http://farbe.li.tu-berlin.de/hey0/hey0l0na.txt /.ps; only vector graphic VG; start output
see separate figures of this output: http://farbe.li.tu-berlin.de/hey0/hey0.htm

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{dF_{ab}(x_r,a)}{dx_r}\frac{dx_r}{dL_r}=\frac{4bm}{[e^{x_r/a}+e^{-x_r/a}]^2L_r}$ $L_r/dL_r=L/dL$, $dF_{ab}(x_r,a)=1$ [6]

$\frac{L}{dL}=\frac{4bm}{[e^{x_r/a}+e^{-x_r/a}]^2}$ $dL=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4bm}$ [7]

hey00−1n eer00−1n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{dF_{cb}(x_r,c)}{dx_r}\frac{dx_r}{dL_r}=\frac{4bm}{[e^{x_r/c}+e^{-x_r/c}]^2L_r}$ $L_r/dL_r=L/dL$, $dF_{cb}(x_r,c)=1$ [6]

$\frac{L}{dL}=\frac{4bm}{[e^{x_r/c}+e^{-x_r/c}]^2}$ $dL=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4bm}$ [7]

hey00−2n eer00−2n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L}{dL}=\frac{4bm}{[e^{x_r/a}+e^{-x_r/a}]^2}$ $dL=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4bm}$ [7]

$\frac{L}{dL}=\frac{4bm}{[L_r^m+L_r^{-m}]^2}$ $dL=\frac{[L_r^m+L_r^{-m}]^2L}{4bm}$ [8]

hey01−1n eer01−1n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L}{dL}=\frac{4bn}{[e^{x_r/c}+e^{-x_r/c}]^2}$ $dL=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4bn}$ [7]

$\frac{L}{dL}=\frac{4bn}{[L_r^n+L_r^{-n}]^2}$ $dL=\frac{[L_r^n+L_r^{-n}]^2L}{4bn}$ [8]

hey01−2n eer01−2n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L}{dL}=\frac{4bm}{[e^{x_r/a}+e^{-x_r/a}]^2}$ $dL=\frac{a[e^{x_r/a}+e^{-x_r/a}]^2L}{4bm}$ [7]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/a}+e^{-x_r/a}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4L_u}$ [8]

hey00−3n eer00−3n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L}{dL}=\frac{4bn}{[e^{x_r/c}+e^{-x_r/c}]^2}$ $dL=\frac{c[e^{x_r/c}+e^{-x_r/c}]^2L}{4bn}$ [7]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/c}+e^{-x_r/c}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4L_u}$ [8]

hey00−4n eer00−4n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L}{dL}=\frac{4bm}{[e^{x_r/a}+e^{-x_r/a}]^2}$ $dL=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4bm}$ [7]

$\frac{L}{dL}=\frac{4bm}{[L_r^{2m}+2+L_r^{-2m}]}$ $dL=\frac{[L_r^{2m}+2+L_r^{-2m}]L}{4bm}$ [8]

hey01−3n eer01−3n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L}{dL}=\frac{4bn}{[e^{x_r/c}+e^{-x_r/c}]^2}$ $dL=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4bn}$ [7]

$\frac{L}{dL}=\frac{4bn}{[L_r^{2n}+2+L_r^{-2n}]}$ $dL=\frac{[L_r^{2n}+2+L_r^{-2n}]L}{4bn}$ [8]

hey01−4n eer01−4n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/a}+e^{-x_r/a}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=1$ for $\{L=L_u, x_r=0$ $\frac{dL}{dL_u}=1$ for $\{L=L_u, x_r=0$ [9]

hey00−5n eer00−5n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/c}+e^{-x_r/c}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=1$ for $\{L=L_u, x_r=0$ $\frac{dL}{dL_u}=1$ for $\{L=L_u, x_r=0$ [9]

hey00−6n eer00−6n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/a}+e^{-x_r/a}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[L_r^m+L_r^{-m}]^2}$; $\frac{dL}{dL_u}=\frac{[L_r^m+L_r^{-m}]^2L}{4L_u}$ [9]

hey01−5n eer01−5n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/c}+e^{-x_r/c}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[L_r^n+L_r^{-n}]^2}$; $\frac{dL}{dL_u}=\frac{[L_r^n+L_r^{-n}]^2L}{4L_u}$ [9]

hey01−6n eer01−6n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/a}+e^{-x_r/a}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=1$ for $\{L_r=1, x_r=0$ $\frac{dL}{dL_u}=1$ for $\{L_r=1, x_r=0$ [9]

hey00−7n eer00−7n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/c}+e^{-x_r/c}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=1$ for $\{L_r=1, x_r=0$ $\frac{dL}{dL_u}=1$ for $\{L_r=1, x_r=0$ [9]

hey00−8n eer00−8n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{ab}(x_r,a)=b\tanh(x_r/a)=b\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r<=0$ [1]

$\frac{dF_{ab}(x_r,a)}{dx_r}=\frac{4b}{a[e^{x_r/a}+e^{-x_r/a}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $m=1/(\ln(10)a)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/a}+e^{-x_r/a}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/a}+e^{-x_r/a}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{L_r^{2m}+2+L_r^{-2m}}$; $\frac{dL}{dL_u}=\frac{(L_r^{2m}+2+L_r^{-2m})L}{4L_u}$ [9]

hey01−7n eer01−7n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

$F_{cb}(x_r,c)=b\tanh(x_r/c)=b\frac{e^{x_r/c}-e^{-x_r/c}}{e^{x_r/c}+e^{-x_r/c}}$ $x_r=\log(L_r)$, $L_r=L/L_u$, $x_r>=0$ [1]

$\frac{dF_{cb}(x_r,c)}{dx_r}=\frac{4b}{c[e^{x_r/c}+e^{-x_r/c}]^2}$ $x_r=\ln L_r/\ln(10)$, $dx_r/dL_r=1/(\ln(10)L_r)$, $n=1/(\ln(10)c)$ [5]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{[e^{x_r/c}+e^{-x_r/c}]^2}$; $\frac{dL}{dL_u}=\frac{[e^{x_r/c}+e^{-x_r/c}]^2L}{4L_u}$ [8]

$\frac{L/dL}{(L/dL)_u}=\frac{4}{L_r^{2n}+2+L_r^{-2n}}$; $\frac{dL}{dL_u}=\frac{(L_r^{2n}+2+L_r^{-2n})L}{4L_u}$ [9]

hey01−8n eer01−8n

TUB-test chart hey0; Model of normalized receptor-response functions $F_{ab}(x_r)$ and $F_{cb}(x_r)$
Calculation of derivations $F'_{ab}(x_r)$, $F'_{cb}(x_r)$, of contrasts $L/\Delta L$, and discriminations $(\Delta L)_{ab}$, $(\Delta L)_{cb}$

see similar files of the whole serie: http://farbe.li.tu-berlin.de/heys.htm
technical information: http://farbe.li.tu-berlin.de or http://color.li.tu-berlin.de

TUB registration: 20241201-hey0/hey0l0na.txt /.ps
application for evaluation and measurement of display or print output
TUB material: code=rha4ta