

higher colour metric (color data: nonlinear relation to CIE 1931 data)

nonlinear color terms	name and relationship with tristimulues or chromaticity values	notes
lightness	$L^*_1 = k \log [Y / Y_Z]$ ($L^*_1 = 0$ for $Y = Y_Z$) If contrast = 25:1 = 90:3,6, then $-40 \leq L^*_1 \leq 40$	LABJND 2019 $k = 40 / \log (5) = 57$
chroma red-green yellow-blue radial	<i>logarithmic transform of tristimulues values XYZ.</i> $A^*_1 = n_{A^*} [\log (X / X_Z) - \log (Y / Y_Z)]$ If contrast 25:1 = 90:3,6, then $-70 \leq A^*_1 \leq 70$ $B^*_1 = n_{B^*} [\log (Y / Y_Z) - \log (Z / Z_Z)]$ If contrast = 25:1 = 90:3,6, then $-28 \leq B^*_1 \leq 28$ $C^*_{AB,1} = [A^{*2}_1 + B^{*2}_1]^{1/2}$	For grey Z of D65 $X_Z = 95,05 \cdot 0,18$ $Y_Z = 100,00 \cdot 0,18$ $Z_Z = 108,90 \cdot 0,18$ $n_{A^*} = 100, n_{B^*} = -40$ (background)
chromaticity red-green yellow-blue radial	<i>nonlinear chromaticities, if XYZ are normalized to 100.</i> $a^*_1 = \log [X / Y] = \log [x / y]$ $b^*_1 = \log [Z / Y] = \log [z / y]$ $c^*_{AB,1} = [(a^*_1 - a^*_{z1})^2 + (b^*_1 - b^*_{z1})^2]^{1/2}$	<i>compare to log cone excitation</i> $\log [L / L_Z]$ $\log [M / (M_Z)]$ $\log [S / (S_Z)]$