Additional Figures with Symmetric Task Efficiencies

Last updated: March 14, 2019

A few notes:

- Below are the simulation results when *one line is more efficient at one task while the other line is more efficient at the other task*. In terms of the values of α, **Fig. 1X** is the counterpart to Fig. 1 in the most recent document (MixingModel_Updates_4Mar2019.pdf), **Fig. 2X** to Fig. 2, and **Fig. 3X** to Fig. 3. Each panel includes figures for both task 1 (top row) and task 2 (bottom row) performance.
  - **Fig. 1X**: When both lines are efficient, we only observe downward contagions, as is the case in Fig. 1. Changing the demand rate has no qualitative effect.
  - **Fig. 2X**: When both lines are inefficient, we observe downward contagions (**Fig. 2Xa**) when the mixed colonies are efficient and "averaging" contagions (**Fig. 2Xb**) when the mixed colonies are inefficient.
  - **Fig. 3X**: When increasing the demand rate changes both lines from being efficient to inefficient, we observe downward contagions. Note, however, that if we continue to increase the demand rate, the mixed colonies become inefficient and we observe "averaging" contagions as in **Fig. 2Xb**.

- I assumed that $\alpha_1^A = \alpha_2^B$ and $\alpha_2^A = \alpha_1^B$ (but $\alpha_1^A \neq \alpha_2^A$) in all cases. Because of this symmetry, pure-A and pure-B colonies are either *both efficient or both inefficient*. In other words, we don't have a scenario like Fig. 2—which showed upward contagions—in which one line is efficient where the other is inefficient. *So it seems that this asymmetry between the lines plays an important role in the direction of contagions.* To test this more rigorously we would need to try varying all four efficiency parameters.

