http://130.149.60.45/~farbmetrik/JE69/JE69L0NA.TXT /.PS
N: No Output Linearization (OL) data in File (F), Startup (S) or Device (D), page 1/2

line element of light technology (luminance L) and color metrics with „color values" P, D, T

luminance signal function $F(L)$
color signal functions $F(P, D, T)$

Taylor-derivations:

$$\Delta F(L) = \frac{dF}{dL}\Delta L$$

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

JE690−1

line element of *Helmholtz* (1896) with „color values" P, D, T

three separate color signal functions

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

Taylor-derivations:

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

$$\Delta F(P, D, T) = \frac{i}{P}\Delta P + \frac{j}{D}\Delta D + \frac{k}{T}\Delta T$$

JE690−2

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

luminance signal function $F(L)$

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

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

JE691−1

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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:

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

JE690−8

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:

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

JE690−1

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

three separate color signal functions

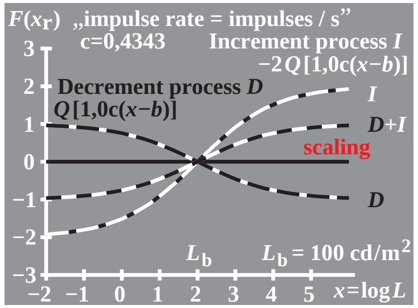
$F(P) = -2i\sqrt{P}$
$F(D) = -2j\sqrt{D}$
$F(T) = -2k\sqrt{T}$

Taylor-derivations:

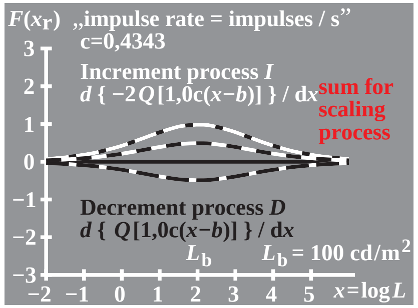
$$\Delta F(P, D, T) = \frac{dF}{dP}\Delta P + \frac{dF}{dD}\Delta D + \frac{dF}{dT}\Delta T$$

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

JE690−4



JE691−3



JE691−4

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:

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

JE690−5

„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 $l = m = 1$:

$Q[k(x-u) \rightarrow +\infty] = 1$
$Q[k(x-u) = 0] = 0$
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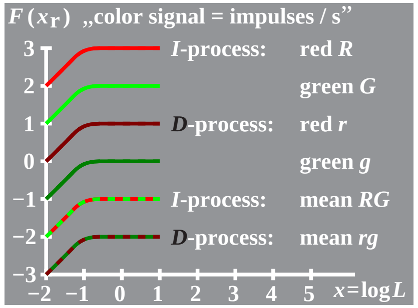
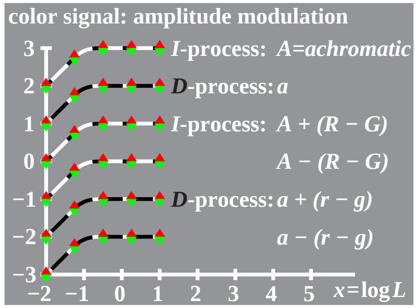
JE690−6



JE691−5



JE691−6

„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:

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

JE690−7

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

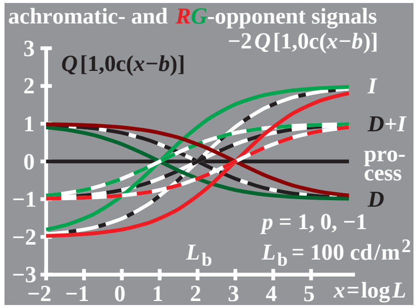
with: $L = 10^x$ $H = e^h = 10^{\log e\, k(x-u)}$
$dL/dx = \ln 10\, L$ $dH/dx = k\, H$

it follows: $L/\Delta L = [kH/(dH \ln 10)]$

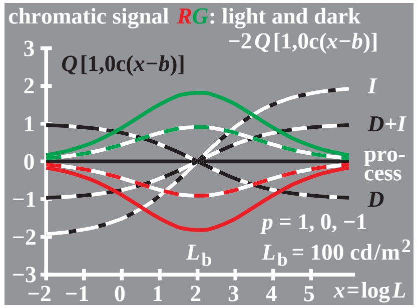
$$\frac{L}{dL} = \text{const}\; H/[(1+\sqrt{2}H)(2+\sqrt{2}H)]$$

