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/hey0l0np.pdf /.ps
application for evaluation and measurement of display or print output
TUB material: code=rha4ta

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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

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

hey00−1n eer00−1n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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

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hey00−2n eer00−2n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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

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

hey01−1n eer01−1n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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hey01−2n eer01−2n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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

hey00−3n eer00−3n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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

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

hey00−4n eer00−4n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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

hey01−3n eer01−3n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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

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hey01−4n eer01−4n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

$$\frac{L/dL}{(L/dL)_u}=1 \text{ for } \begin{cases} L=L_u \\ x_r=0 \end{cases} \qquad \frac{dL}{dL_u}=1 \text{ for } \begin{cases} L=L_u \\ x_r=0 \end{cases} \quad [9]$$

hey00−5n eer00−5n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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

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hey00−6n eer00−6n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

hey01−5n eer01−5n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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hey01−6n eer01−6n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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$$\frac{L/dL}{(L/dL)_u}=1 \text{ for } \begin{cases} L_r=1 \\ x_r=0 \end{cases} \qquad \frac{dL}{dL_u}=1 \text{ for } \begin{cases} L_r=1 \\ x_r=0 \end{cases} \quad [9]$$

hey00−7n eer00−7n

Achromatic colour vision with relative luminance
Mathematical equations with hyperbel functions

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

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

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hey00−8n eer00−8n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

hey01−7n eer01−7n

Achromatic colour vision with relative luminance
Mathematical hyperbel and potential functions

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

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

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

hey01−8n eer01−8n