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## Painting with light by Rob and Nick Carter: Dramatic failures of colour constancy in articulated scenes

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**Abstract.** Recent work by British artists Rob and Nick Carter uses kinetic lights illuminating abstract photographic prints to induce dramatic failures of colour constancy.

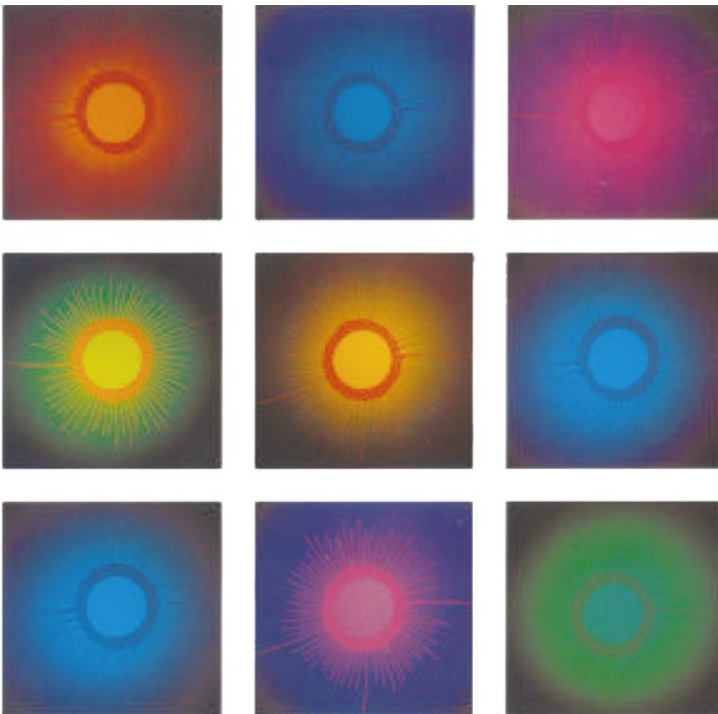
Colour constancy refers to our ability to perceive constant surface colours despite frequent and often large changes in ambient illumination. It has always been regarded as one of the most remarkable achievements of the visual system, even though early measurements of colour constancy in precisely controlled laboratory conditions indicated that the degree of constancy is considerably weaker than our everyday experience might suggest (Helson and Judd 1936; Arend and Reeves 1986). Attesting to the importance and the extent of colour constancy, recent measurements in laboratory settings closely approximating natural viewing conditions have revealed that, although not perfect, it approached an astonishing 83% (Kraft and Brainard 1999). In light of these new findings, one could be excused for taking colour constancy for granted, especially in natural, non-impooverished, real-life settings. Consequently, we were very much puzzled and impressed upon encountering some dramatic examples of failures of colour constancy in a real-life setting. Well, almost real-life. While in Cork Street, London, visiting a Bridget Riley retrospective, we were intrigued by Rob and Nick Carter's show entitled "Painting with Light" at the Beaux Arts Gallery.

"Photographs without camera, paintings without brushes" is how Rob and Nick Carter describe their artwork. Light from a variety of sources ranging from fluorescent tubes to lasers is applied directly to photosensitive material, which is then processed in the normal way. Most of the prints are finished with the application of paint, applied by hand or dripped onto turntable-mounted spinning prints (the website [www.robandnick.com](http://www.robandnick.com) contains many fine examples of these dynamic compositions). However, their most interesting artworks are the ones using 'colour-kinetic' lights. These are truly 'paintings with light', as the most dramatic effects result not just from the pigment on the artwork surface but from the way it interacts with light falling on it.

Photographic prints (45 inch × 45 inch) are viewed under illumination slowly changing in chromaticity (Lighting Technology, C-200s light sources). Two light sources set to scroll through the visible spectrum once every 20 s are diffusely projected onto the surface of a print. Figures 1 and 3 show two such original prints, *Pressure Drop* and *Pulse State*, respectively. When viewed under changing illumination produced by colour-kinetic lights they appear to change dramatically, as illustrated in figures 2 and 4. Instead of the expected relative stability of perceived colour, one is faced with a static print that looks more like a computer monitor constantly cycling through colour look-up tables. Of course, it has long been known that sufficiently great illumination changes may radically alter surface colours (see Hurlbert 1999; Maloney 1999) but such alterations in surface appearance are usually accompanied by the perception of salient



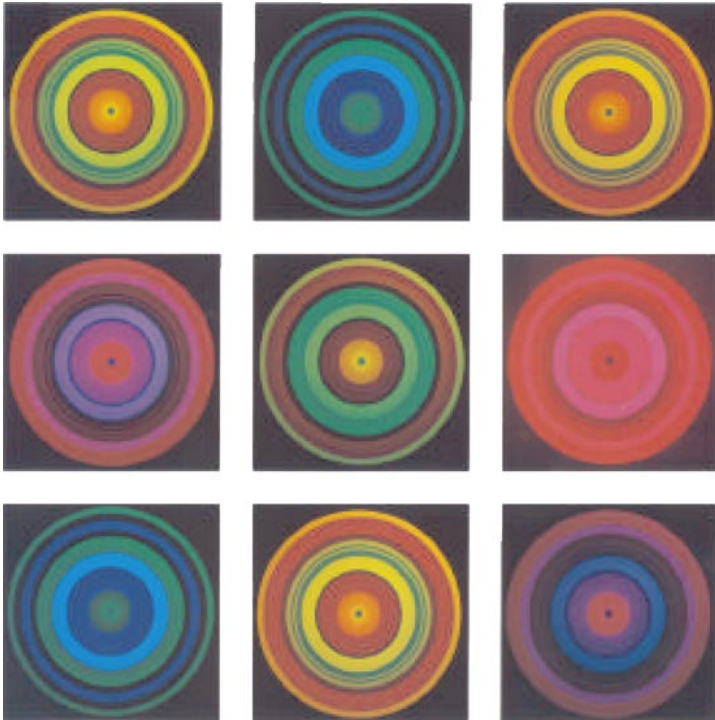
**Figure 1.** Original Cibachrome print *Pressure Drop*.



**Figure 2.** Nine photographs showing *Pressure Drop* when lit with colour- kinetic lights.



**Figure 3.** Original Cibachrome print *Pulse State*.



**Figure 4.** Nine photographs showing *Pulse State* when lit with colour-kinetic lights.

changes in illumination as well. In other words, observers typically have little difficulty in distinguishing between a change in illuminant and a change in the materials comprising the scene (Craven and Foster 1992; Nascimento and Foster 1997). Interestingly, one does not perceive any changes in illumination falling on these prints. Instead, all changes appear to be associated with the appearance of distinct chromatic regions in the prints.

Overall, the degree of perceived changes is just astonishing. The artists report that the effect does not seem to be diminished by substituting a black surround for a white one or with different spatial arrangements, for example vertical stripes. The degree of perceived chromatic changes for *Pulse State* (that has quite a high number of distinct colours) seems as high, if not higher, than for *Pressure Drop* (that has only two distinct colours). These examples seem to challenge the assumption that, despite changes in illumination, both the ‘accuracy’ and stability of colour perception should improve with the degree of articulation in the scene (where ‘articulation’ is taken to refer to a number of distinct surfaces present in the scene). However, the exact nature of this real-life failure of colour constancy requires further investigation.

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