

Changes to the Rescorla-Wagner Modified Model

1 Updating α

We hereby present 3 alternatives.

a Double α

$$\begin{aligned}\alpha^{n+1} &= \alpha^n + \Delta\alpha^n \\ &= \alpha^n + [\lambda\alpha_{\text{Mack}}^n + (1 - \lambda)\alpha_{\text{Hall}}^n]\end{aligned}\tag{1}$$

α_{Mack} reflects the Mackintosh formulation of attention for the Rescorla-Wagner model.

$$\alpha_{\text{Mack}}^n = f(\lambda - V)\tag{2}$$

α_{Hall} reflect the Hall and Pearce phenomenon.

$$\begin{aligned}\alpha_{\text{Hall}}^n &= -\alpha^n \cdot \delta \cdot e^{-\frac{1}{2}} \cdot (\nabla_1[f](n))^2 \\ &= -\alpha^n \cdot \delta e^{-\frac{1}{2}} \cdot (V_{\text{MA}}^n - V_{\text{MA}}^{n-1})^2\end{aligned}\tag{3}$$

$$\delta \in (0, 1)$$

$$V_{\text{MA}}^n(k) = \frac{1}{k} \sum_{i=n-k+1}^n V^i$$

b Maximum of both

$$\alpha^{n+1} = \max(\alpha_{\text{Mack}}^n, \alpha_{\text{Hall}}^n)\tag{4}$$

c Thresholding

$$\alpha^{n+1} = \begin{cases} \alpha_{\text{Mack}}^n & \text{if } V^n > \tau \\ \alpha_{\text{Hall}}^n & \text{otherwise} \end{cases}\tag{5}$$