line element of *Stiles* (1946) with „color values" *P*, *D*, *T*

three separate color signal functions

$F(P) = i\ln(1+9P)$
$F(D) = j\ln(1+9D)$
$F(T) = k\ln(1+9T)$

***Taylor*-derivations:**

$$\Delta F(P,D,T)=\frac{dF}{dP}\Delta P+\frac{dF}{dD}\Delta D+\frac{dF}{dT}\Delta T$$
$$=\frac{9i}{1+9P}\Delta P+\frac{9j}{1+9D}\Delta D+\frac{9k}{1+9T}\Delta T$$

NE120−1, B4_47_1

line element of *Vos&Walraven* (1972) with „color values" *P*, *D*, *T*

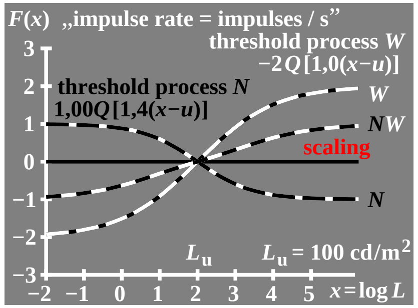
three separate color signal functions

$F(P) = -2i\sqrt{P}$
$F(D) = -2j\sqrt{D}$
$F(T) = -2k\sqrt{T}$

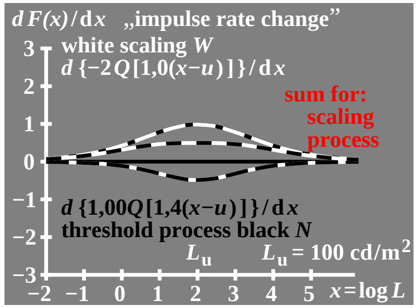
***Taylor*-derivations:**

$$\Delta F(P,D,T)=\frac{dF}{dP}\Delta P+\frac{dF}{dD}\Delta D+\frac{dF}{dT}\Delta T$$
$$\Delta F(P,D,T)=\frac{i}{\sqrt{P}}\Delta P+\frac{j}{\sqrt{D}}\Delta D+\frac{k}{\sqrt{T}}\Delta T$$

NE120−2, B4_47_2



NE121−1, B4_52_1



NE121−2, B4_52_2

functions $q[k(x-u)]$ „achromatic signal"-description

with $x=\log L$ (L = luminance)
$u=\log L_u$ (L_u = surround luminan.)

$q[k(x-u)]=1+1/[1+\sqrt{2}e^{k(x-u)}]$

function values:

$q[k(x-u)\to+\infty] = 1$
$q[k(x-u)=0] = \sqrt{2}$
$q[k(x-u)\to-\infty] = 2$

NE120−3, B4_48_1

„achromatic signal"-description functions $Q_{1m}[k(x-u)]$

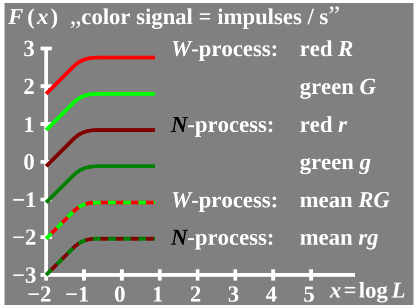
with $x=\log L$ (L = luminance)
$u=\log L_u$ (L_u = surround luminan.)

$Q_{lm}[k(x-u)]=-\frac{l}{\ln\sqrt{2}}\ln q[k(x-u)]-m$

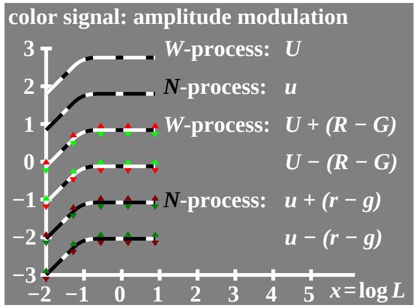
function values with $l = m = 1$:

$Q[k(x-u)\to+\infty] = 1$
$Q[k(x-u)=0] = 0$
$Q[k(x-u)\to-\infty] = -1$

NE120−4, B4_48_2



NE121−3, B4_53_1



NE121−4, B4_53_2

„achromatic signal"discrimination as function of relative light density $h=\ln H= k(x-u)$ ln = natural log.

