Figure S-1: Propagation of the generalized relative variance over time. The dotted, dashed and solid lines represent intra-colony, cross-colony, and overall variance, respectively. The color of the lines (red, orange, green, and blue) corresponds to the initial distributions $(n_1(0), n_2(0)) = (1, 1)$, $(1, 10)$, $(10, 1)$ and $(100, 100)$, respectively. The change of the background color presents the onset of an external signal: pale green means no signals in the culture (τ_{12}^{OFF}) while pale magenta means a signal is released into the culture (τ_{12}^{ON}). Parameters are $\gamma_1 = 1.0$, $\gamma_2 = 0.5$, $\delta_1 = \delta_2 = 0.01$, $\tau_{12} = 0.01$, $\tau_{21}^{OFF} = 0.01$, $\tau_{21}^{ON} = 0.5$.

Figure S-2: Asymptotic ($t \to \infty$) relative variance with respect to different initial distributions for a symmetric setup of the rates. Left panel: The cross-colony and total variance coincide as the top surface, the deterministic and intra-colony variance reside the bottom (zero) surface. Right panel: A cross section of the variation indices along the line $n_1(0) = n_2(0)$. The parameters are chosen as $\gamma_1 = \gamma_2 = 1.0$, $\delta_1 = \delta_2 = 0.01$, $\tau_{12} = \tau_{21} = 0.01$.

Figure S-3: Propagation of the generalized relative variance over time. The lines, from top to bottom, represent the overall variances for the initial numbers $(n_1(0), n_2(0)) = (0, 1)$, $(n_1(0), n_2(0)) = (1, 0)$, $(n_1(0), n_2(0)) = (1, 1)$, $(1, 10)$, $(10, 1)$ and $(100, 100)$, respectively.

Figure S-4: Relative variances of cellular populations in a logistic environment. **(a)** and **(b)** Typical trajectories of cell populations of the two phenotypes obtained from Gillespie simulations. In (a) the initial state is $n_1(0) = 1, n_2(0) = 0$ and in (b) it is $n_1(0) = 0, n_2(0) = 1$. The different colors of the curves represent trajectories from different runs. **(c)** The relative variances for the initial numbers $n_1(0) = 1, n_2(0) = 0$ which corresponds to **(a)**. After the transients decay, the cross-colony variance goes to the steady state, zeros, in this case. **(d)** The relative variances for the initial numbers $n_1(0) = 0, n_2(1) = 0$ which corresponds to **(b)**. After the transients decay, the cross-colony variance goes to the steady state, zeros, in this case.