$L^*_{85,2}$ and $L^*_{85,2}/L^*_{85,2,u}$ — LABJND lightness $L^*_{85,2}$ normalized to the background lightness $L^*_{85,2,u}$

text lightness
- $L^*/L^*_u = (t/a)\ \{ \ln (1 + a \cdot Y) - \ln (1 + a \cdot Y_u) \}$ [1a]
- $L^*/L^*_u = (t/a)\ \{ \ln [1 + b \cdot (Y/Y_u)] - \ln (1 + b) \}$ [1b]

text relative lightness
- a=0,3411 t=88,23 t/a=258,6 b=6,141 [1c]

text log(L*/L*u)

text ln(L*/Lu)

text L*/L*u=e**x

hep20−1a

L^* and L^*/L^*_u — CIELAB lightness L^* normalized to the background lightness L^*_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=116, n=1/3, d=16) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=65,49, L^*_u= r − d) [1b]

text relative lightness
- $L^*/L^*_u = g\ (Y/Y_u)^n - h$ (g=r/(r−d)=1,32, h=d/(r−d)=0,32) [1c]

text log(L*/L*u)
- $\log [(L^*/L^*_u + h) / g] = n \log (Y/Y_u)$ [1d]

text ln(L*/Lu)
- $\ln [(L^*/L^*_u + h) / g] = \ln(10)\ n \log (Y/Y_u)$ [1e]

text L*/L*u=e**x
- $(L^*/L^*_u + h) / g] = e^{\ln(10)\ n \log (Y/Y_u)}$ [1f]

hep20−2a

L^* and L^*/L^*_u — IECsRGB lightness L^* normalized to the background lightness L^*_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/2,4, d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=48,94, L^*_u= r − d) [1b]

text relative lightness
- $L^*/L^*_u = (Y/Y_u)^n$ [1c]

text log(L*/L*u)
- $\log\ (L^*/L^*_u) = n \log\ (Y/Y_u)$ [1d]

text ln(L*/Lu)
- $\ln\ (L^*/L^*_u) = \ln(10)\ n \log\ (Y/Y_u)$ [1e]

text L*/L*u=e**x
- $L^*/L^*_u = e^{\ln(10)\ n \log\ (Y/Y_u)}$ [1f]

hep20−3a

L^* and L^*/L^*_u — TUBsRGB lightness L^* normalized to the background lightness L^*_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/ln(10), d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=47,48, L^*_u= r − d) [1b]

text relative lightness
- $L^*/L^*_u = (Y/Y_u)^{1/\ln(10)}$ (ln(x)=ln(10) log(x)) [1c]

text log(L*/L*u)
- $\log(L^*/L^*_u) = (1/\ln(10))\ \log(Y/Y_u)$ [1d]

text ln(L*/Lu)
- $\ln(L^*/L^*_u) = \log(Y/Y_u)$ [1e]

text L*/L*u=e**x
- $L^*/L^*_u = e^{\log(Y/Y_u)}$ [1f]

hep20−4a

hep20−3n

ΔY and $\Delta Y/\Delta Y_u$ — LABJND tristimulus value difference ΔY normalized to ΔY_u

text lightness
- $L^*/L^*_u = (t/a)\ \{ \ln (1 + a \cdot Y) - \ln (1 + a \cdot Y_u) \}$ [1a]
- $L^*/L^*_u = (t/a)\ \{ \ln [1 + b \cdot (Y/Y_u)] - \ln (1 + b) \}$ [1b]

text relative lightness
- normalized tristimulus value Y difference [3e]

text log(L*/L*u)
- $dY/dY_u = (1 + a \cdot Y) / (1 + a \cdot Y_u)$ [3d]

text ln(L*/Lu)

text L*/L*u=e**x

hep20−5a

ΔY and $\Delta Y/\Delta Y_u$ — CIELAB tristimulus value difference ΔY normalized to ΔY_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=116, n=1/3, d=16) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=65,49, L^*_u= r − d) [1b]

text relative lightness
- $dY = [Y_n/ (n\ s)]\ (Y / Y_n)^{1-n}$ [2c]

text log(L*/L*u)
- $dY_u = [Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} = 1{,}4602$ [2d]