$Q'=\frac{d}{dH}[\ln\{1+1/(1+\sqrt{2}H)\}]/\ln\sqrt{2}$
$=-\sqrt{2}/[\ln\sqrt{2}(1+\sqrt{2}H)(2+\sqrt{2}H)]$

function values:

$Q'[k(x-u)\to+\infty] = 0$
$Q'[k(x-u)=0] = -0{,}5$
$Q'[k(x-u)\to-\infty] = 0$

NE120−5, B4_49_1

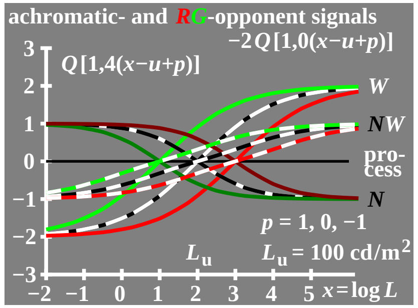
luminance discrimination possibility $L/\Delta L$ as function of H

with: $L=10^x$ $H=e^h=10^{\log e\, k(x-u)}$
$dL/dx=\ln 10\, L$ $dH/dx=k\,H$

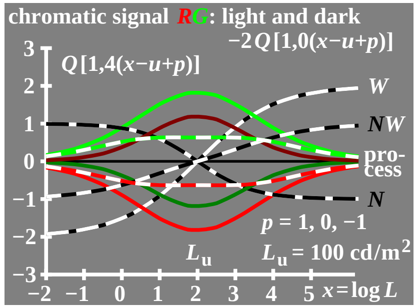
it follows: $L/\Delta L=[kH/(dH\ln 10)]$
$\frac{L}{dL}$ = const $H/[(1+\sqrt{2}H)(2+\sqrt{2}H)]$

$Q'[k(x-u)\to+\infty] = 0$
$Q'[k(x-u)=0]$ = maximum
$Q'[k(x-u)\to-\infty] = 0$

NE120−6, B4_49_2



NE121−5, B4_54_1



NE121−6, B4_54_2

double line element of *Richter* (1987) for the lighting technic with luminance $L=F(P,D,T)$

luminance signal function $F(L)$

$$F(L)=iQ(H)=\begin{cases}\underline{i}\,Q(\underline{H}) & (x<u)\\ \bar{i}\,Q(\bar{H}) & (x\ge u)\end{cases}$$

with: $\underline{k}=1{,}4$ $\bar{k}=1$ $\underline{i}=1$ $\bar{i}=-2$
$x=\log L$ $u=\log L_u$
$H=e^{k(x-u)}$, $\underline{H}=e^{\underline{k}(x-u)}$, $\bar{H}=e^{\bar{k}(x-u)}$

NE120−7, B4_50_1

double line element of *Richter* (1987) for the lighting technic with luminance $L=F(P,D,T)$

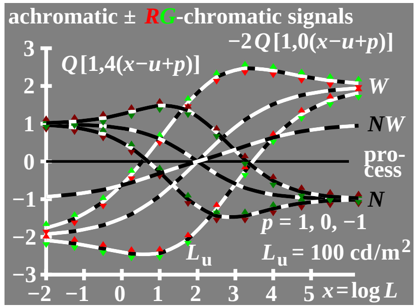
luminance signal function $F(L)$

$F(L)=iQ(H)$ $H=e^{k(x-u)}$
$Q[\ln\{1+1/(1+\sqrt{2}H)\}]/\ln\sqrt{2}-1$

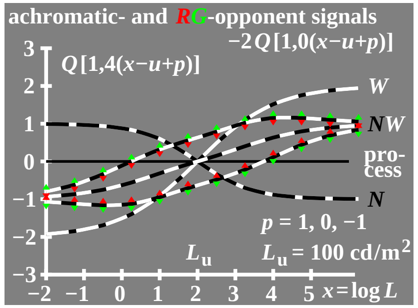
Taylor-derivations:

$\Delta F(L)=\frac{dF}{dL}\Delta L=i\frac{dQ}{dH}\Delta H$
$=-i\sqrt{2}\Delta H/[\ln\sqrt{2}(1+\sqrt{2}H)(2+\sqrt{2}H)]$

NE120−8, B4_50_2



NE121−7, B4_55_1



NE121−8, B4_55_2

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TUB registration: 20101101-NE12/NE12L0NP.PDF /.PS
application for measurement of printer or monitor systems

TUB material: code=rha4ta