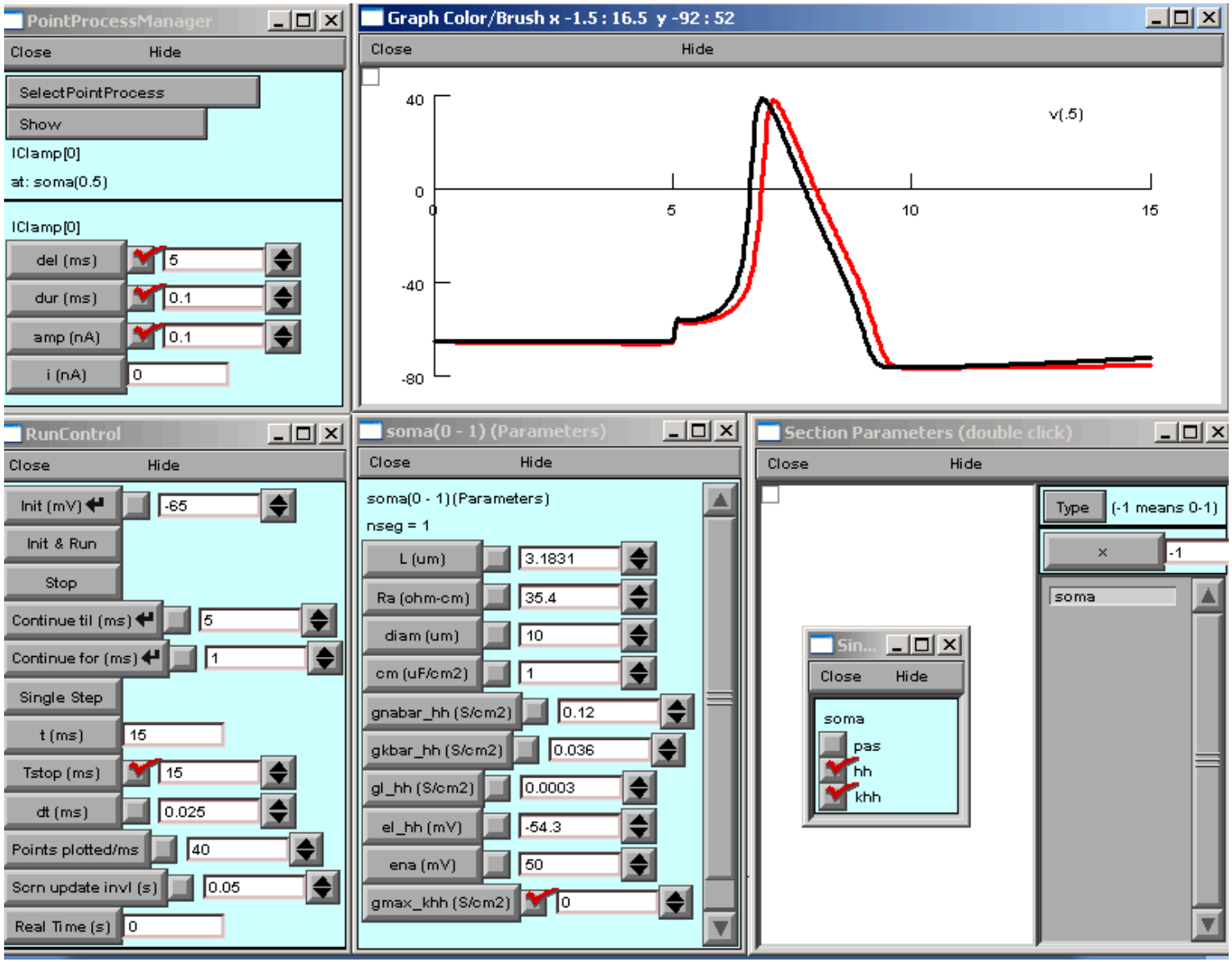
Lab V

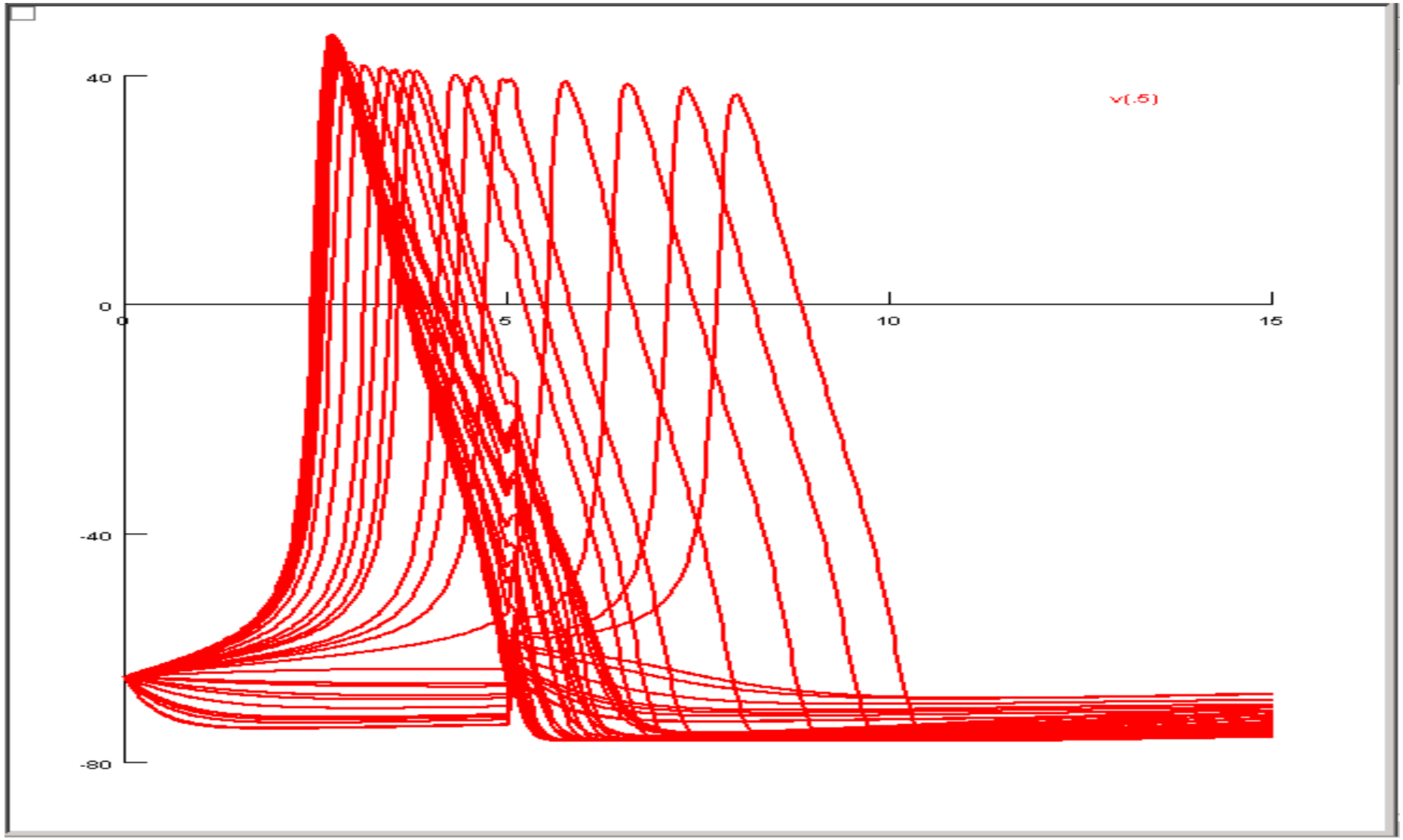
Kinetic Scheme

Below is a graph of the action potentials resulting from both the standard hh channel (black) and the channel built in the tutorial. (red)



