

<http://farbe.li.tu-berlin.de/heao/heao0l0n1.txt> /ps; only vector graphic VG; start output see separate images of this page: <http://farbe.li.tu-berlin.de/heao/heao0.htm>

sensation scaling functions

lightness L^* and tristimulus value Y

adaptation on surround white W

$$L^*_{\text{W}} = 100 \cdot (Y / 100)^{1/2,0}$$

adaptation on surround grey U

$$L^*_{\text{IECsRGB}} = 100 \cdot (Y / 100)^{1/2,4}$$

description with CIELAB 1976

$$L^*_{\text{CIELAB}} = 116 \cdot (Y / 100)^{1/3,0} - 16$$

adaptation on surround black N

$$L^*_{\text{N}} = 100 \cdot (Y / 100)^{1/3,0}$$

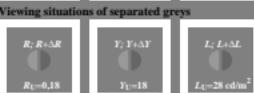
see similar files of the whole serie: <http://farbe.li.tu-berlin.de/heao0.htm> Or <http://farbe.li.tu-berlin.de>

technical information: <http://farbe.li.tu-berlin.de/heash.htm>

Viewing situations of adjacent greys



Viewing situations of separated greys



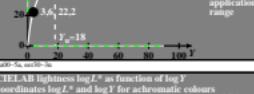
see file heao0l0n1-heao0l0n1-adjacent.htm

CIELAB lightness L^* as function of CIE tristimulus value Y coordinates L^* and Y for achromatic colours

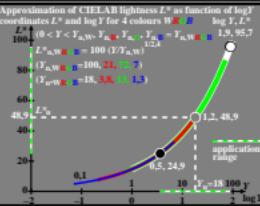


see file heao0l0n1-heao0l0n1-achromatic.htm

CIELAB lightness L^* as function of log Y coordinates L^* and log Y for achromatic colours

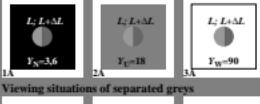


see file heao0l0n1-heao0l0n1-achromatic.htm

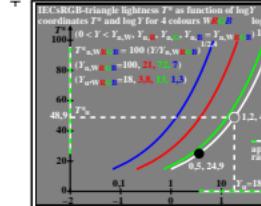


see file heao0l0n1-heao0l0n1-approx.htm

Approximation of CIELAB lightness L^* as function of log Y coordinates L^* and log Y for 4 colours W, RGB, Y, and N



see file heao0l0n1-heao0l0n1-approx.htm



see file heao0l0n1-heao0l0n1-approx.htm

IECsRGB-triangle lightness T^* as function of log Y coordinates L^* and log Y for 4 colours W, RGB, Y, and N



see file heao0l0n1-heao0l0n1-approx.htm

CIELAB lightness L^* , tristimulus value discrimination dY , contrast (dY/dT) , and sensitivity (dT/dY)

CIELAB lightness for all colours, $L^*=50$ for $Y_w=18$

$$L^* = 66 \cdot (Y/Y_w)^{1/3} - 16 \quad (Y_w=18, Y>1)$$

For the grey discrimination we get:

$$dL^*/dY = (66(Y_w)^{1/3})/(13(Y/Y_w))^{2/3}$$

and for dL^*/dY (about 3 thresholds) we can write:

$$dL^* = 3(Y_w/66)(13/Y_w)^{2/3}$$

or $\log(dL^*) = \log(3(Y_w/66)) + (2/3)\log(Y/Y_w)$

therefore in a log-log diagram the slope is (2/3).

for the CIE contrast sensitivity, and for $dL^*/dY = 1$ it is valid:

$$Y/dY = (1/3)(66(Y_w)^{1/3})^{1/3}$$

or $\log(Y/dY) = \log(1/3)(66(Y_w)^{1/3}) + (1/3)\log(Y/Y_w)$

see file heao0l0n1-heao0l0n1-dLdY.htm

IECsRGB-triangle lightness T^* , CIE tristimulus value discrimination dY and CIE contrast (dY/dT) , see file heao0l0n1-heao0l0n1-2-1.htm

