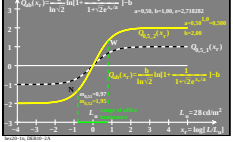


Achromatic receptor-response function $Q_{ab}[x_r/a]$

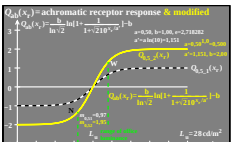
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a]=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}e^{(x_r/a)}}]+b$$

function values for b=1 and a>0 :

$Q_{a1}[x_r/a\to-\infty]$	=-1	$x=\log L_u$, $u=\log L_u$
$Q_{a1}[x_r/a=0]$	=0	$x_r=\log[L/L_u]$
$Q_{a1}[x_r/a\to+\infty]$	=+1	$=x-u$

tex20-2a, tex20-2a



Achromatic receptor-response function $Q_{ab}[x_r/a']$ a'=a·ln(10)

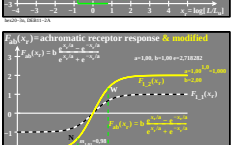
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a']=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}\,10^{(x_r/a')}}]+b$$

function values for b=1 and a'=a·ln(10)>0 :

$Q_{a1}[x_r/a'\to-\infty]$	=-1	$x=\log L_u$, $u=\log L_u$
$Q_{a1}[x_r/a'=0]$	=0	$x_r=\log[L/L_u]$
$Q_{a1}[x_r/a'\to+\infty]$	=+1	$=x-u$

tex20-4a, tex20-4a



Achromatic receptor-response function $F_{ab}[x_r/a]$ x_r=log(relative luminance)

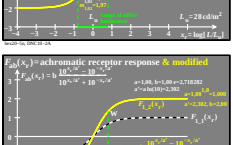
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F_{ab}[x_r/a]=b\,\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}=b\tanh[x_r/a]$$

function values for b=1 and a>0 :

$F_{a1}[x_r/a\to-\infty]$	=-1	$x=\log L_u$, $u=\log L_u$
$F_{a1}[x_r/a=0]$	=0	$x_r=\log[L/L_u]$
$F_{a1}[x_r/a\to+\infty]$	=+1	$=x-u$

tex20-6a, tex20-6a



Achromatic receptor-response function $F_{ab}[x_r/a']$ x_r=log(relative luminance)

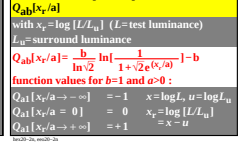
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F_{ab}[x_r/a']=b\,\frac{10^{x_r/a'}-10^{-x_r/a'}}{10^{x_r/a'}+10^{-x_r/a'}}=b\tanh[x_r/a']$$

function values for b=1 and a'=a·ln(10)>0 :

$F_{a1}[x_r/a'\to-\infty]$	=-1	$x=\log L_u$, $u=\log L_u$
$F_{a1}[x_r/a'=0]$	=0	$x_r=\log[L/L_u]$
$F_{a1}[x_r/a'\to+\infty]$	=+1	$=x-u$

tex20-8a, tex20-8a



Derivation of achromatic receptor response $F'_{ab}[x_r/a]$ x_r=log(relative luminance)

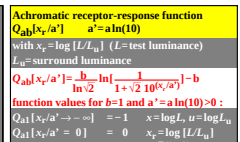
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	$x=\log L_u$, $u=\log L_u$
$F'_{a1}[x_r/a=1]$	=1	$x_r=\log[L/L_u]$
$F'_{a1}[x_r/a\to+\infty]$	=0	$=x-u$

tex21-2a, tex21-2a



Derivation of achromatic receptor response $F'_{ab}[x_r/a']$ x_r=log(relative luminance)

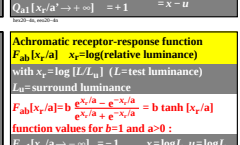
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a']=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$$

function values for b=1 and a'=a·ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	$x=\log L_u$, $u=\log L_u$
$F'_{a1}[x_r/a'=1]$	=1	$x_r=\log[L/L_u]$
$F'_{a1}[x_r/a'\to+\infty]$	=0	$=x-u$

tex21-4a, tex21-4a



Derivation of achromatic receptor response $F'_{ab}[x_r/a]$ x_r=log(relative luminance)

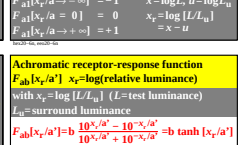
with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	$x=\log L_u$, $u=\log L_u$
$F'_{a1}[x_r/a=1]$	=1	$x_r=\log[L/L_u]$
$F'_{a1}[x_r/a\to+\infty]$	=0	$=x-u$

tex21-6a, tex21-6a



Derivation of achromatic receptor response $F'_{ab}[x_r/a']$ x_r=log(relative luminance)

with $x_r=\log[L/L_u]$ (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a']=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$$

function values for b=1 and a'=a·ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	$x=\log L_u$, $u=\log L_u$
$F'_{a1}[x_r/a'=1]$	=1	$x_r=\log[L/L_u]$
$F'_{a1}[x_r/a'\to+\infty]$	=0	$=x-u$

tex21-8a, tex21-8a

TUB-test chart hex2; Model of two response functions $F_{ab}(x_r)$ & $Q_{ab}(x_r)$ and derivation $F'_{ab}(x_r)$
Tangens hyperbolicus $\tanh(x_r)$ and modified functions with e^{x_r} and 10^{x_r}; $a^n=a^{1,0}$