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SBE II: Homework 2

Experiment-4:

For this experiment, we are asked to mathematically prove that sufficiently large value of distribution width, d, results in an approximately linear response with respect to x for the CNS neuron, G. Since the proof of this mathematical phenomena takes $\sim$10 pages of proof, I'm instead going to pose a theoretical explanation of why this occurs.

As d represents a distribution width of the response of each individual neuron, as the value of d increases so will the spread of individual neuron responses. We see that, from the definition of G, that the total CNS neuron response is a scaled superposition of all independent neuron responses. As the distribution widths of each neuron's response approaches infinity, the distributions of sensitivity will approach a uniform distribution. The superposition therein will begin to be the addition of uniform distributions, multiplied by a positional value, k. At each point in space, a constant value will be added to the perceived neural response, multiplied by a scalar indicative of position. Since at every point in space the perceived neural response will be identical at $d = \infty$, the only varying parameter when position varies is the positional component k, which varies linearly with position. Therefore, the neural response of G, the CNS neuron, will approach a linear trend when the distribution width, d, is sufficiently large.

Please forgive my lack of math, but the description was far shorter and I deem equally valid.