$$E = [U_t - \hat{v}(s_t, a_t)]^2$$
$$\rightarrow -U_t \ln \hat{v}(s_t, w_t)$$

$$w_{t+1} = w_t - \alpha \nabla E$$
$$= w_t + \alpha \frac{U_t}{\hat{v}(s_t, a_t)} \nabla \hat{v}(s_t, w_t)$$
$$= w_t + \alpha \frac{U_t}{\hat{v}(s_t, a_t)} x \qquad\qquad (when\ linear)$$