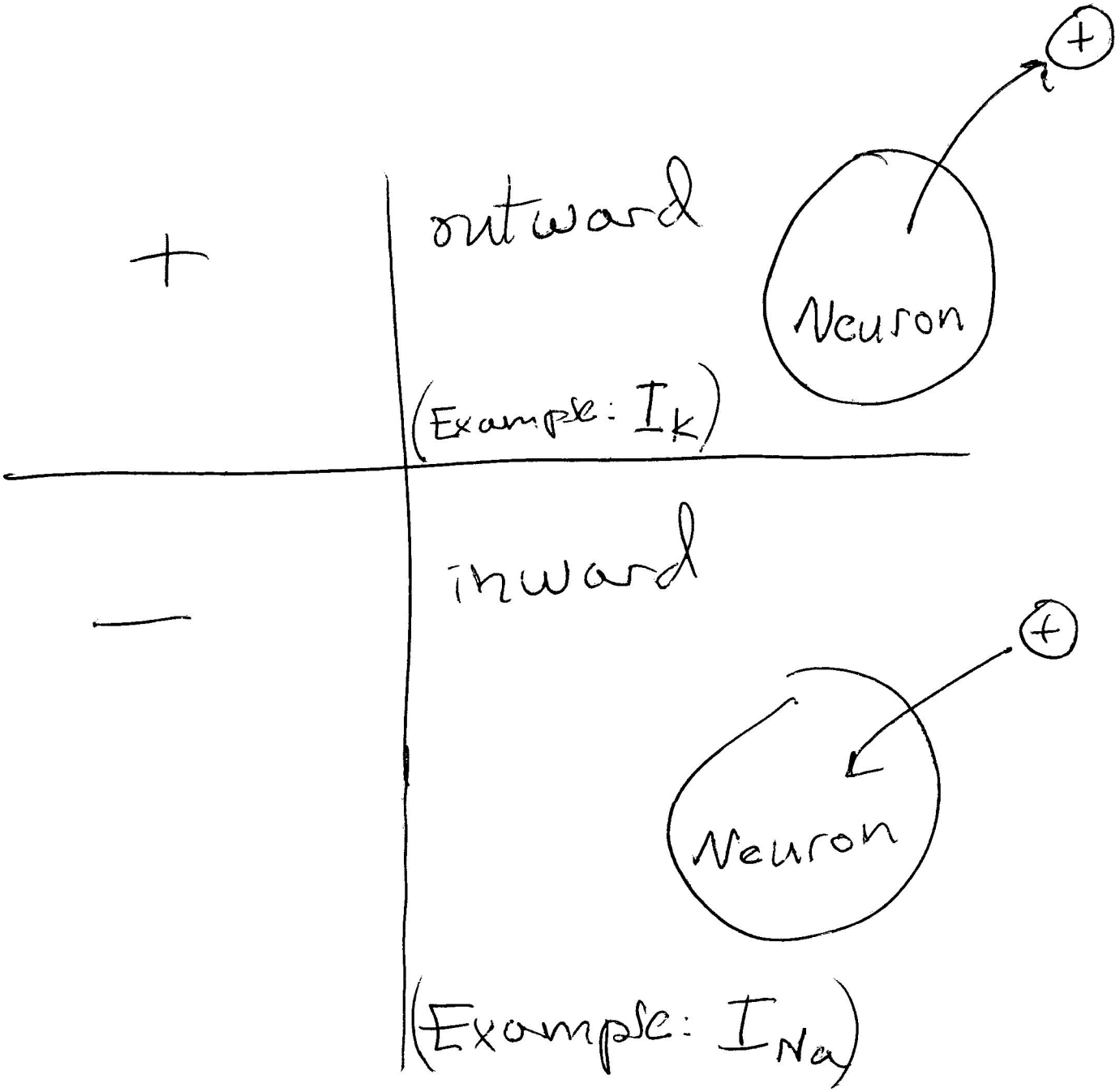
Current conventions



$$g_{Na} = \frac{I_{Na}}{(V_c - E_{Na})}$$

command ↓ V_c — reversal ↓ E_{Na}

$$g_{Na}(V_c - E_{Na}) = I_{Na}$$

if $V_c = 0$ mV, then:

$$g_{Na}(0 - +45\text{mV}) = I_{Na}$$

$$g_{Na}(-45\text{ mV}) = I_{Na}$$

This says that if the command voltage is set to 0 mV, then the sodium current, I_{Na}, will be negative. This is correct, as current is defined to be the direction of ⊕ charge flow, and the convention is that inward current is negative. Recall $E_{Na} = +45$ mV

$$g_K = \frac{I_K}{(V_c - E_K)}$$

$$g_K(V_c - E_K) = I_K$$

V_c: command voltage

E_K: reversal potential for K^+

If we set $V_c = 0$, then:

$$g_K(0 - -100\,mV) = I_K$$

$$g_K(+100\,mV) = I_K$$

This says that if $V_c = 0$, then the potassium current, I_K, will be positive. This is correct because current is defined to be the direction of positive charge flow, and the convention is that outward current is positive. Recall $E_K = -100\,mV$