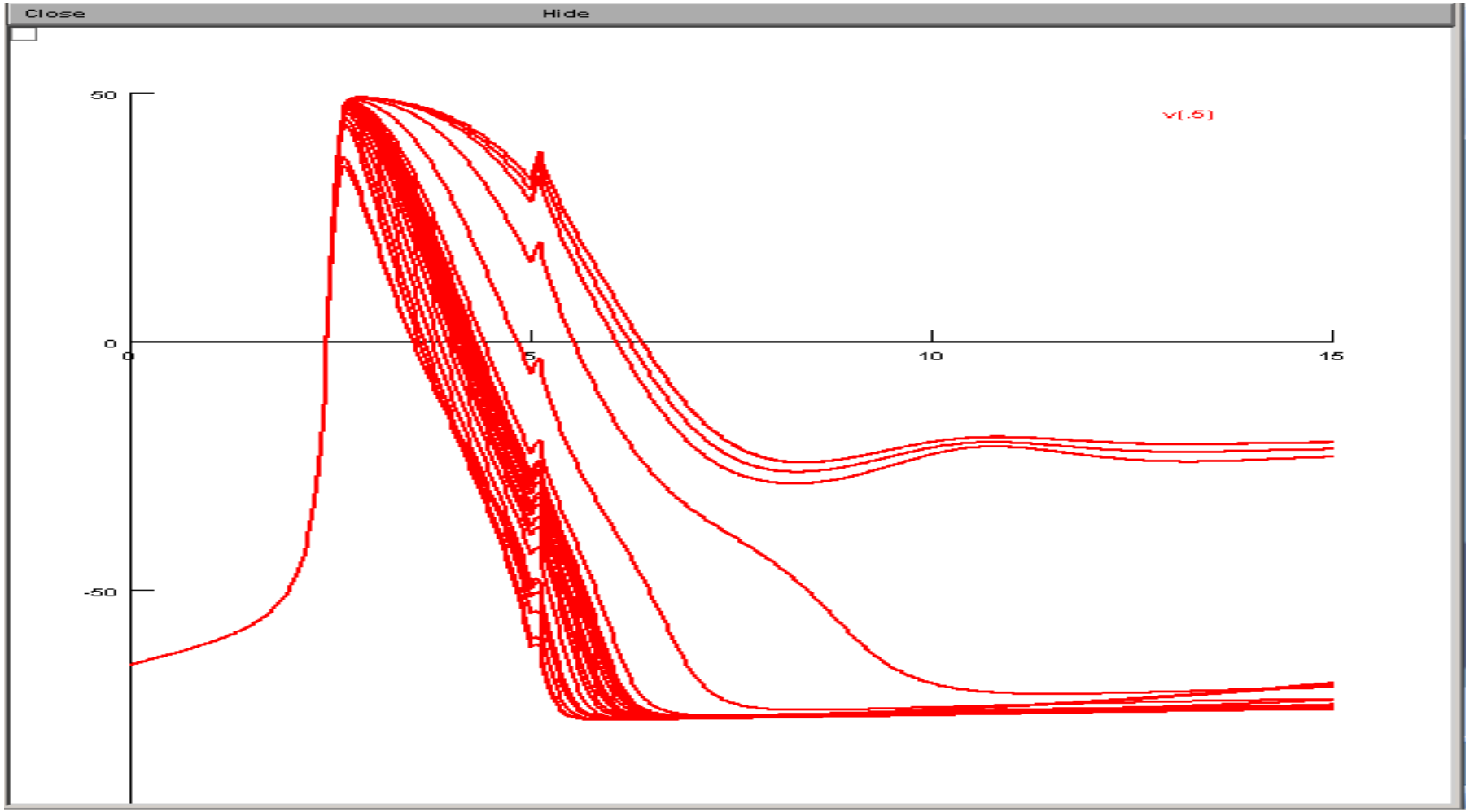
Effect of Changing inf parameters

Below is the result of changing the control point for inf from d=40 to d=-60. Two important points emerge from this. Up until d = -25, the action potential occurs at approximately the same time, with larger ‘d’s only changing the amplitude (making it larger.) After -25, the action potential occurs progressively later, until d=-50 and lower,

