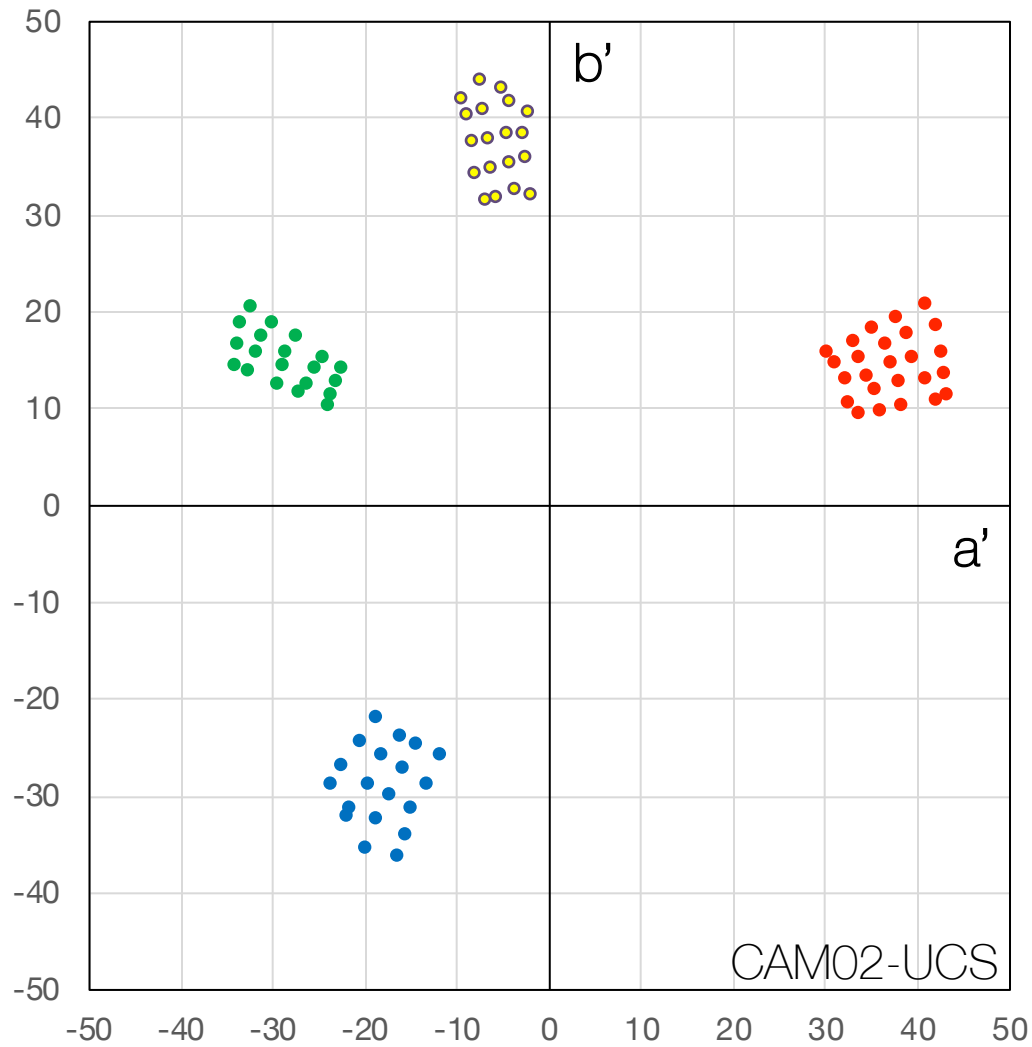
1000 lx light

100 lx light



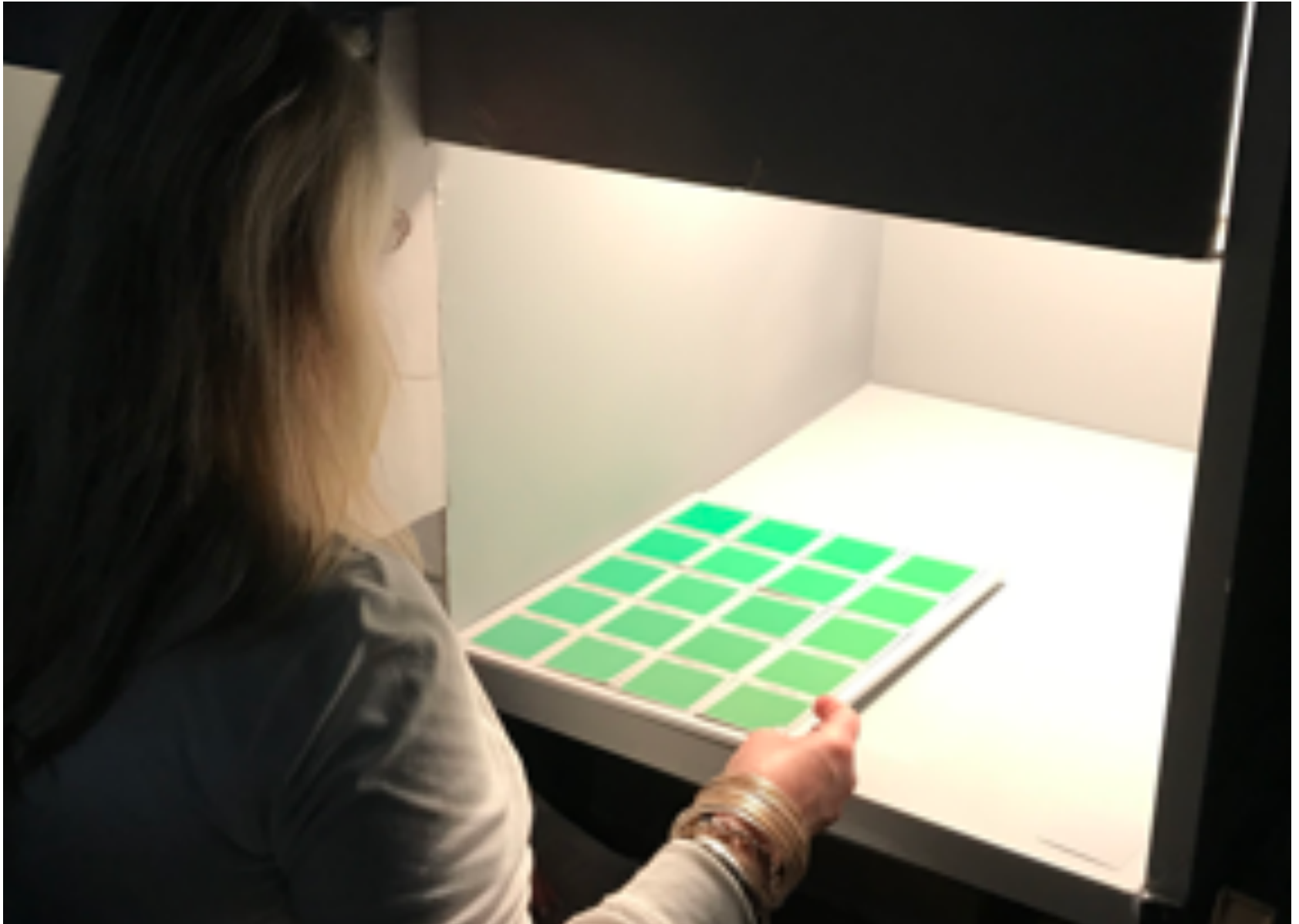
