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Daniel Kernell
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Colours and Colour Vision

Colours are increasingly important in our daily life but how did colour vision evolve? How have colours been made, used and talked about in different cultures and tasks? How do various species of animals see colours? Which physical stimuli allow us to see colours and by which physiological mechanisms are they perceived? And how and why do people differ in their colour perceptions? In answering these questions and others, this book offers an unusually broad account of the complex phenomenon of colour and colour vision. The book's broad and accessible approach gives it wide appeal; it will serve as a useful coursebook for upper-level undergraduate students studying psychology, particularly cognitive neuroscience and visual perception courses, as well as for students studying colour vision as part of biology, medicine, art and architecture courses.

Daniel Kernell is Emeritus Professor of Medical Physiology at the University of Groningen, The Netherlands.

Colours and Colour Vision

An Introductory Survey

DANIEL KERNELL
University of Groningen, The Netherlands

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Preface

This is a book about many different aspects of colours, how they arise and how one might see and experience them. When writing this book, my first source of inspiration was my own visual system: I belong to the rather large minority with an inherited red-green blindness. It has often astonished me that most people know so little about what this sensory constitution means, in spite of the fact that, in our part of the world, it affects more than 4% of the total population. Thus, I started my writing enterprise as a book about colour blindness, but the project gradually expanded to become a more general survey of matters concerning colour. The description includes an account of the physical and physiological mechanisms of colours and colour vision in humans and other animals, which comes naturally to me because I worked in neurophysiological research for many years (albeit on subjects other than colour vision).

Colours often give us a very direct and immediate kind of sensory experience and one might therefore be inclined to think that the nature of the phenomenon is simple and straightforward. This is, however, not the case: colour vision is a highly complicated and multidimensional subject matter. For many people, colours are an important source of enjoyment in everyday life, in nature and in various expressions of art and culture (true also for red-green colour-blind persons). Publications about colour often mainly deal with their various aesthetic qualities. In 1819, Keats published his very long poem, *Lamia*, which includes a few famous lines suggesting that the rainbow might lose its colourful beauty if one knows too much about it:

> *Philosophy will clip an Angel's wings,*
> *Conquer all mysteries by rule and line,*
> *Empty the haunted air, and gnomed mine*
> *Unweave a rainbow*[1]

However, it might equally well be argued that the unweaving of a rainbow does not make its colours and beauty less impressive but rather the opposite: the more one knows about a subject the more interesting and captivating it usually becomes.[2] According to some interpretations of Keats' poem, the author himself and his contemporary colleagues might even have agreed on this point, provided

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that one does not lose one's sense of wonder when confronted with the many complexities of human perceptions and the natural world.

Administrative note

Supplementary information concerning items in the running text may be found in notes at the end of the book. In Appendix E, an explanatory list is given for commonly used technical terms. In order to facilitate reading of the book, greytone-versions of all illustrations are shown close to the relevant sections of running text. For illustrations referred to as 'Plates', which provide further information by using coloured components, additional full-colour prints are included in a separate colour plate section.

The author of this book has lived in Sweden, in the Netherlands and (briefly) in Britain. When mentioning 'our culture' or other similar concepts, the 'our' or 'us' or 'we' refers to inhabitants or conventions of Western Europe.