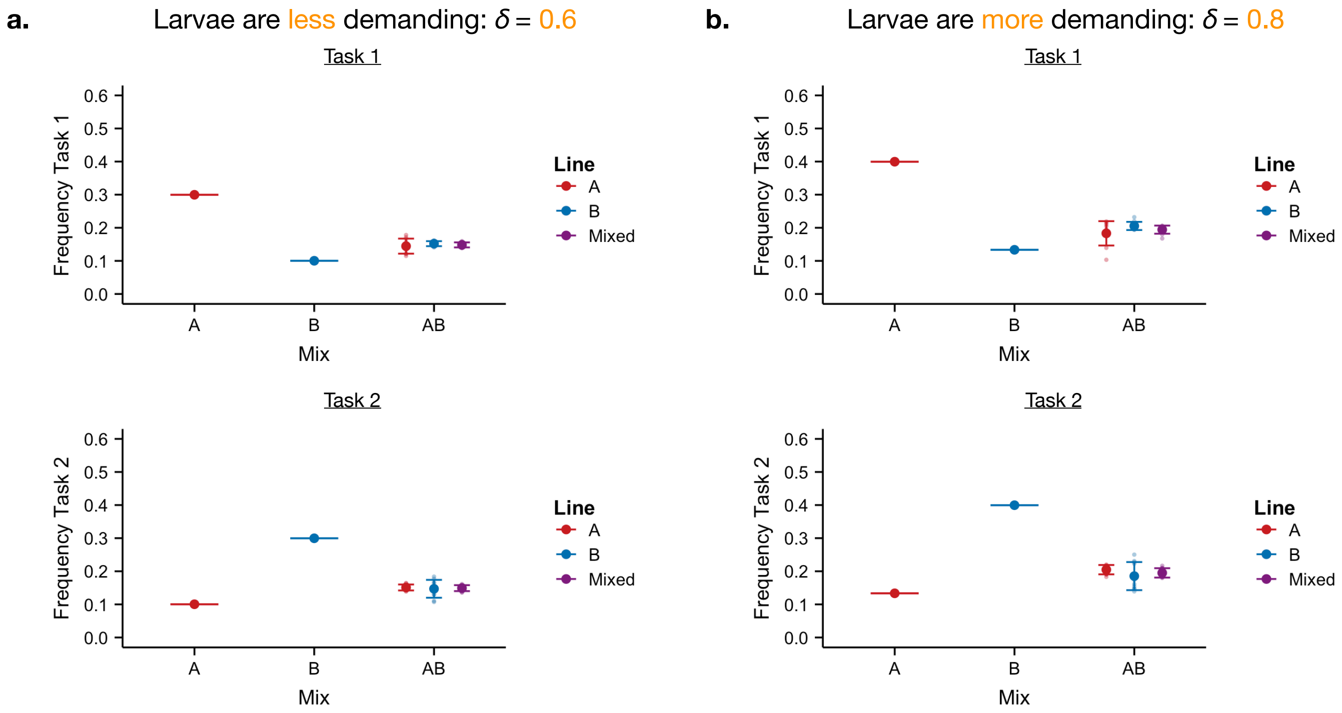

Figure 1X: Simulation results for varying both the demand rate (δ) and the task efficiency (α). Both lines A and B are efficient in pure colonies; mixed colonies are also efficient. For a fixed δ, line B is more efficient than line A at task 1, while line A is more efficient than line B at task 2.
a: Larvae are less demanding (δ = 0.6). **b**: Larvae are more demanding (δ = 0.8). Parameters: $\alpha_1^A = \alpha_2^B = 2$, $\alpha_2^A = \alpha_1^B = 6$.

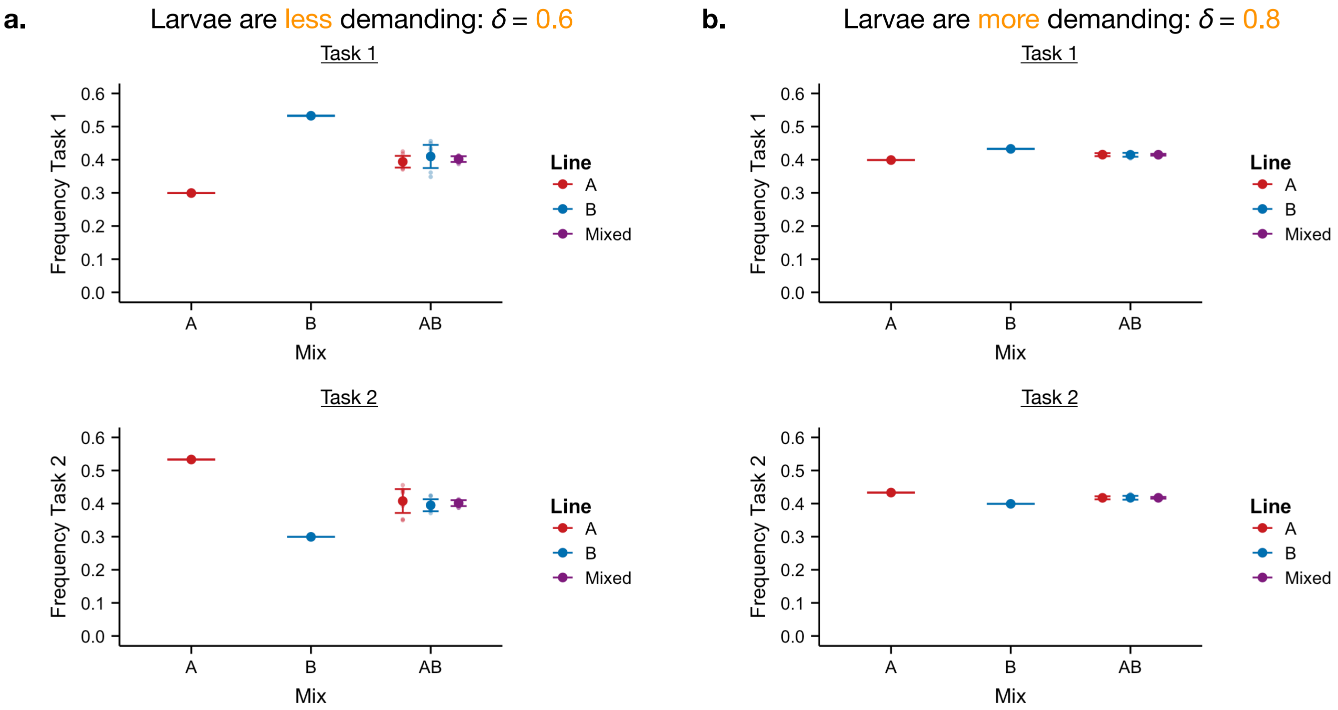

Figure 2X: Simulation results for varying both the demand rate (δ) and the task efficiency (α). For both values of δ, both lines A and B are inefficient in pure colonies; mixed colonies are efficient when the larvae are less demanding (**a**) but inefficient when the larvae are more demanding (**b**). For a fixed value of δ, line A is more efficient than line B at task 1, while line B is more efficient than line A at task 2. **a**: Larvae are less demanding (δ = 0.6). **b**: Larvae are more demanding (δ = 0.8). Parameters: $\alpha_1^A = \alpha_2^B = 2$, $\alpha_2^A = \alpha_1^B = 1$.

