

leads to higher accuracy. However, considering both matching accuracy and time efficiency, six observers and four starting points were estimated as sufficient to obtain accurate and stable results.

Colour Variations Within Light Fields: Interreflections and Colour Effects

Cehao Yu¹, Elmar Eisemann² and Sylvia Pont¹

¹Perceptual Intelligence Laboratory, TUDelft, the Netherlands

²Computer Graphics and Visualization Group, TUDelft, the Netherlands

The human visual system incorporates knowledge about local chromatic and lightness effects of interreflections (Bloj et al., *Nature*, 1999). Here, we study basic principles behind chromatic effects of interreflections using computational modelling and photometric measurements. The colour of interreflections varies as a function of the number of bounces they went through. Using a computational model, we found that those colour variations can show brightness, saturation, and even hue shifts. Using a chromatic Mach Card, a concave folded card with both sides made of the same colour, we demonstrated those three types of colour effects empirically. Finally, we tested the effects of such coloured interreflections on light fields in three-dimensional spaces. Via cubic spectral illuminance measurements in both computer simulations and full mock up room settings under different furnishing scenarios, we measure the chromatic variations of first-order properties of light fields. The types of chromatic variations were found to depend systematically on furnishing colour, lighting, and geometry, as predicted, and also vary systematically within the light field and thus throughout the space. We will next compare the physical light fields with visual light fields (including chromatic properties) and test perceived material colours for (combinations of) the three types of effects.

Is Color Assimilation Only Due to a Luminance–Chromatic Interaction?

Xavier Otazu and Xim Cerda-Company

Department of Computer Science, Computer Vision Center, Universitat Autònoma de Barcelona, Spain

Color induction is the influence of surrounding objects (the inducers) on the color of the target region. When the target's color shifts away from the one of the first inducer, color contrast is occurring; and when the target's color shifts toward the one of the first inducer (opposite effect), color assimilation (CA) occurs. In a previous study, we observed that CA depends on the luminance

differences. We concluded that this luminance effect is stronger along the *s*-axis of the MacLeod–Boynton color space, supporting the mutual-inhibition hypothesis (activated luminance neurons inhibit color neurons and, thus, CA is stronger). To test this hypothesis for a chromatic–chromatic interaction instead of a chromatic–luminance one, we defined four chromatic conditions along the diagonals of MacLeod–Boynton color space (activating both konio- and parvocellular pathways) and five luminance conditions (two darker and two brighter than the first inducer, plus equiluminant). Similar to the previous study, we observed that CA is stronger along the *s*-axis. Moreover, we observed that CA only depends on the luminance contrast (i.e., we observe no CA at equiluminance). This could suggest that mutual-inhibition hypothesis is only valid considering a luminance–chromatic interaction and that no mutual-inhibition exist between konio- and parvocellular pathways.

Saturating Luminance-Sensitive Mechanisms Reveals the Sensitivity of hV4 and V3A to Colour

Rebecca Lowndes^{1,2}, Lauren Welbourne^{1,2}, Molly Williams¹, Andre Gouws^{1,2}, Alex Wade^{1,2,3} and Antony Morland^{1,2,3}

¹Department of Psychology, University of York, UK

²York Neuroimaging Centre, University of York, UK

³York Biomedical Research Institute, University of York, UK

Ventral visual areas are thought to play an important role in colour perception, while the dorsal pathway appears to be more aligned with achromatic motion processing. Here, we explored how a typical ventral area (hV4) and a typical dorsal stream area (V3A) respond to chromatic and achromatic contrast modulations when achromatic responses are attenuated. We used population receptive field techniques to identify areas hV4 and V3A in six subjects. We then presented chromatic and achromatic probe patterns (L+M+S contrast at 15%, L-M contrast at 2.7%, or S-cone contrast at 10.5%) superimposed on a constantly present, flickering achromatic background to saturate responses from luminance-sensitive mechanisms. The background comprised an array (100 × 100) of dynamically modulated 0.2° checks (50% L+M+S contrast). The probe gratings were additional modulations of this background that added chromatic or achromatic contrast in a square wave pattern (1.25 c/deg or 2.5 c/deg) within the central 10°. hV4 was more responsive to colour than V3A, and hV4, but not V3A, showed a reduced response for higher spatial frequency, particularly for the S-cone stimuli. We show that “pure” colour responses in hV4, but not V3A, are robust and depend on spatial frequency in a way that maps onto human behaviour.