text ln(L*/Lu)
- $dY / dY_u = (Y / Y_u)^{1-n}$ [2e]

text L*/L*u=e**x
- $\log(dY / dY_u) = (1-n)\ \log(Y / Y_u)$ [2f]

hep20−6a

ΔY and $\Delta Y/\Delta Y_u$ — IECsRGB tristimulus value difference ΔY normalized to ΔY_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/2,4, d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=48,94, L^*_u= r − d) [1b]

text relative lightness
- $dY = [Y_n/ (n\ s)]\ (Y / Y_n)^{1-n}$ [2c]

text log(L*/L*u)
- $dY_u = [Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} = 1{,}1746$ [2d]

text ln(L*/Lu)
- $dY / dY_u = (Y / Y_u)^{1-n}$ [2e]

text L*/L*u=e**x
- $\log(dY / dY_u) = (1-n)\ \log(Y / Y_u)$ [2f]

hep20−7a

ΔY and $\Delta Y/\Delta Y_u$ — TUBsRGB tristimulus value difference ΔY normalized to ΔY_u

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/ln(10), d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=47,48, L^*_u= r − d) [1b]

text relative lightness
- $dY = [Y_n/ (n\ s)]\ (Y / Y_n)^{1-n}$ [2c]

text log(L*/L*u)
- $dY_u = [Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} = 1{,}0934$ [2d]

text ln(L*/Lu)
- $dY / dY_u = (Y / Y_u)^{1-n}$ [2e]

text L*/L*u=e**x
- $\log(dY / dY_u) = (1-n)\ \log(Y / Y_u)$ [2f]

hep20−8a

hep20−7n

$(\Delta Y/Y)$ and $(\Delta Y/Y) / (\Delta Y/Y)_u$ — LABJND-Y sensitivity normalized to $(\Delta Y/Y)_u$

text lightness
- $L^*/L^*_u = (t/a)\ \{ \ln (1 + a \cdot Y) - \ln (1 + a \cdot Y_u) \}$ [1a]
- $L^*/L^*_u = (t/a)\ \{ \ln [1 + b \cdot (Y/Y_u)] - \ln (1 + b) \}$ [1b]

text relative lightness
- tristimulus value Y sensitivity [3c]

text log(L*/L*u)
- $(dY/Y)_u = [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} / Y_u$ [3d]

text ln(L*/Lu)

text L*/L*u=e**x

hep21−1a

$(\Delta Y/Y)$ and $(\Delta Y/Y) / (\Delta Y/Y)_u$ — CIELAB-Y sensitivity normalized to $(\Delta Y/Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=116, n=1/3, d=16) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=65,49, L^*_u= r − d) [1b]

text relative lightness
- $dY / Y = [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} / Y$ [3c]

text log(L*/L*u)
- $(dY / Y)_u = [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} / Y_u$ [3d]

text ln(L*/Lu)
- $(dY / Y) / (dY / Y)_u = (Y / Y_u)^{-n}$ [3e]

text L*/L*u=e**x
- $\log [(dY / Y) / (dY / Y)_u] = (-n)\ \log(Y / Y_u)$ [3f]

hep21−2a

$(\Delta Y/Y)$ and $(\Delta Y/Y) / (\Delta Y/Y)_u$ — IECsRGB-Y sensitivity normalized to $(\Delta Y/Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/2,4, d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=48,94, L^*_u= r − d) [1b]

text relative lightness
- $dY / Y = [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} / Y$ [3c]

text log(L*/L*u)
- $(dY / Y)_u = [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} / Y_u$ [3d]

text ln(L*/Lu)
- $(dY / Y) / (dY / Y)_u = (Y / Y_u)^{-n}$ [3e]

text L*/L*u=e**x
- $\log [(dY / Y) / (dY / Y)_u] = (-n)\ \log(Y / Y_u)$ [3f]

hep21−3a

$(\Delta Y/Y)$ and $(\Delta Y/Y) / (\Delta Y/Y)_u$ — TUBsRGB-Y sensitivity normalized to $(\Delta Y/Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/ln(10), d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=47,48, L^*_u= r − d) [1b]

text relative lightness
- $dY / Y = [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} / Y$ [3c]

