



April 9, 1974.

AIR MAIL

Mr. Rolf Kuehni,  
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Dear Mr. Kuehni:

Thank you for your letter of March 25, 1974. I am sorry to be late with my reply, but your letter arrived during my absence and I have just returned from a visit to Europe.

I agree with you that the problem of color-difference evaluations is far from being solved and the new working program on color differences proposed by the CIE Colorimetry Committee may not yield a final solution either. However, it is hoped that we will make further progress and learn more about the intricacies of the problem. Your work and that of others will, no doubt, be helpful in our effort.

With regard to your specific questions I would like to reply as follows:

From previous work, it is anticipated that the ( $L^*u^*v^*$ ) space may provide reasonable predictions of color differences of medium to large sizes. The reference in the working program to the well-known Munsell Book of Color was made mainly to provide an idea of what is meant by medium to large differences. I do not believe that the Committee wanted to say that the color spacing in the Munsell Book of Color is a perfectly uniform spacing. We know that it is not.

I do not think that the ( $L^*a^*b^*$ ) space is closely related to the Munsell space. The  $L^*$  function duplicates the Munsell-value function quite well, but the way the coordinates  $L^*$ ,  $a^*$ ,  $b^*$  are combined to estimate a color difference does not yield good predictions of Munsell Book color differences. In taking into account recent studies mainly done in industry, the Committee figured that the Adams-

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Nickerson formula might give reasonable predictions of small color differences of sizes found, for example, in the textile industry. However, the Adams-Nickerson formula is rather awkward because of the Munsell-value function involved. It was felt that a simpler mathematical model would also suffice and thus the proposal of the cube-root version.

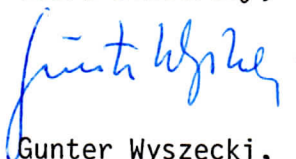
The differences between the existing different perceptibility data is a big puzzle and only new experimental studies will resolve it. It is suspected that differences in observing conditions (luminance level, surround, sample size, separation of samples, etc.) have a strong bearing on the discrepancies in addition to observer differences and occasional difficulties in the calibration of the stimuli.

As far as acceptability data are concerned the Committee decided to ignore them as being biased and not suitable for perceptibility studies. A great deal of discussion has gone into the controversy "acceptability versus perceptibility" and I cannot go into this again at this time; but I think the Committee's decision was a wise one. The problem of predicting acceptability must remain a problem to be dealt with by individual industries and cannot be the concern of the CIE who should try to serve all industries simultaneously by looking at the basic color-vision problems involved.

As far as the weight of the lightness difference is concerned in the total color difference, the working program specifically mentions this and it is hoped that further work looks at this problem as well.

Let me emphasize once more, that the Committee's proposal is only a working program at this stage, not a CIE recommendation on color-difference evaluations. However, many workers in colorimetry anticipate that one or both of the formulas under study may become official recommendations in 1976; perhaps with the note that "these are recommended to promote uniformity of practice and cannot be considered the ideal solution to predicting color differences accurately. The ideal formula does not exist as yet."

Yours sincerely,



Gunter Wyszecki,  
Chairman, CIE TC-1.3  
(Colorimetry).

GW/sl

c.c. Dr. D. L. MacAdam