$T^*_{\text{IECsRGB}} = 100 \cdot (Y/Y_w)^{1/2,4}$ is an approximation of L^* for CIELAB

sRGB-triangle lightness for achromatic colours: W

$$T^*_{\text{sRGB,100}} = 100 \cdot (Y/Y_w)^{1/2,4} \quad (Y_w=100)$$

For the grey discrimination we get:

$$dT^*_{\text{IECsRGB}}/dY = (1/2)(4/Y_w)^{-1/2,4} = 0.42 \cdot (1/Y_w)^{-1/2,8}$$

and for dT^*_{IECsRGB}/dY (about 3 thresholds) we can write:

$$dT^* = 2.4 \cdot (1/Y_w)^{1/2,4}$$

or $\log(dT^*) = \log(2.4) + (1/2,4)\log(Y/Y_w)$

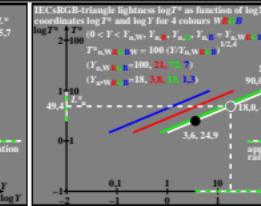
therefore in a log-log diagram the slope is 1/4,24.

for the CIE contrast sensitivity, and for $dT^*_{\text{IECsRGB}}/dY = 1$:

$$Y/dY = (1/4,24)(Y/Y_w)^{1/2,4}$$

or $\log(Y/dY) = \log(1/4,24) + (1/2,4)\log(Y/Y_w)$

see file heao0l0n1-heao0l0n1-dT.htm



see file heao0l0n1-heao0l0n1-approx.htm

IECsRGB-triangle lightness T^* as function of log Y coordinates L^* and log Y for 4 colours W, RGB, Y, and N



see file heao0l0n1-heao0l0n1-approx.htm

CIELAB lightness L^* , CIE tristimulus value discrimination dY , contrast (dY/dT) , and sensitivity (dT/dY)

CIELAB lightness for all colours, $L^*=100$ for $Y_w=100$

$$L^* = 116 \cdot (Y/Y_w)^{1/3} - 16 \quad (Y_w=100, Y>1)$$

For the grey discrimination we get:

$$dL^*/dY = (66(Y_w)^{1/3})/(13(Y/Y_w))^{2/3}$$

and for dL^*/dY (about 3 thresholds) we can write:

$$dL^* = 3(Y_w/66)(13/Y_w)^{2/3}$$

or $\log(dL^*) = \log(3(Y_w/66)) + (2/3)\log(Y/Y_w)$

therefore in a log-log diagram the slope is (2/3).

for the CIE contrast sensitivity, and for $dL^*/dY = 1$ it is valid:

$$Y/dY = (1/3)(116(Y_w)^{1/3})^{1/3}$$

or $\log(Y/dY) = \log(1/3)(116(Y_w)^{1/3}) + (1/3)\log(Y/Y_w)$

see file heao0l0n1-heao0l0n1-dLdY.htm

IECsRGB-triangle lightness T^* , CIE tristimulus value discrimination dY and CIE contrast (dY/dT) , see file heao0l0n1-heao0l0n1-2-1.htm

$T^*_{\text{IECsRGB}} = 100 \cdot (Y/Y_w)^{1/2,4}$ is an approximation of L^* for CIELAB

sRGB-triangle lightness for chromatic colours: RGB

$$T^*_{\text{sRGB,100}} = 100 \cdot (Y/Y_w)^{1/2,4} \quad (Y_w=100, Y>1)$$

For the discrimination we get:

$$dT^*_{\text{IECsRGB}}/dY = (1/2)(4/Y_w)^{-1/2,4} = 0.42 \cdot (1/Y_w)^{-1/2,8}$$

and for dT^*_{IECsRGB}/dY (about 3 thresholds) we can write:

$$dT^* = 2.4 \cdot (1/Y_w)^{1/2,4}$$

or $\log(dT^*) = \log(2.4) + (1/2,4)\log(Y/Y_w)$

therefore in a log-log diagram the slope is 1/4,24.

for the CIE contrast sensitivity, and for $dT^*_{\text{IECsRGB}}/dY = 1$:

$$Y/dY = (1/4,24)(Y/Y_w)^{1/2,4}$$

or $\log(Y/dY) = \log(1/4,24) + (1/2,4)\log(Y/Y_w)$

see file heao0l0n1-heao0l0n1-dT.htm

TUB-test chart heao0: Special colorimetric properties for colour vision and image technology
Comparison CIELAB and IECsRGB coordinates, lightness & triangle lightness, contrast and sensitivity