

Supporting Table S 10: Initial conditions and bounds for least-squares-fits. Model functions and their parameters are described in Methods subsection “Model functions”, number before model indicates if the model pertained to data from the one or two stimulus conditions. $u = \min_i y_i + 1.2 \text{ptp}_i y_i$ where $\text{ptp}_i y_i = \max_i y_i - \min_i y_i$ and $\{y_i\}$ is the set of all firing rates in the tuning curve. The values of 10.74, 2.41 and 100 for the width-parameter k of the $s\beta$ model correspond to a half-width-at-half-maximum of 45° , 90° and 15° . Likewise the values of $k = 2.3, 0$ and 20.34 for the vM model correspond to 45° , 90° and 15° ; As $k = 0$ would make the denominator in the definition of vM zero it was replaced by 0.001.

model	initial condition	lower bounds	upper bounds
1 $s\beta$	$(u/2, 10.74, 240, 10)$	$(0, 2.41, 180, -50)$	$(u, 100, 300, 100)$
1 vM	$(u/2, 2.3, 240, 10)$	$(0, 0.001, 180, -50)$	$(u, 20.34, 300, 100)$
1 wG	$(u/2, 45, 240, 10)$	$(0, 15, 180, -50)$	$(u, 90, 300, 100)$
1 wC	$(u/2, 45, 240, 10)$	$(0, 15, 180, -50)$	$(u, 90, 300, 100)$
1 wB	$(u/2, 45, 240, 10, 2)$	$(0, 15, 180, -50, 1)$	$(u, 90, 300, 100, 10)$
2 $s\beta$	$(u/2, 10.74, 120, 5, u/2, 10.74, 240, 5)$	$(0, 2.41, 30, -25, 0, 2.41, 180, -25)$	$(u, 100, 180, 50, u, 100, 330, 50)$
2 vM	$(u/2, 2.3, 120, 5, u/2, 2.3, 240, 5)$	$(0, 0.001, 30, -25, 0, 0.001, 180, -25)$	$(u, 20.34, 180, 50, u, 20.34, 330, 50)$
2 wG	$(u/2, 45, 120, 5, u/2, 45, 240, 5)$	$(0, 15, 30, -25, 0, 15, 180, -25)$	$(u, 90, 180, 50, u, 90, 330, 50)$
2 wC	$(u/2, 45, 120, 5, u/2, 45, 240, 5)$	$(0, 15, 30, -25, 0, 15, 180, -25)$	$(u, 90, 180, 50, u, 90, 330, 50)$
2 wB	$(u/2, 45, 120, 5, 2, u/2, 45, 240, 5, 2)$	$(0, 15, 30, -25, 1, 0, 15, 180, -25, 1)$	$(u, 90, 180, 50, 10, u, 90, 330, 50, 10)$