Descriptive Model

C_h, C_v	stimulus contrasts
C_{0h}, C_{0v}	effective stimulus baseline contrasts
O_h, O_v	input optostim powers
O_0	input optostim baseline power (known?)
$r_h = E(R_h) = f\left[\alpha_{hh} C_h + \alpha_{vh} C_v + C_{0h} + \beta_{hh}(O_h + O_0) + \beta_{vh}(O_v + O_0)\right]$	mean response of horizontal columns
$r_v = E(R_v) = f\left[\alpha_{vv} C_v + \alpha_{hv} C_h + C_{0v} + \beta_{vv}(O_v + O_0) + \beta_{hv}(O_h + O_0)\right]$	mean response of vertical columns
$s_h = \sqrt{r_h}$	response SD of horizontal columns
$s_v = \sqrt{r_v}$	response SD of vertical columns
$f(x) = \dfrac{x^n}{x^n + x_{50}^n}$	nonlinear response function
$p = \Phi\left(\dfrac{2\Delta r}{\sqrt{s_h^2 + s_v^2}}\right)$	proportion response “horizontal”

Potential first pass: $\alpha_{hv} = \alpha_{vh} = 0 \quad \beta_{hv} = \beta_{vh} = 0$

$C_{0v} = C_{0h} = C_0 \;\; \alpha_{hh} = \alpha_{vv} = \alpha \;\; \beta_{hh} = \beta_{vv} = \beta$

$$r_h = f\left[\alpha C_h + C_0 + \beta(O_h + O_0)\right]$$

$$r_v = f\left[\alpha C_v + C_0 + \beta(O_v + O_0)\right]$$

$\alpha, \beta, C_0, n, x_{50}$ vary these 5 parameters

Once these parameters are in the ballpark of fitting the behavioral data, then vary the others to see their effect.