Method - Color Patches

9

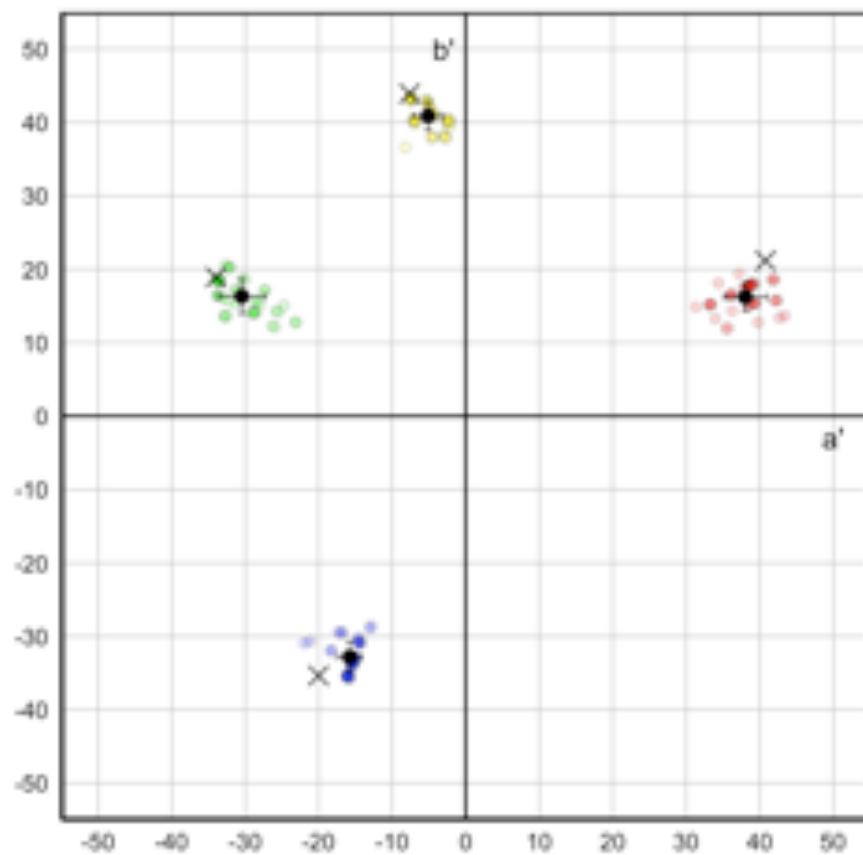


Method – Haploscopic viewing