text log(L*/L*u)
- $(dY / Y)_u = [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} / Y_u$ [3d]

text ln(L*/Lu)
- $(dY / Y) / (dY / Y)_u = (Y / Y_u)^{-n}$ [3e]

text L*/L*u=e**x
- $\log [(dY / Y) / (dY / Y)_u] = (-n)\ \log(Y / Y_u)$ [3f]

hep21−4a

hep21−3n

$(Y/\Delta Y)$ and $(Y/\Delta Y) / (Y/\Delta Y)_u$ — LABJND-Y contrast normalized to $(Y/\Delta Y)_u$

text lightness
- $L^*/L^*_u = (t/a)\ \{ \ln (1 + a \cdot Y) - \ln (1 + a \cdot Y_u) \}$ [1a]
- $L^*/L^*_u = (t/a)\ \{ \ln [1 + b \cdot (Y/Y_u)] - \ln (1 + b) \}$ [1b]

text relative lightness
- tristimulus value Y contrast [4c]

text log(L*/L*u)
- $(Y/dY) / (Y_u dY_u)$ [4d]

text ln(L*/Lu)
- $= [Y / (1 + a \cdot Y)] / [Y_u / (1 + a \cdot Y_u)]$ [4e]

text L*/L*u=e**x

hep21−5a

$(Y/\Delta Y)$ and $(Y/\Delta Y) / (Y/\Delta Y)_u$ — CIELAB-Y contrast normalized to $(Y/\Delta Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=116, n=1/3, d=16) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=65,49, L^*_u= r − d) [1b]

text relative lightness
- $Y / dY = Y / \{ [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} \}$ [4c]

text log(L*/L*u)
- $(Y / Y)_u = Y_u / \{ [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} \}$ [4d]

text ln(L*/Lu)
- $(Y / dY) / (Y / dY)_u = (Y / Y_u)^n$ [4e]

text L*/L*u=e**x
- $\log [(Y / dY) / (Y / dY)_u] = (n)\ \log(Y / Y_u)$ [4f]

hep21−6a

$(Y/\Delta Y)$ and $(Y/\Delta Y) / (Y/\Delta Y)_u$ — IECsRGB-Y contrast normalized to $(Y/\Delta Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/2,4, d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=48,94, L^*_u= r − d) [1b]

text relative lightness
- $Y / dY = Y / \{ [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} \}$ [4c]

text log(L*/L*u)
- $(Y / Y)_u = Y_u / \{ [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} \}$ [4d]

text ln(L*/Lu)
- $(Y / dY) / (Y / dY)_u = (Y / Y_u)^n$ [4e]

text L*/L*u=e**x
- $\log [(Y / dY) / (Y / dY)_u] = (n)\ \log(Y / Y_u)$ [4f]

hep21−7a

$(Y/\Delta Y)$ and $(Y/\Delta Y) / (Y/\Delta Y)_u$ — TUBsRGB-Y contrast normalized to $(Y/\Delta Y)_u$

text lightness
- $L^* = s\ (Y/Y_n)^n - d$ (Y_n=100, Y_u=18, s=100, n=1/ln(10), d=0) [1a]
- $L^* = r\ (Y/Y_u)^n - d$ (r = s $(Y_u/Y_n)^n$=47,48, L^*_u= r − d) [1b]

text relative lightness
- $Y / dY = Y / \{ [(Y_n/ (n\ s)]\ (Y / Y_n)^{1-n} \}$ [4c]

text log(L*/L*u)
- $(Y / Y)_u = Y_u / \{ [(Y_n/ (n\ s)]\ (Y_u / Y_n)^{1-n} \}$ [4d]

text ln(L*/Lu)
- $(Y / dY) / (Y / dY)_u = (Y / Y_u)^n$ [4e]

text L*/L*u=e**x
- $\log [(Y / dY) / (Y / dY)_u] = (n)\ \log(Y / Y_u)$ [4f]

hep21−8a

hep21−7n

TUB-test chart hep2; LABJND, CIELAB, IECsRGB, and TUBsRGB colour-difference formulae
log & lin[lightness L^*, threshold ΔY, sensitivity $\Delta Y / Y$, contrast $Y / \Delta Y$, normalized for grey U]