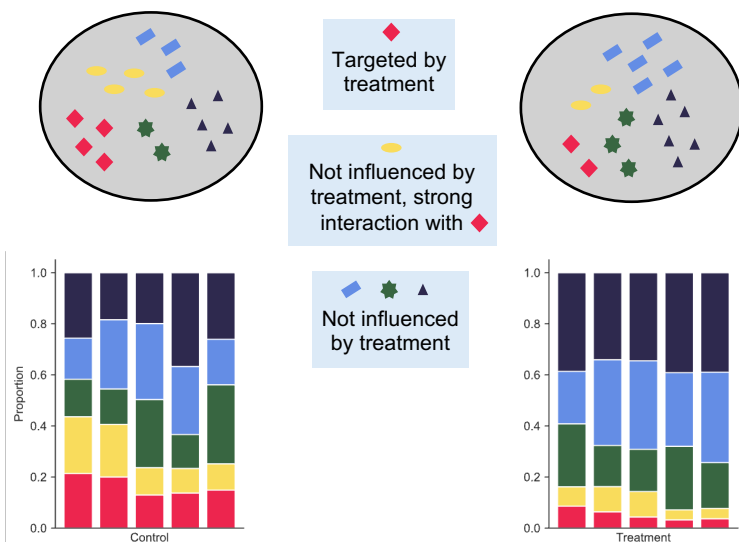


**a**

**Control**

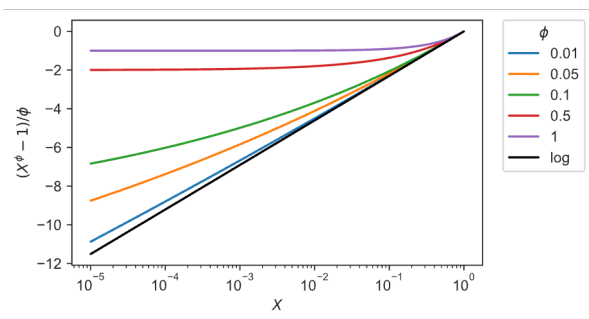
**Treatment**



$$P(X) = \frac{1}{2a} X^{aT} \begin{matrix} \text{[Matrix]} \\ K \end{matrix} X^a + \frac{1}{b} \left( \begin{matrix} \text{[Vector]} \\ \eta_0 \end{matrix} + \begin{matrix} \text{[Vector]} \\ \eta_1 \end{matrix} \right) X^b$$

**b**

**Power transformation**



$$\lim_{\phi \rightarrow 0} \frac{X^\phi - 1}{\phi} = \log(X)$$

No zero replacement necessary

**c**

**Regularized score matching**

$$\min_{\theta} \theta^T \Gamma(X) \theta + g(X)^T \theta - \lambda_1 \|K_{off}\|_1$$

**d**

**Differential abundance**

$$T_j = -\frac{1}{2} \left| \frac{\hat{\eta}_{1,j}}{\hat{\sigma}_{\eta_{1,j}}} \right|$$

