VEZELINSTITUUT T.N.O.
(FIBRE RESEARCH INSTITUTE T.N.O.)

Delft – Holland – P.O. Box 110 – Schoemakerstraat 97 – Telephone 01730–37000 – Bankers: R. Mees & Zoonen, Delft

Textile, paper and fibre research and testing

Your ref.:
--
Our ref.:
FT 966-Frie/MR
Enclosure(s):

Mr. R. Kuehni
Verona Dyestuff Division
P.O. Box 385
Union Metropolitan Park
Union, N.J. 07083
U.S.A.

DELFT, 1st May, 1975

Dear Mr. Kuehni,

Thank you for your letter and enclosures, March 21.
Regarding your analysis of the MMB data, I was already too far ahead in de calculations to incorporate your ellipses for MMB. Incorporation would have meant starting anew.
In handling the Davidson-Friede, Robinson, Kuehni and Metropolitan Section AATCC data I had to eliminate, apart from the 0 and 100% acceptance samples, some other samples which are either clearly incorrect or of low acceptance and out of the linear relationship.
I deleted:

Robinson	23-29
Davidson-Friede	G 8, 13, 14
	H 8, 14
	K 17
	L 4, 18, 19
	M 13
	N 3
	O 11
Metropolitan	B 4, 11, 13
	D 3
	F 6
	H 4, 5, 14

To my surprise I ended up with 439 samples: probably I deleted the same samples as you did.
For sake of control I calculated the correlation coefficients for FMC-2: total 0.62 average 0.70.
The result is essentially the same as yours. The next formula was FMC-1 with the adapted parameter values l = 0.08 f = 1.0 which I suggested in my Helmholtz Symposium paper. This formula is called FMC-F by me. FMC-F: total 0.63 average 0.77.
So FMC-F is as good as your MCR formula. It seems to me that the modification of only two parameter values in an already well-known formula will be more readily accepted in practice than the introduction of a brand new formula.

-2-

Now I compared the values ΔE (50%) for Robinson, Kuehni and Metropolitan with those for Davidson-Friede. The comparison was made for colors in the same area of the chromaticity diagram. The former values are systematically lower than the latter, indicating a smaller ellips size for 50% acceptance. The reduction factor is about 2/3. There can be no objections against a correction for groups of results, when the observers in one group are more strict than those in another group. I therefore multiplied all ΔE values of the former groups with 1.5. The total correlation coefficient FMC-F is then improved: 0.67. The average stays of course unaltered. The same operation can obviously be applied to your totals. Applying the same correction factor, my new formula yields: total 0.74, average 0.81. Probably a small further improvement is possible by a better parameter optimization than the rather crude graphical analysis used now.
How can we proceed from here? As I wrote you before, it is my opinion that we should make a thorough statistical analysis of all the available data and then optimize the parameter values in my new formula. I am convinced that the new formula is such, that a nearly constant ΔE (50%) value will be obtained all over the color space. The numerical value will of course depend on the typical conventions and the needs of the customer. There is still quite a lot of work ahead and I am looking for either financial support or support by cooperation. Please let me know your interest in this development and suggestions how to proceed.
Enclosed you will find the new data I handed in to Dr. Wyszecki. For the moment this is only for your personal information. However I hope I will be authorized to distribute it at the September session of TC-1.3. There is however more information available than is stated in this letter. Once the criterion was color difference, but secondly the same samples were rated for acceptance. I did not include this information in the letter because Dr. Wyszecki is not interested. From comparison of the color difference and the acceptance ratings I concluded that "the acceptability data do not indicate any observer bias when compared to perceptibility". So I underline your conclusion. The accuracy of the paired comparison experiment is however much better than that of the acceptance experiment. The acceptance data add a size scale to the perceptibility data. From this I conclude that the unit chromaticity ellipses should expand under, say, 10% luminance. In my new formula this aspect is built in. It is only a question of parameter optimization.
The final part of this letter, as I wrote it down, regarded CIE standardization. This morning your letter April 24 came in. It would be grand when the U.S. would vote against Lab. Previously I had the idea that I was fighting all alone, people thinking that my aim was to promote FMC, because my name is attached to it. This is however not true: I am not in favour of adoption of FMC in international standardization, I am only against standardization of Luv and Lab because these do not meet the requirements of practice. My opinion is that premature standardization will make a mess. But obviously the vote of a small country has no weight. Therefore I am very happy with the detailed report you handed in to TC-1.3, which is fully in line with my views.
I hope the U.S. delegation will not only vote against Lab but also against Luv, because this is the worst of all: see Schultze. The fact that Wyszecki is advocating Luv should make no difference. The U.S. should not only help to stop the present development in CIE but also that in ISO which is parallel. Actually the English are trying to force CIE by movements in ISO (textile, plastics, paints), where the opposition is weak, as there are less specialists in the committees.

From my letter to Wyszecki you see that I will not hand in a counter proposal. I only bring forward new data which again prove that the present line of thinking in TC-1.3. is not acceptable.
As for Judd's paper "Ideal color space" I see both the saturation dependency and the lightness effect as a crispening effect. In principle these effects have been taken into account in my new formula. However in the data I analysed the lightness crispening effect did not turn up clearly. Here we must wait for further analyses.
It is quite my view that Mc Laren is heavily biased. But you cannot make an argument of that.
When you would like to discuss this letter in your problem committee please do so.

With best regards,
Yours sincerely,

Fibre Research Institute TNO

(Drs. L.F.C. Friele)