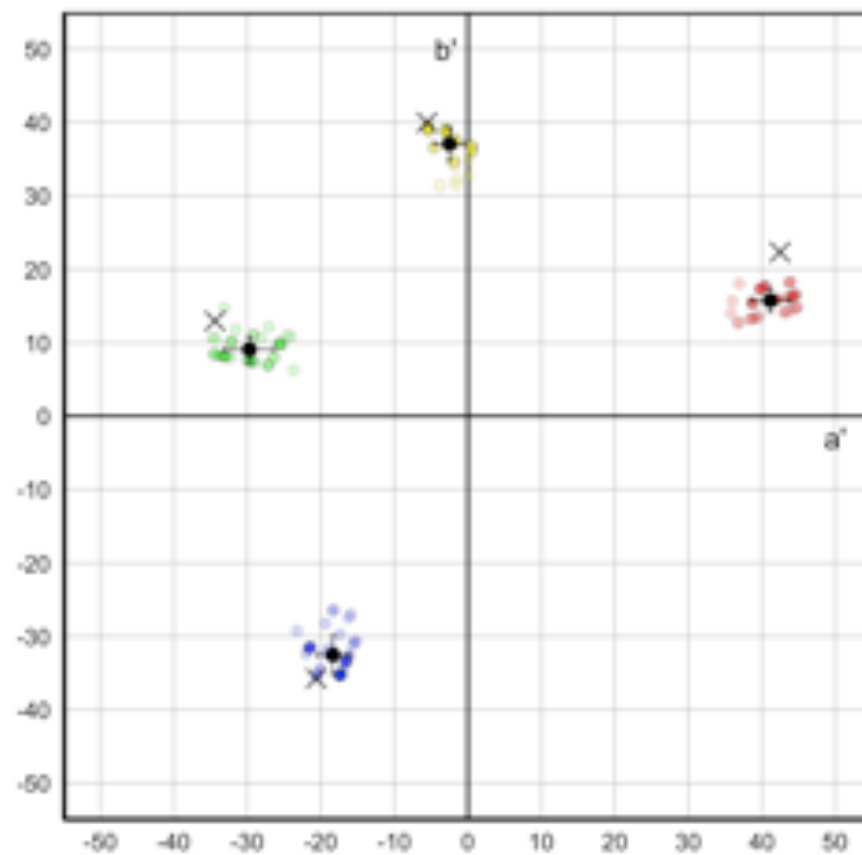
10

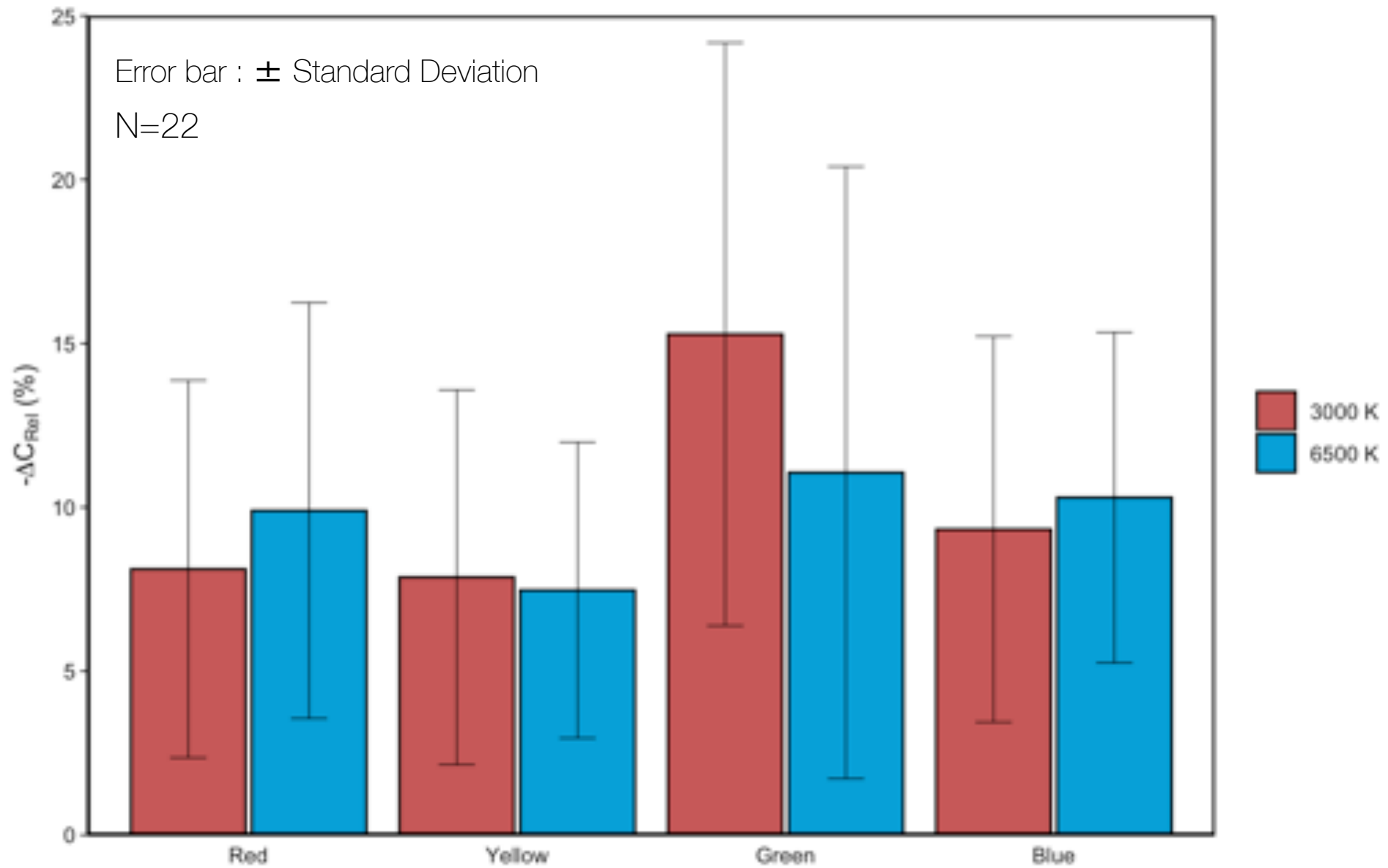


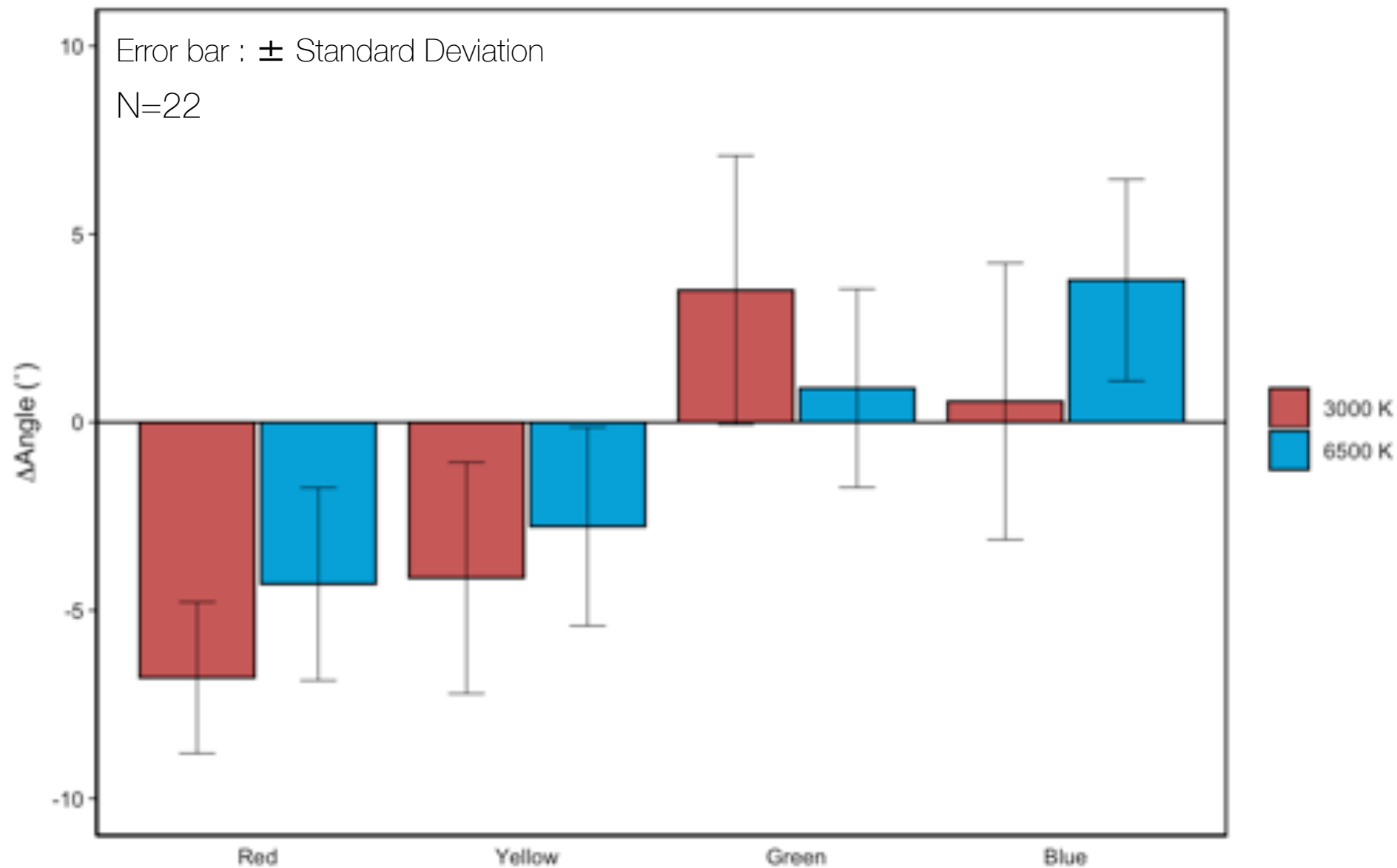