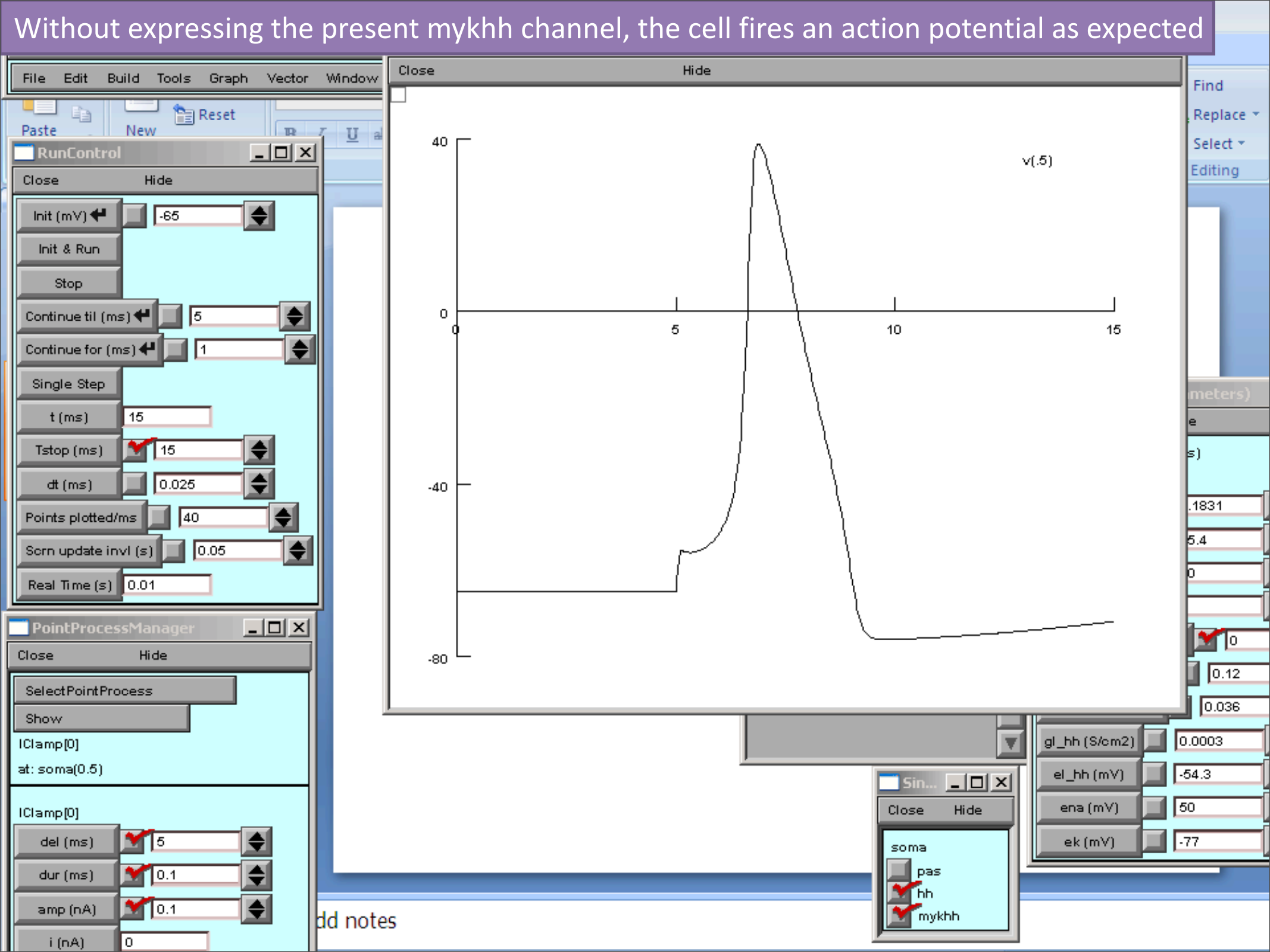


Effect of Changing tau parameters

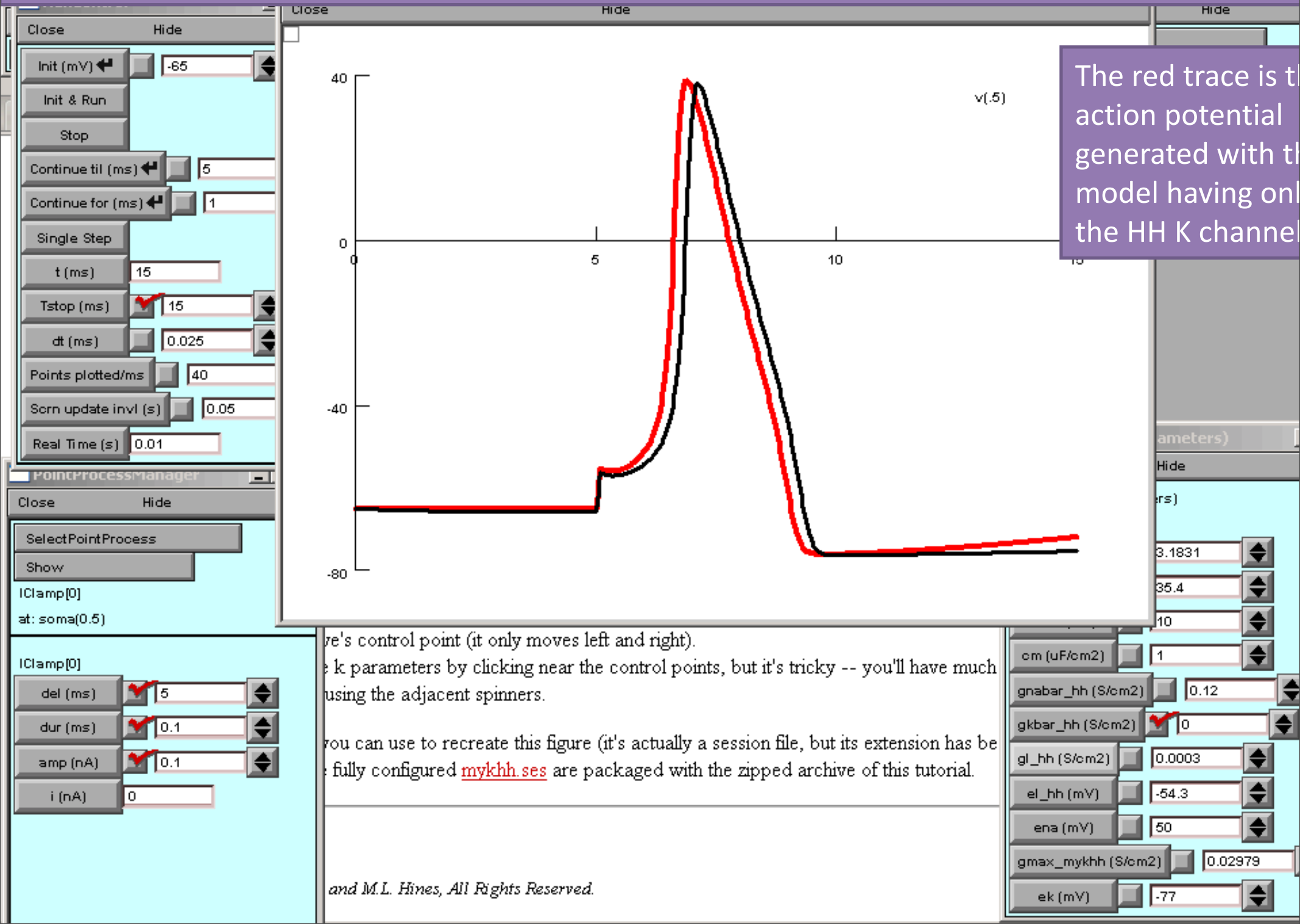
Below is the effect of manipulating the control point of tau. Beginning at 0,0, tau was first moved along the vertical access (incressing A) This resulted in successively larger action potentials. (slightly wider as well) However, as tau was moved in the positive x direction, tau(d) became significantly larger, resulting in slower termination of the action potential. Ultimately, high d values resulted in a much higher resting membrane potential.



