participant level

$$
\begin{aligned}
m_p &\sim \text{Normal}(XXX, XXX) \\
c_p &\sim \text{Normal}(XXX, XXX) \\
\epsilon_p &\sim \text{Beta}_{(0,0.5)}(\omega(\kappa-2)+1, (1-\omega)(\kappa-2)+1) \\
\alpha_p &\sim \text{Normal}_{(0,+\infty)}(XXX, XXX)
\end{aligned}
$$

trial level

$$
\begin{aligned}
\log(k^A_{pt}) &= m_p.\log(A_{pt}) + c_p \\
\log(k^B_{pt}) &= m_p.\log(B_{pt}) + c_p \\
V^A_{pt} &= \frac{A_{pt}}{1 + k^A_{pt} D^A_{pt}} \\
V^B_{pt} &= \frac{B_{pt}}{1 + k^B_{pt} D^B_{pt}} \\
P_{pt} &= \epsilon_p + (1 - 2.\epsilon_p).\Phi\left(\frac{V^B_{pt} - V^A_{pt}}{\alpha_p}\right) \\
R_{pt} &\sim \text{Binomial}(P_{pt}, 1)
\end{aligned}
$$