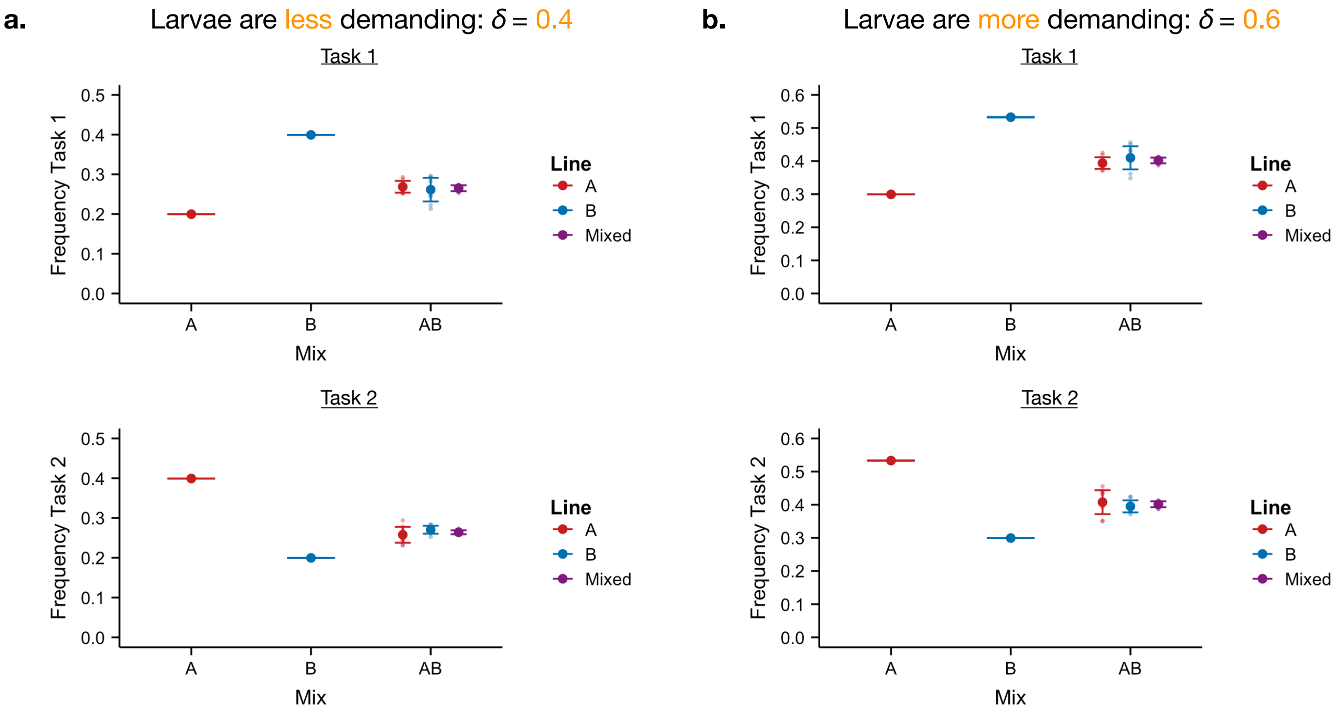

Figure 3X: Simulation results for varying both the demand rate (δ) and the task efficiency (α). **a**: Larvae are less demanding ($\delta = 0.4$). **b**: Larvae are more demanding ($\delta = 0.6$, same as **Fig. 2Xa**). For a fixed value of δ, line A is more efficient than line B at task 1, while line B is more efficient than line A at task 2. In pure colonies, both lines are efficient when the larvae are less demanding (**a**) but inefficient when the larvae are more demanding (**b**); mixed colonies are efficient. Parameters: $\alpha_1^A = \alpha_2^B = 2$, $\alpha_2^A = \alpha_1^B = 1$.