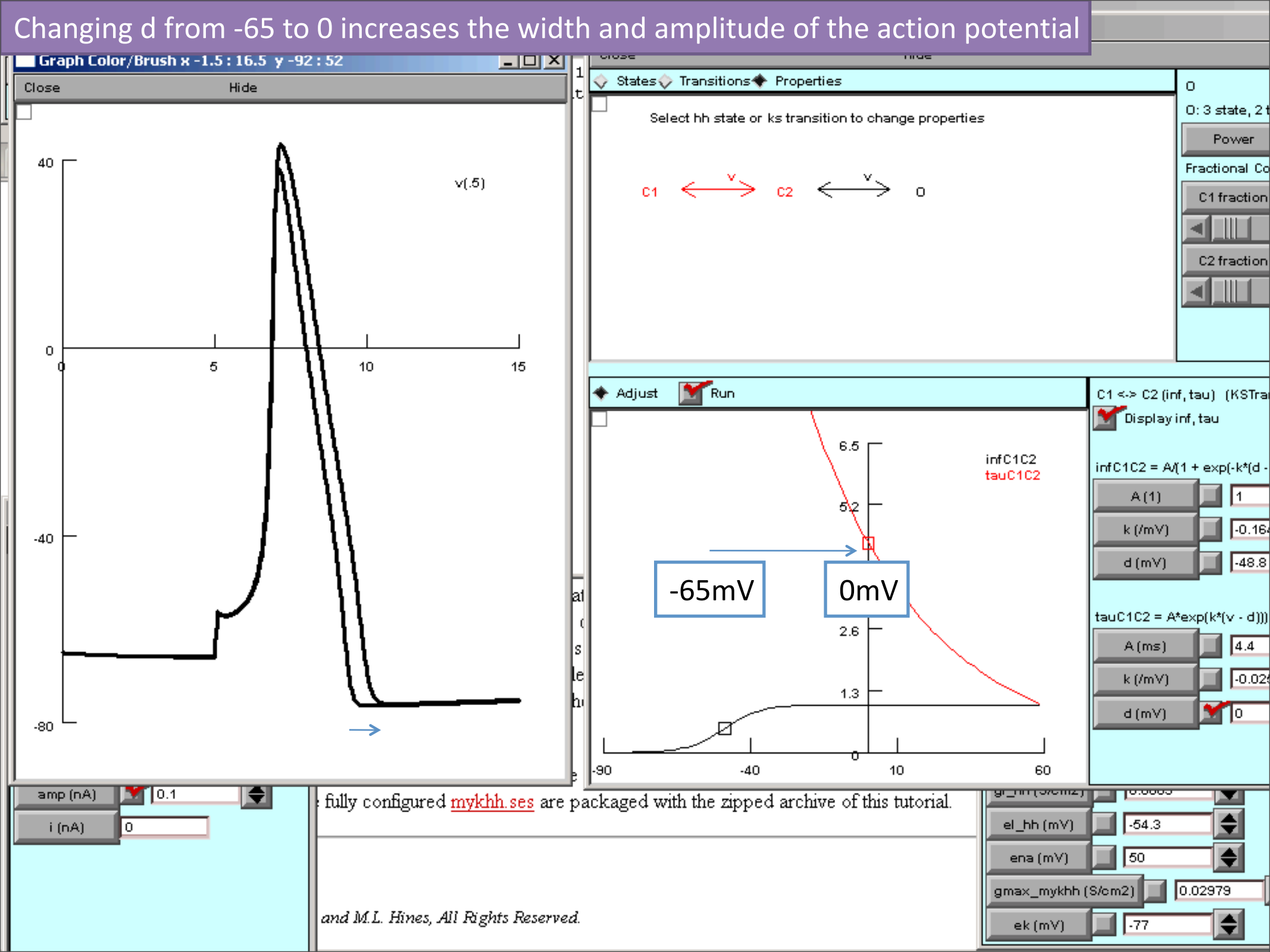
Without expressing the present mykhh channel, the cell fires an action potential as expected