6500 K

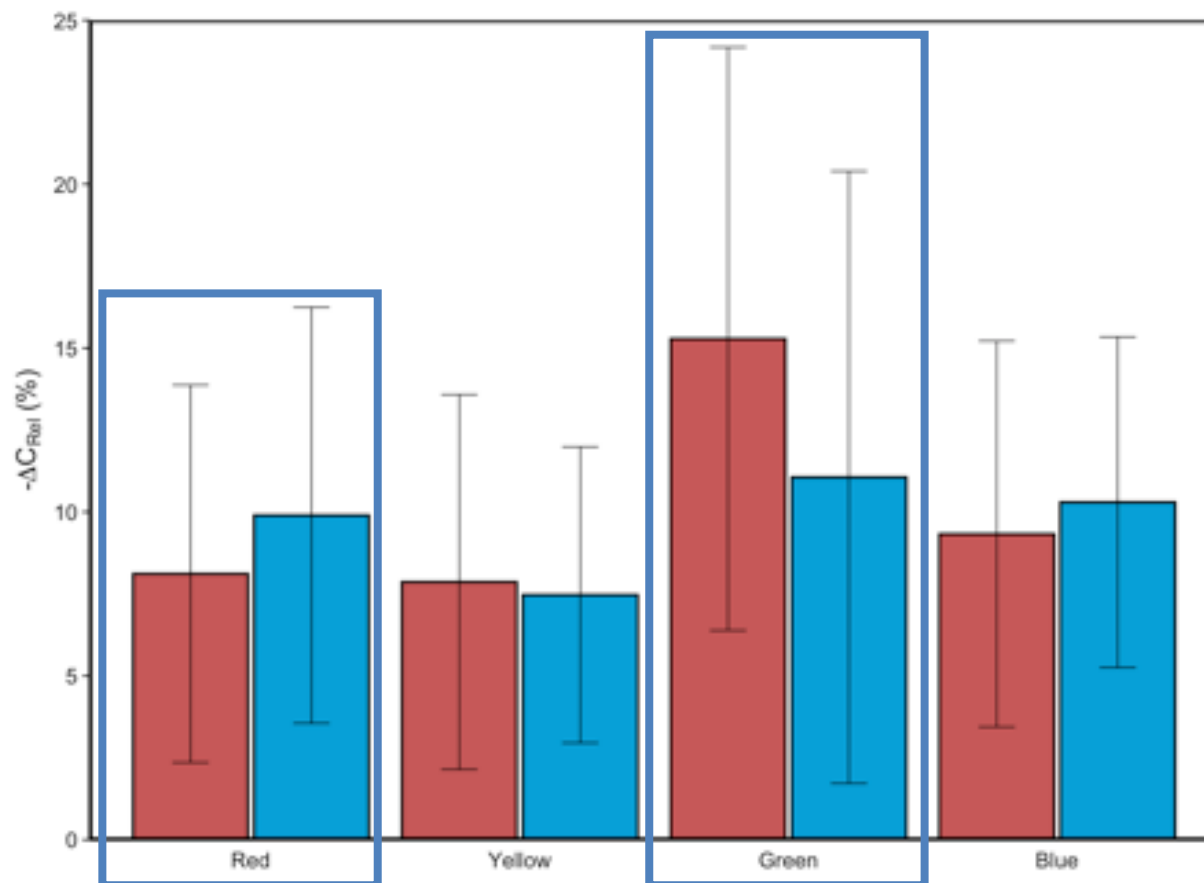


3000 K





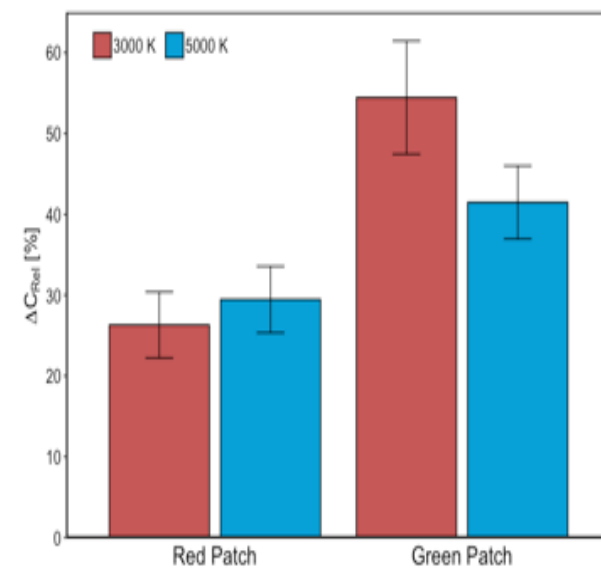




