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June 18, 1974

Mr. Rolf Kuehni

Verona

Union, N.J. 07083

Dear Rolf,

Thank you for your letter of June 12 and the two pages from your draft of an article. To answer your question directly, the original article reporting a color match was published in American Dyestuff reporter, Vol. 33, page 1, 1944. I am sending you a Xerox copy of the part dealing with color matching. As you can read, I reported the results of nine matches and referred to the JOSA article for a description of the method. In this article, VS stands for visual range spectrophotometer.

Before I get down to my plea, let me say that the missing page 1 of your article tantalizes me. What made it possible for the problem of analyzing the concentration of colorants from a reflectance factor curve. Surely you didn't say Kubelka and Munk! The reciprocal function of ICI or an empirical analysis by the method of Stearns and Noechel (see my book p. 269) is entirely adequate. The empirical method is more accurate than the Kubelka and Munk formula, which only approximates the truth. Pineo developed the method, and it was in use in our laboratory, before Kubela and Munk published. You may be interested to know that the reason we did not refer to Kubelka and Munk in the 1944 JOSA article was that we had never heard of them at the time. This was the third formula that Pineo developed and you will note that it differs from K & M by a factor s.

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I believe you have a slight misunderstanding when you state on p. 2 "For this reason the graphical solution of the Pineo method was further developed etc". Pineo never made a color match in his life using different dyes in the match and standard. The Pineo method is an analytical method to determine identity and amount of dyes. Of course, if you happen to have the same dyes in the match and standard, the answer gives you both a match and an analysis. Derby liked this because he was opposed to metamerism. But the development was as an analytical tool, not a color matching procedure.

When you say " the method was hampered by the fact that it leads to good,etc", I believe you are presenting a half truth. The 1944 method consisted of four parts, selection of additive function, approximation, evaluation, iteration. The iteration was the main contribution. We stated that we had experimented with other methods of approximation, but the iteration was a contribution that has stood the test of time. The only inaccuracy is that we have to use $F(R_a)/F'(R_s)$ whereas we should use $F(R_a)/F'(R_m)$. m is match, s is target, a is dye, R is reflectance and F is the additive function. If the same dyes are used, R_m is R_s and one calculation of the iteration formula gives an exact answer.

The iteration formula is so good that it was used by the COMIC I , reaffirmed by Allen (J. O.S.A. 56 1256 (1966), and is today used in several commercial computer programs. The iteration

half of the article is not hampered and has been a brilliant success.

That is why I say your statement is a half truth.

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About COMIC I. If you will refer to the JSDC 72 577 (1963) article describing the COMIC you will see that they have a very lucid description of the derivation of the operative equation, much more lucid than our 1944 presentation, but they admit that the equation is identical to ours.

I am sending you a copy of the 1968 article which presents my ideas of the history of color matching.

Now for my plea. Please give me a little more credit. You would make me deliriously happy if you would add after "died in 1943" the statement "and I am inclined to agree with him because I know of no results published before his 1944 date."

If you would say " On a practical level the approximation method was hampered by the fact that it leads to good approximations only if bright colorants are used, but the iteration method is fundamental to many single constant color matching programs today."

If you would say " The iteration formula proposed in 1944 was first put to commercial use in 1958 by Davidson and Hemmendinger etc"

If you would be unhappy to make these changes, I would appreciate it if you would say " A somewhat different view of the development of color matching has been presented by Stearns (Amer. Dye Rptr 60 P151 (1968)).

The young workers in the field look up to the writings of a man of your stature as gospel. I hope you see things more my way after due deliberation.

Best personal regards,

Ed