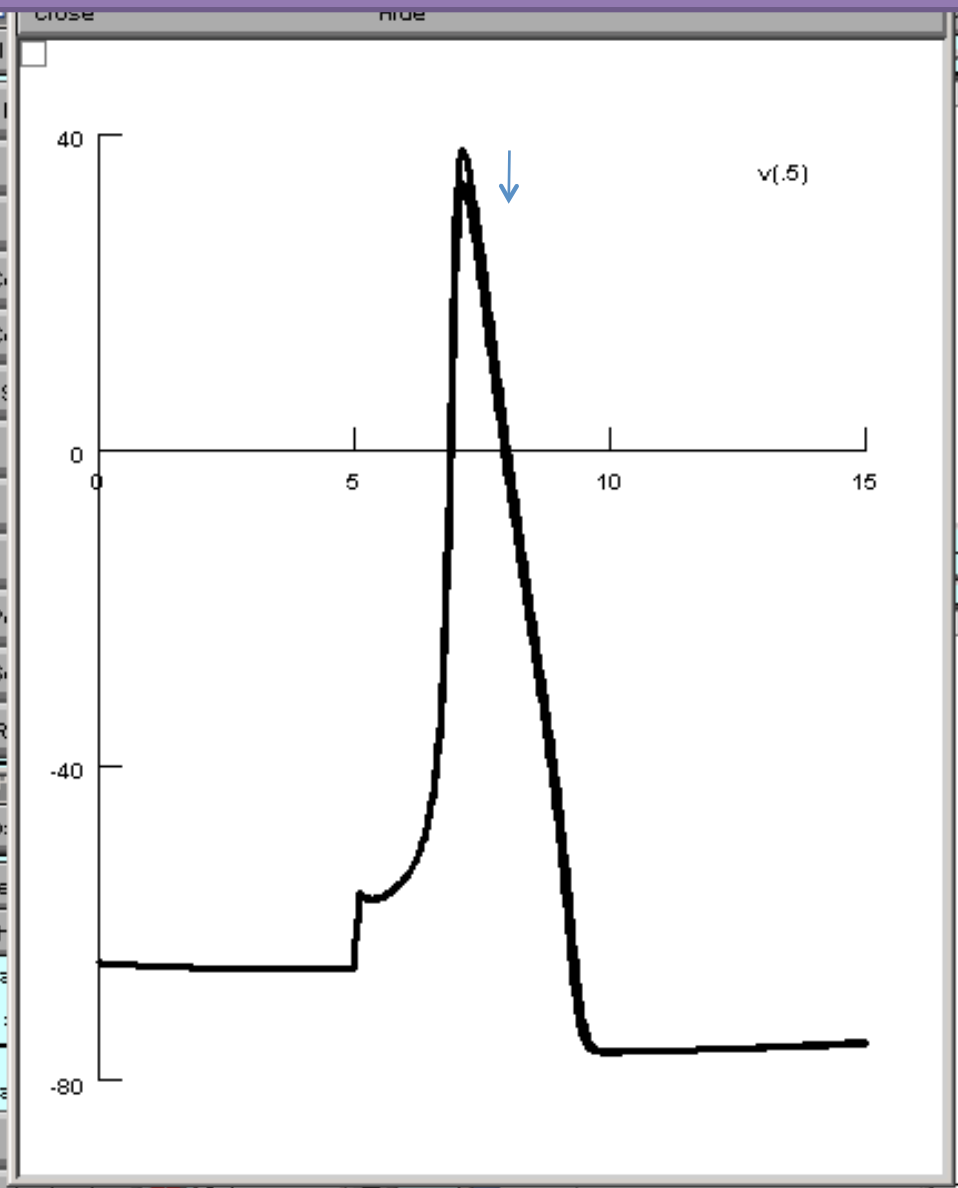
Replacing the HH K channel with my mykhh channel, the cell fires a similar action potential as exp



Changing d from -65 to 0 increases the width and amplitude of the action potential



Changing a from 4.4 to 2 decreases the amplitude of the action potential



States Transitions Properties

Select hh state or ks transition to change properties

C1 ⇄ C2 ⇄ O

O

O: 3 state, 2 t

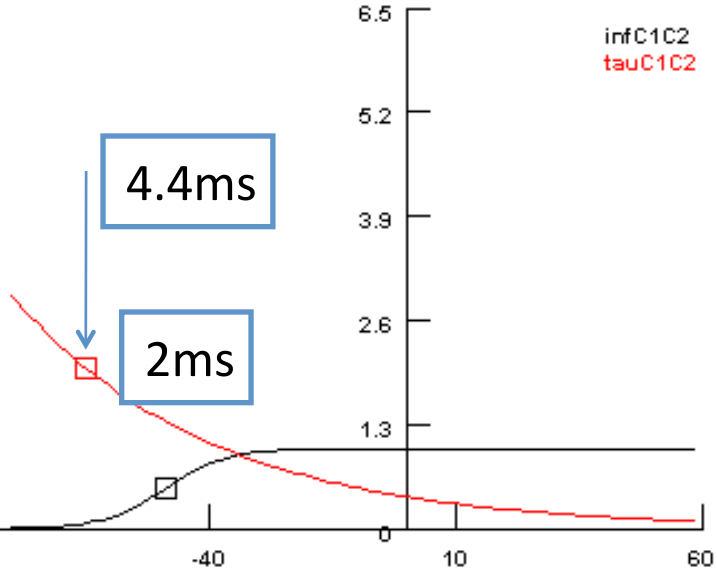
Power

Fractional Co

C1 fraction

C2 fraction

Adjust Run



C1 <-> C2 (inf, tau) (KSTra

Display inf, tau

infC1C2 = A/(1 + exp(-k*(d -

A (1) 1

k (/mV) -0.164

d (mV) -48.8

tauC1C2 = A*exp(k*(v - d)))

