The Standard Observer: a Controversial Subject

J.A.J.

Roufs

Institute for Perception Research, Eindhoven

Abstract

The efficiency of monochromatic light for the eye is expressed in the relative spectral sensitivity of the eye. In 1924, the 'Commission Internationale de l'Eclairage' (CIE) recommended a curve for this purpose that had to be representative for the average photopic observer. In 1931 this was incorporated in the CIE Standard Observer. The particularly important conception of luminance is defined with the aid of the relative spectral sensitivity. It is a measure for brightness and enables us to compare the light flow of sources of different color. It affords the possibility of specifying the adaptive condition under which visual tests have to be carried out. When more data became available, however, it appeared that the standard observer is less representative than initially thought. For example, its sensitivity in the blue is too low, and the spectral sensitivity of the eye proved to depend on many parameters, like field size and location on the retina. Moreover, the visual spectral sensitivities determined according to various methods prove to be mutually different. This results in the increasingly urgent question, i.e. under which circumstances a light measurement, normally based on the sensitivity of the standard observer, is adequate or not. In view of this, in the latest session of the CIE (1971) a new study of the methodologic foundations was recommended. At the same time, high priority was recommended for research into the spectral sensitivity of small fields and the specification of mesopic light. Both are of importance for perimetry and mesoptometry.

Author's address: Dr. J. A. J. Roufs, Institute for Perception Research, Eindhoven (The Netherlands)

Discussion

Crone: Isn't the influence of age (yellowing of the lens) on the eye sensitivity curve greater than the influence of the method of examination.

Roufs: Yellowing of the lens during aging indeed exerts a distinct influence on the spectral efficiency (see, for example, R. A. Weale, The aging eye, Lewis 1963).

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Roufs

However, in an adequate direct comparison of methods the measurements according to the various procedures are carried out by the same test persons. In one or another form of averaging over the subjects, age then is one of the interaction factors that should be taken into account.

In my opinion

there is not sufficient comparable material available to give a somewhat reliable verdict on the magnitude of the effect of the method on the resulting spectral efficiency within the test subjects in comparison with the effect of age within the methods. Roughly speaking it may perhaps be said that the effects do not seem to diverge in several orders of magnitude; in comparative measurements the effect of age can therefore not be neglected.