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

JE690−8



JE691−7



JE691−6, B8931_2, E8241−6, B4_54_2, N=4_54_2

TUB-test chart JE69; Line elements of light and color metric
N−W−, R−G−, and J−B−opponent processes of colour vision

input: *w setgray*
output: no change compared to input

See original or copy: http://web.me.com/klaus.richter/JE69/JE69L0NA.TXT /.PS
Technical information: http://www.ps.bam.de or http://130.149.60.45/~farbmetrik

TUB registration: 20100301-JE69/JE69L0NA.TXT /.PS
application for evaluation and measurement of printer or monitor systems

TUB material: code=rha4ta

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JE690−1

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JE690−2

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JE691−1

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Taylor-derivations:

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JE690−8

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JE690−1

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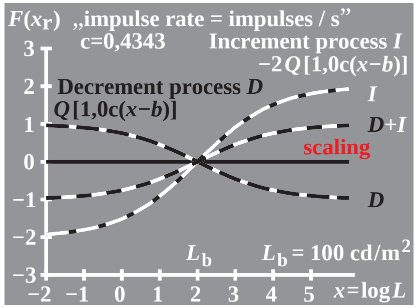
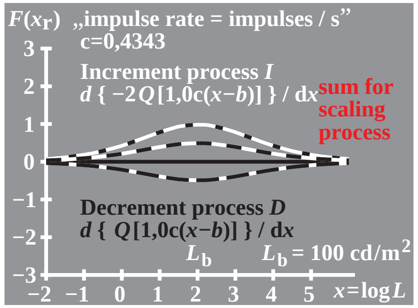
JE690−4



JE691−3



JE691−4

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JE690−5

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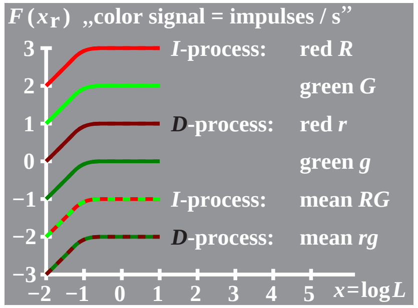
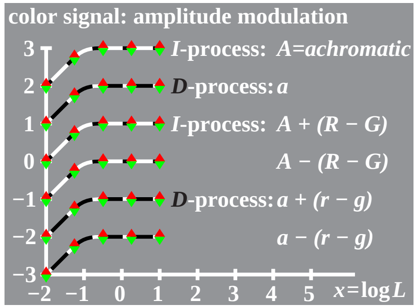
JE690−6



JE691−5



JE691−6

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JE690−7

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it follows: $L/\Delta L = [kH/(dH \ln 10)]$

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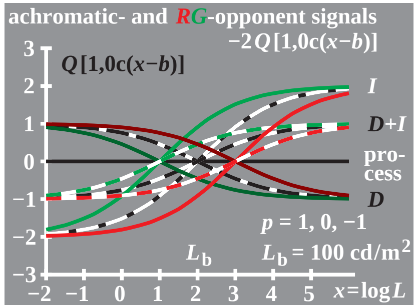
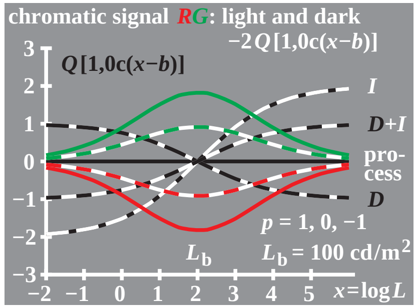
JE690−8



JE691−7



JE691−6, B8931_2, E8241−6, B4_54_2, N=4_54_2

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TUB registration: 20100301-JE69/JE69L0NA.TXT /.PS
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