A (ms) 2

k (/mV) -0.02

d (mV) -65

dur (ms) 0.1

amp (nA) 0.1

i (nA) 0

el_hh (mV) -54.3

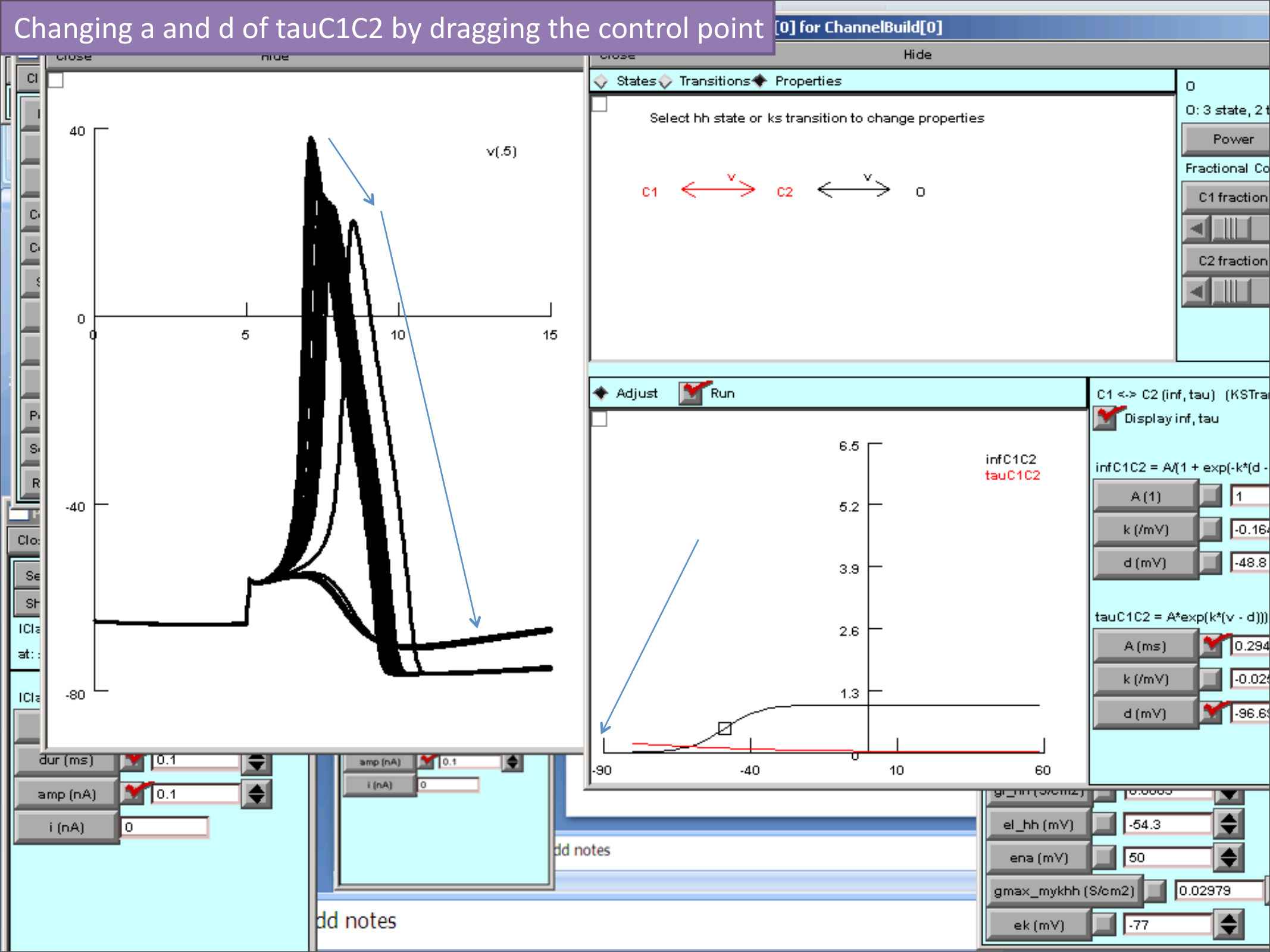
ena (mV) 50

gmax_mykhh (S/cm2) 0.02979

ek (mV) -77

dd notes

Changing a and d of tauC1C2 by dragging the control point



Changing d of infC1C2 by dragging the control point – increasing it (shifting the curve to the right) makes the depolarization and action potential occur earlier