

Colorimetry: What's next?

A dear friend, who could maybe recognise himself in these words, once told me a long time ago that the real goal of a mentor, a PhD supervisor or teacher, is to push their disciples to overtake the master, to not only do better but, following the scientific method, to prove (if it is the case) that the mentor is wrong. These are not just words: they are the key to progress.

Science is not just about having the answer, it is also about posing good questions. It is not about admiring or being admired for publishing several important papers, but about the generosity of spreading ideas and fostering interest in what we care about. It is not about having your name on the latest algorithm, or having performed the experiment which proves that the latest algorithm is flawed. It is about forging new directions and motivations.

Thus, here we are about colour and colorimetry. Colour is such a complex topic, entangled with many other fields of research, with contributions developed in different subfields; for this it is vital to foster interdisciplinary critics and scientific challenges. Colour is inherently a meta-discipline. Now is the right time to collate many different points of view to search for new directions and motivations.

This special issue, for which we are very grateful to the journal, the Editor-in-Chief, and to those colleagues who believed in it, is a very unusual special issue. In a world where we publish or perish, where seminal papers are as rare as albino pandas, we break the strict constraint of the necessity of results in order to step away from the conventional approach that, too often using oversimplified tests based on oversimplified assumptions, leads to tiny incremental steps.

In this special issue, we have invited authors to raise questions rather than provide answers.

This special issue derives from an experiment that started in 2009. That year, at the Electronic Imaging symposium of the "Color Imaging: Displaying, Processing, Hardcopy, and Applications" conference, we ran an invited session called "The Dark side of Color". This was an experiment to bring together people from the field of colour and to let them pose questions that conventional publishing routes do not often have space for.

The introduction to this successful moment is reproduced below because it captures the essence of the experiment:

What is the dark side of colour ?

Colour is a very complex phenomenon that cannot be explained with only physics principles. The human vision system is what transforms the physical stimuli into the colours we see.

Colour-related topics are sometimes taught and communicated without presenting their inner complexity, their limits, and the simplifications which are sometimes at their base. Acritically following predefined "recipes" can lead to the risk of losing the overall framework and consequently a complete understanding of the chosen technique. Classic colorimetric methods, specifically designed to deal with colour in aperture mode (isolated, out of visual context), have become dominant in digital colour science and technology. Their use has been extended to deal with a great variety of situations in which colour is considered inside a visual context, thus outside its initial scope. Colour science is facing this transitional evolution in order to deal with colour in context and appearance, but without substantial changes to their original foundation. There is a need to widen the scientific debate and discuss paradigms. This can be achieved, for example, by new questions and attending to different details, information in the margins that to date have been discounted or overlooked. These aspects are what we consider to be the "dark side of colour".

The invited speakers in this section have been asked to stimulate ideas and discussions on the needs and the characteristics of possible alternative approaches and/or point of view. This session aims at suggesting paradigm shifts, lateral thinking and bottom-up experimentation by readdressing the current state of the evolving situation in colour in the sciences, arts and technologies.

Following these principles, every speaker has chosen a topic of their own preference and presents open issues and problems in a short 10-minute presentation. The presentation abstracts are reported in the following sections to give the reader an overview of the topics discussed.

We would like to stress that basically no answers are expected to arise from the presentations in this session, but more likely questions and shifts of perspective.

In fact, colorimetry is not a recipe to be applied step by step without criticism; nor is it an eternal immutable tool. It is a continuously evolving multidisciplinary research field that has a unique reference point: our vision system. No great formula or beautiful algorithm will survive for long if it does not match or reproduce what our vision does. There are sub-fields of research in colorimetry in which the numbers of people performing research can be counted on the fingers of one hand. Under these conditions, inbreeding is a real risk.

We need a renewed interest in colour, with fresh new minds to challenge and replace the old guard (surely, we are two of them). And we need to teach them to consider their doubts as a precious tool to use throughout their scientific careers.

We wish you good, fruitful reading, and hope that the content of each paper in this special issue will stimulate in you great research.

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