ANOVA (Color of patch x CCT)

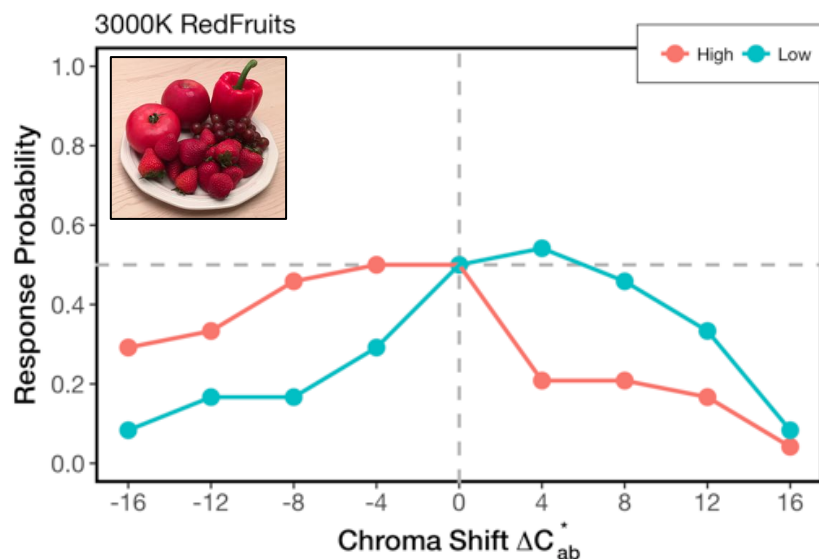
- Significant main effect: color of patch
- Interaction between color of patch and CCT
 - 3000 K/Green v. Red: Significant
 - 6500 K/Green v. Red: Not significant

