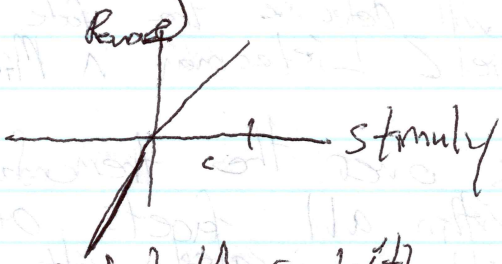
Molecule of More: How a Single Chemical in your brain Drives Love, Sex, and Creativity - and will determine the fate of the human race - Daniel Z Lieberman & Michael E. Long

This book goes over the tremendous role Dopamine has within all facets of life. Dopamine, the neurotransmitter associated with motivation, biases our brain to action. Dopamine gives you the pleasure when presented with novel positive stimulis. The basis of Dopamine comes from RPE (Reward prediction error. The amount of dopamine a certain thing gives is also predicted as a function of familiarity. As the familiarity of a thing that gives dopamine increases the amount of Dopamine released slowly tapers. The primary biological purpose of dopamine is to maximize resources that will be available to us in the future. Dopamine is the anticipation molecule. There is also the yang to the yin of the dopamine system these are the here and now molecules of serotonin, oxytocin, endorphins. These chemicals don't give us pleasure through anticipation, rather give us pleasure through sensation and emotion. These chemicals such as oxytocin and vasopressin are associated among long term relationships. The dopamine response is modelled by RPE reward prediction Error. That is the actual reward minus the expected reward, but if the negative is dominating it is weighted more heavily. That is the integral of the negative side has a more bias. This has been seen in studies such as behavioral economics where researchers such as Daniel Kahneman

elucidated such findings.



Now can model this with the following piecewise function $f(x) = \begin{cases} x & \text{if } x > 0 \\ 2x & \text{if } x < 0 \end{cases}$

Now to find the optimal stimuli level you could find the argmax of the integral of this function. Although this is much too simple of a model to use in real life as it neglects things such as upregulation and downregulation of dopamine receptors.

The author goes on to look at the role dopamine has on more large scale phenomena such as human's initial immigration from Africa, and the political leanings dopamine ridden individuals are likely to have. I'd like to end this off with the relationship between dopamine scheduling and stoicism. With stoicism you learn to try your best, but also be happy given any circumstances. There is also a built in mechanism within stoicism that will optimize happiness through reward prediction error. That is the practice of negative visualization. With this mechanism you are priming your dopamine system to be ready for a negative event, and thus maximize the positive integral of reward prediction error. As any event will be either positive or neutral.