

Categorical focal colours are structurally invariant under illuminant changes

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The visual system perceives the colour of surfaces approximately constant under changes of illumination. In this work, we investigate how stable is the perception of categorical “focal” colours and their interrelations with varying illuminants and simple chromatic backgrounds. It has been proposed that best examples of colour categories across languages cluster in small regions of the colour space and are restricted to a set of 11 basic terms (Kay and Regier, 2003 *Proceedings of the National Academy of Sciences of the USA* **100** 9085–9089). Following this, we developed a psychophysical paradigm that exploits the ability of subjects to reliably reproduce the most representative examples of each category, adjusting multiple test patches embedded in a coloured Mondrian. The experiment was run on a CRT monitor (inside a dark room) under various simulated illuminants. We modelled the recorded data for each subject and adapted state as a 3D interconnected structure (graph) in Lab space. The graph nodes were the subject’s focal colours at each adaptation state. The model allowed us to get a better distance measure between focal structures under different illuminants. We found that perceptual focal structures tend to be preserved better than the structures of the physical “ideal” colours under illuminant changes. [This work was partially funded by projects TIN2010-21771-C02-1 and Consolider-Ingenio 2010-CSD2007-00018 from the Spanish MICINN. CAP was funded grant RYC-2007-00484]