Experiment 2018

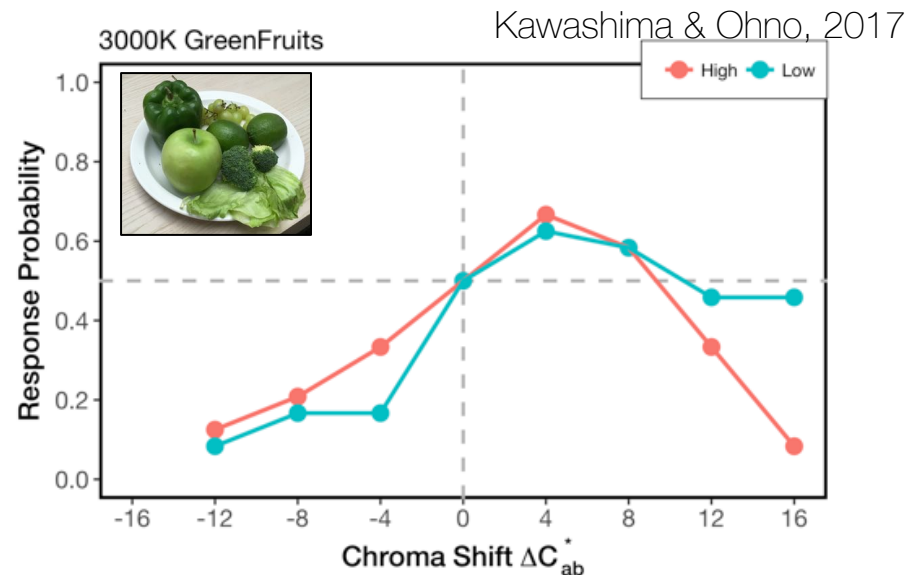


The green patch needed more chroma saturation for matching than the red patch

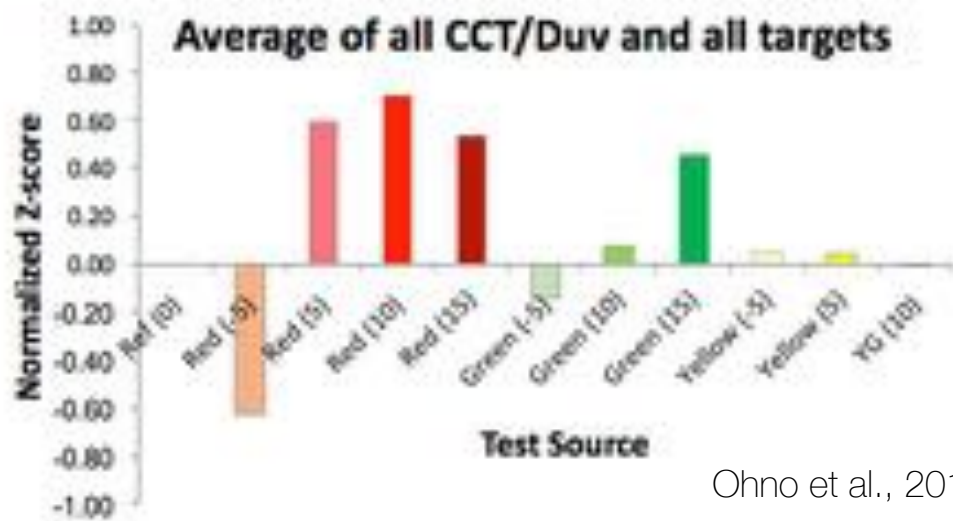
Discussion



- Changes of the objects' appearance was easily detected



- Changes of the objects' appearance was hardly detected



- Chroma changes of red has the largest effect on the preference for illuminated objects
- Green was 2nd

The experimental results showed

- The hue angles also shifted slightly in different directions for different colors due to the Hunt effect
- At 100 lx level, the chroma saturation decreased by 8~15% compared to those at 1000 lx
 - The green patch needed larger chroma decrease for matching than the other patches