Line element of *Stiles* (1946)
with „cone values" L, M, S
separate colour response functions

$F(L) = i \ln(1+9L)$
$F(M) = j \ln(1+9M)$
$F(S) = k \ln(1+9S)$

Taylor-derivations:

$$\Delta F(L,M,S) = \frac{dF}{dL}\Delta L + \frac{dF}{dM}\Delta M + \frac{dF}{dS}\Delta S$$
$$= \frac{9i}{1+9L}\Delta L + \frac{9j}{1+9M}\Delta M + \frac{9k}{1+9S}\Delta S$$

feb20−1N

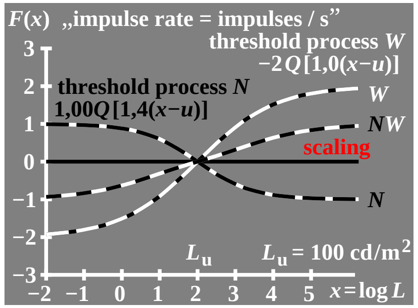
Line element of *Vos&Walraven* (1972)
with „cone values" L, M, S
separate colour response functions

$F(L) = -2i\sqrt{L}$
$F(M) = -2j\sqrt{M}$
$F(S) = -2k\sqrt{S}$

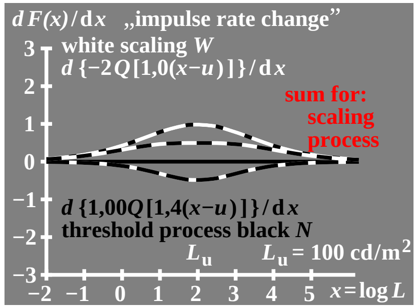
Taylor-derivations:

$$\Delta F(L,M,S) = \frac{dF}{dL}\Delta L + \frac{dF}{dM}\Delta M + \frac{dF}{dS}\Delta S$$
$$\Delta F(L,M,S) = \frac{i}{\sqrt{L}}\Delta L + \frac{j}{\sqrt{M}}\Delta M + \frac{k}{\sqrt{S}}\Delta S$$

feb20−2N



feb21−1N



feb21−2N

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:

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

feb20−3N

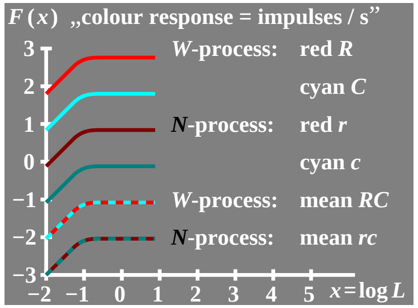
„achromatic signal"-description
functions $Q_{1m}[k(x-u)]$

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

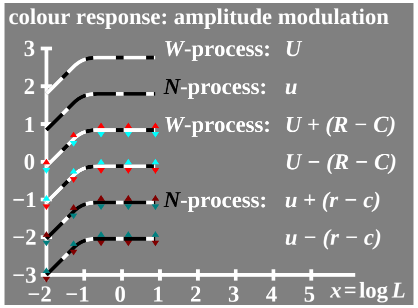
$Q_{1m}[k(x-u)] = -\frac{l}{\ln\sqrt{2}} \ln q[k(x-u)] - m$
function values with $l = m = 1$:

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

feb20−4N



feb21−3N



feb21−4N

„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:

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

feb20−5N

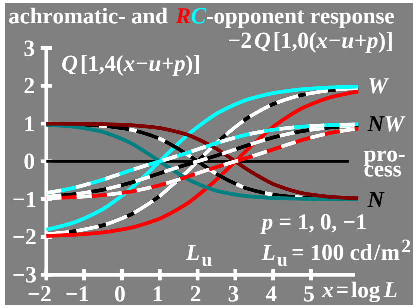
luminance discrimination
possibility $L/\Delta L$ as function of H

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

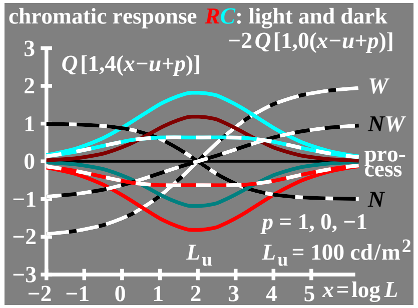
it follows: $L/\Delta L = [kH/(dH \ln 10)]$
$\frac{L}{dL}$ = const $H/[(1+\sqrt{2}H)(2+\sqrt{2}H)]$

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

feb20−6N



feb21−5N



feb21−6N

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

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

feb20−7N

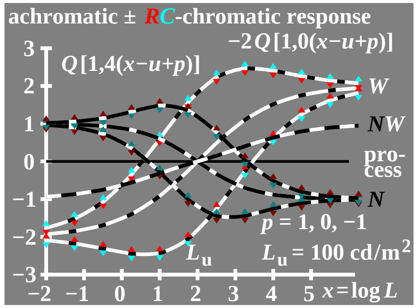
double line element of *Richter*
(1987) for the lighting technic with
luminance $L = F(L, M, S)$

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

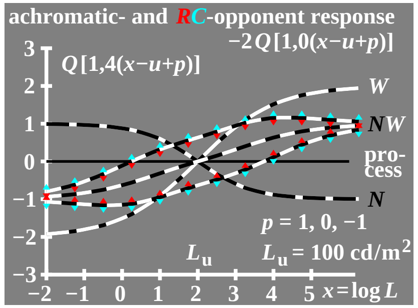
Taylor-derivations:

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

feb20−8N



feb21−7N



feb21−8N

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

TUB registration: 20231201-feb2/feb2l0na.txt /.ps
application for evaluation and measurement of display or print output

TUB material: code=rha4ta