

Figure 5 - figure supplement 1

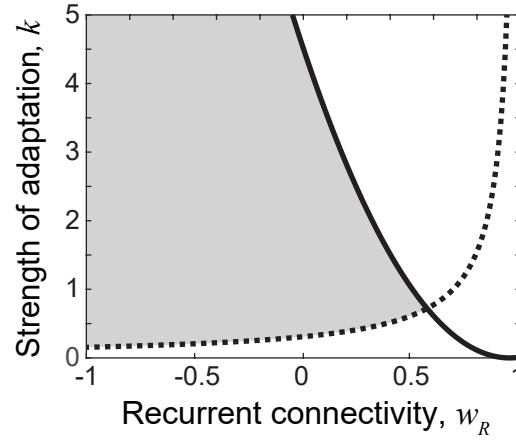


Figure 5 – figure supplement 1. Constraints on w_R and k to reproduce responses to novel stimuli (shaded area). In the dynamics of \bar{r} and \bar{a} in Eq. (4), no damped oscillation for novel stimuli provides a constraint $k \leq ((-1 + w_R) / \tau_R + 1 / \tau_A)^2 \tau_R \tau_A / 4$ (solid black line). To analytically obtain the constraints for the lower peak in the successive presentation of novel stimuli, we assumed that during the rising phase of activity, adaptation variable and external inputs are constant. Also, we assumed neural activity changes linearly during the rising and decaying phase. Under these assumptions, the lower peak for the second novel stimuli provides the constraint $c(\tau_R, \tau_A, t_0, t_l, r_l / r_0) < (1 - w_R)k$ (the dotted line). Here, c is a constant determined by time constants τ 's and t_0 and t_l that are the durations of the rising and decaying phases, and r_0 and r_l that are the activities at the end of the rising and decaying phases such that

$$c = \frac{r_l / r_0 \cdot \tau_R / t_0}{1 - \exp(-t_l / \tau_A) - (1 - r_l / r_0)(\tau_A / t_0 (\exp(-t_l / \tau_A) - 1) + 1)} .$$

The parameters used in this figure are $\tau_R = 5$ ms, $\tau_A = 200$ ms, $t_0 = 30$ ms, $t_l = 120$ ms, $r_l / r_0 = 0.7$.