

The cover features a large, stylized eye with a blue iris and black pupil, set within a white triangular shape. This triangle is part of a larger geometric composition of overlapping triangles in light blue and yellow, all set against a black background. The eye is positioned in the upper left quadrant. The yellow triangles have fine white lines radiating from their vertices. The overall design is abstract and modern.

J. BERGMANS

***SEEING***  
***COLOURS***

POPULAR SERIES  
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## PREFACE

In the grammar schools, which provide the basis of a general education, many subjects are taught today which formed no part of the general education a few decades ago.

In those days these subjects formed the private field of study of a few specialists, spread over various countries, who made their thoughts known by means of publications and private correspondence, in a special language devised by themselves.

When, later on, the need was felt to introduce the first principles of Chemistry and Physics into the general education, the result of the years of study of the specialists was condensed into a simple, though scientifically correct, form and added to the teaching curriculum of the grammar school. Certain concepts which the specialists had used in the early part of the studies could be omitted, since the newer insights provided the possibility of representing them in a simpler and more correct manner.

Through the years of effort of the grammar school teachers, an important percentage of the people in those countries where the general standard of education is fairly high have a good understanding of the principles of chemistry and physics.

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## INTRODUCTION

A number of books have been written in recent years on this subject\*). The "Philips Technical Library" already contains the book "Physical Aspects of Colour" by the late Dr. P. J. Bouma, which has been considered to be one of the best books on this subject.

Nevertheless, we are of the opinion that it will serve a useful purpose to present a book somewhat smaller in size on this subject. We are doing this for the following reasons:

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- \*) 1. A. C. Hardy, Handbook of Colorimetry, The Technology Press M.I.T., Cambridge, Massachusetts, 1936.
2. M. Richter, Grundriss der Farbenlehre der Gegenwart, Theodor Steinkopff Verlag, Dresden, Leipzig, 1940.
3. R. M. Evans, An introduction to Color, John Wiley and Sons, New York, Chapman and Hall Ltd., London, 1948.
4. D. B. Judd, Color in Business, Science and Industry, John Wiley and Sons, New York, Chapman and Hall, London, 1952.
5. H. D. Murray, Colour in Theory and Practice, Chapman and Hall, London, 1952.
6. R. W. G. Hunt, The Reproduction of Colour, The Fountain Press, London, 1957.
7. Yves Le Grand, Light, Colour and Vision, (approved translation by R. W. G. Hunt, J. W. T. Walsh, and F. R. W. Hunt), Chapman and Hall Ltd., London, 1957.
8. W. D. Wright, The Measurement of Colour, Hilger and Watts Ltd., London, 1958.

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- a) The subject matter is so extensive and the various publications on this subject are also so extensive, that we fear that only very few will be able to find the time to study them thoroughly.
- b) Although the problem of colour vision is really a physiological subject, on which work is constantly being carried out, and the *true* red-, green- and blue-sensitivities of the eye have not yet been scientifically established, there is nevertheless so much known and brought into good correlation that the time is ripe to introduce this knowledge to a wider circle.
- c) We usually regard colour as an essential property of an object. Nevertheless it sometimes happens that two light-sources, which produce the same colour on a white screen, render the colour of the object in entirely different ways. We therefore speak of "colour rendition" and imply thereby a property of the light. Since fluorescent lamps are being installed more and more in homes, this matter of colour rendering is beginning to play an increasingly important role in practice in daily life. It is necessary, therefore, that everybody who uses these lamps or is considering using them, should be well informed on this, at first sight, remarkable phenomenon.

It is our intention, therefore, to give a concise general treatment of the problem of colour vision.

We would like to compare this treatment with the geography lesson, such as is given to pupils in grammar schools. The teacher gives the scholars an insight into the shape and the importance of the countries with the help of maps, which contain much data, including that of a geological nature, without going too deeply into the manner in which these maps

have been prepared. The actual study subjects, surveying and geology, without which these maps could never have been made, are practically not discussed. It is sufficient that the scholars can see the facts, which they need for their future life and for the journeys which they will make, in their mutual relationship and absorb them. Much of the data shown on the maps, therefore, must be learned by heart, but it is particularly important that the scholars learn to read the map.

There is also a colour map. Irrespective of what the specialists will discover in their future studies of colour sensitivity of the human vision, (see the remarks written above under b)) an official international system of colour indication was officially accepted in 1931 by the Congress of the International Commission on Illumination. This system, known as the "I.C.I.-Colour Triangle", in which the indication of the colours is expressed in the "x, y and z coordinates of the I.C.I.", has already been officially in use for the last 25 years. It appears to fit the facts very well and is extremely practical.

We will base our discussion of the human sense of vision on this colour triangle, just as on a map, which is indispensable for the lesson. One must learn to "read" this map, in order to be able to work with it. Only then is one in a position to form an opinion about the new light-sources and their possibilities and to join in discussions about their applications.

We have borne in mind the fact that some of our readers dislike diagrammatic representations, whilst others prefer them. To satisfy the majority of readers, therefore, we have avoided diagrammatic representations in the main text; but at all points where this seemed desirable to us, we have inserted sections in which the preceding text is repeated and made clear with the help of diagrams. *These sections are indicated with an*



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*asterisk at the beginning of each paragraph and introduce no new subject-matter.* Sections so marked are thus not required by those who only wish to read the main text.

however, that those of our readers who are accustomed to the use of diagrammatic representations will appreciate them.

We have had to make an exception with one diagram. This is the colour-triangle itself. There can be no geography without a map, and no treatment of the problem of colour vision without the colour-triangle. The colour-triangle is thus the only diagrammatic representation used in the main text.